
softtech
2023
TECHNOLOGY REPORT
ISBANK Subsidiary

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2023 TECHNOLOGY REPORT

ISBANK Subsidiary

IMPRESSUM

PREFACE

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Dear readers,

Technology is now an integral part of all human life. In today's world, where yesterday's science fiction is a reality, not only those whose business is technology but every sector has to use technology as an integral part of its business, making it essential to follow the trends that will shape the future. On this path, we aimed to present a guide to our readers from all walks of life. We are happy to say that we have prepared the Technology Report in our sixth year, as always, with great excitement. The kindness of our esteemed authors, who are experts in their fields, in contributing to our report is very valuable to us.

There is a great deal of labour and work behind our effort to place the world of the future on our radar, keeping our finger on the pulse of today as much as possible. Every year, we try to address the topics set by the agenda and shape our Report. In the 2023 Technology Report, we focus on what technologies (finance, climate and environment, people, etc.) will bring to sectors and people in times of crisis. In our report, you can find these issues under the following three headings.

Future of Technologies and Industries

- Metaverse, Virtual Reality, Augmented Reality, Crypto Assets, Quantum Computers, Artificial Intelligence, Cybersecurity, 5G, Connectivity and Communications, Fintech, Proptech, Healthtech, Insuretech and Gaming Sectors, Payment Systems, Service Banking, Digital Identity, Data, Low-Code No-Code Platforms, User Experience, Flying Vehicles, Agriculture and Biotechnology

Human, Life and Motion

- Financial, Social, and Environmental Crises and Their Impacts, Technological Changes Effects on Emotions, Technology and Art, Law in Virtual Universes, Living in Smart Cities, Sustainability, Changing Learning Habits, Working in Times of Crisis and Employee Engagement

Innovation and Entrepreneurship

- Turkey's Entrepreneurship Ecosystem, Disruptive Innovation and Organization Relationship, Crisis Periods and Radical Innovation, Product Management and Strategies, Food Sustainability and Food Entrepreneurship, Climate Environmental Entrepreneurship within Changes

Without the interest and appreciation of you, our readers, this journey would not have continued for years. We hope that we have been able to bring you a Technology Report that you will enjoy reading and enrich your knowledge in 2023.

We wish to be together for many more years.

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PREFACE

M. BÜLENT ÖZÇENGEL

Softtech
General Manager

Dear Readers,

A year full of quite special, unusual incidents and crises is now behind us. The world is currently scuffling with crises of energy and food, both of which are the essential needs of human beings. Scarce resources have always been challenging; however, we are going through the most arduous period of modern times.

The memories of the pandemic in late 2019 that shocked the whole world and were not experienced before by the modern population are still apparent. Affecting individuals and societies on multiple levels as a societal phenomenon, the pandemic has altered the way we live alongside its adverse outcomes. Our working habits have transformed in addition to shifts in our approaches, especially on employment, tourism, transportation, human resources, and human psychology.

Three years after the beginning of the pandemic, the whole world was enjoying recovery thanks to the widespread vaccination in 2022. Even China finally loosened its Zero-Covid policy last November. However, while the celebrations of the recovery from the pandemic were still ongoing, a war broke out between Russia and Ukraine, opening a new phase in the food and energy crisis and shattering the global supply chain. A food crisis, the most vital need of life, is one of the most serious challenges we must overcome. As if that was not enough, the energy crisis is gaining momentum, and energy prices are skyrocketing. The production facilities in some regions are halting their production just because they cannot find adequate energy. We have witnessed official measures for saving energy and electricity in some countries. How we will overcome the crises in energy and food supplies, the essentials in every production process, is still uncertain.

Since the beginning of the pandemic, central banks have been continuously printing money with the hope of maintaining economic vitality. However, this expansionary monetary policy has created momentum for inflation.

Another crisis we faced in 2022 was in the crypto world. We witnessed the collapse of one of the biggest cryptocurrencies in market capitalization terms and one of the largest crypto exchanges in financial terms. As a result, billions of dollars of assets literally melted overnight.

In 2022, unfortunately, we could no longer contribute to the sustainability initiatives for our planet. Climate catastrophes have continued unabated. An ice shelf spanning about 1165 square kilometres shattered off eastern Antarctica in March. This was the largest ice shelf to shatter off the continent, which has been observed by satellites for the last 50 years. In Turkey, extreme fires swallowed up 12,384 hectares of land. Dams of the country were about to run dry. Sustainability has been discussed much more than ever; however, it is questionable how many countries and organizations genuinely internalize the sustainability concept and endeavour to leave a habitable planet for future generations with sustainable ecological, economic, and social conditions.

We forgot the pandemic, during which our planet had a fresh breath, even just for a while, and we continue to consume the resources fiercely despite all the unfavourable conditions.

Expectations of crises and economic stagnation accompany us at the very start of brand-new 2023, as well. However, humanity has the power and the technologies to turn them into opportunities. We only need to use the technologies we hold in the right way and modify our approach.

We need to put a distance from “Growth is the only condition for the welfare” approach. Our societies require a change in their perspective to overcome the sustainability problem of the planet. I sincerely believe that we are able to reduce the crises’ effects on the people and planet with a balanced income distribution by moving away from the growth-focused approach and by avoiding the consumption of scarce resources. By supporting this idea, Alan Knight (founder of Singleplanetliving) says: “We have entered an era during which growth-oriented economic theories will not work anymore. We ought to revisit economics by considering low carbon emissions, zero poverty, and a planetary life we all want and need.” Similarly, Tim Jackson (Professor of Sustainable Development at the University of Surrey) says that we have no choice but to question the growth: “But question it we must. It’s failed us for all sorts of reasons. The myth of growth has failed the one billion people who still attempt to live on half the price of a cup of coffee each day. It has failed the fragile ecological systems on which we depend for survival. It has failed, spectacularly, in its own terms, to provide economic stability and secure people’s livelihoods.”

Looking ahead to 2023, it is not difficult to predict that investments in agriculture and energy will resume without slowing down. These two sectors will continue to be the areas where technology will be utilized most intensively.

Moreover, we observe that there are advancements in the Artificial intelligence front. AI has been incorporated into every aspect of our lives at full speed, including the world of art. 2023 will be the year where we will notice AI and AR/VR technologies even more. There is a probability that most organizations without an AI strategy will disappear in the near future. As Jack Soslow comments on Twitter: “In 2011, software was eating the world; in 2022, AI is eating software.

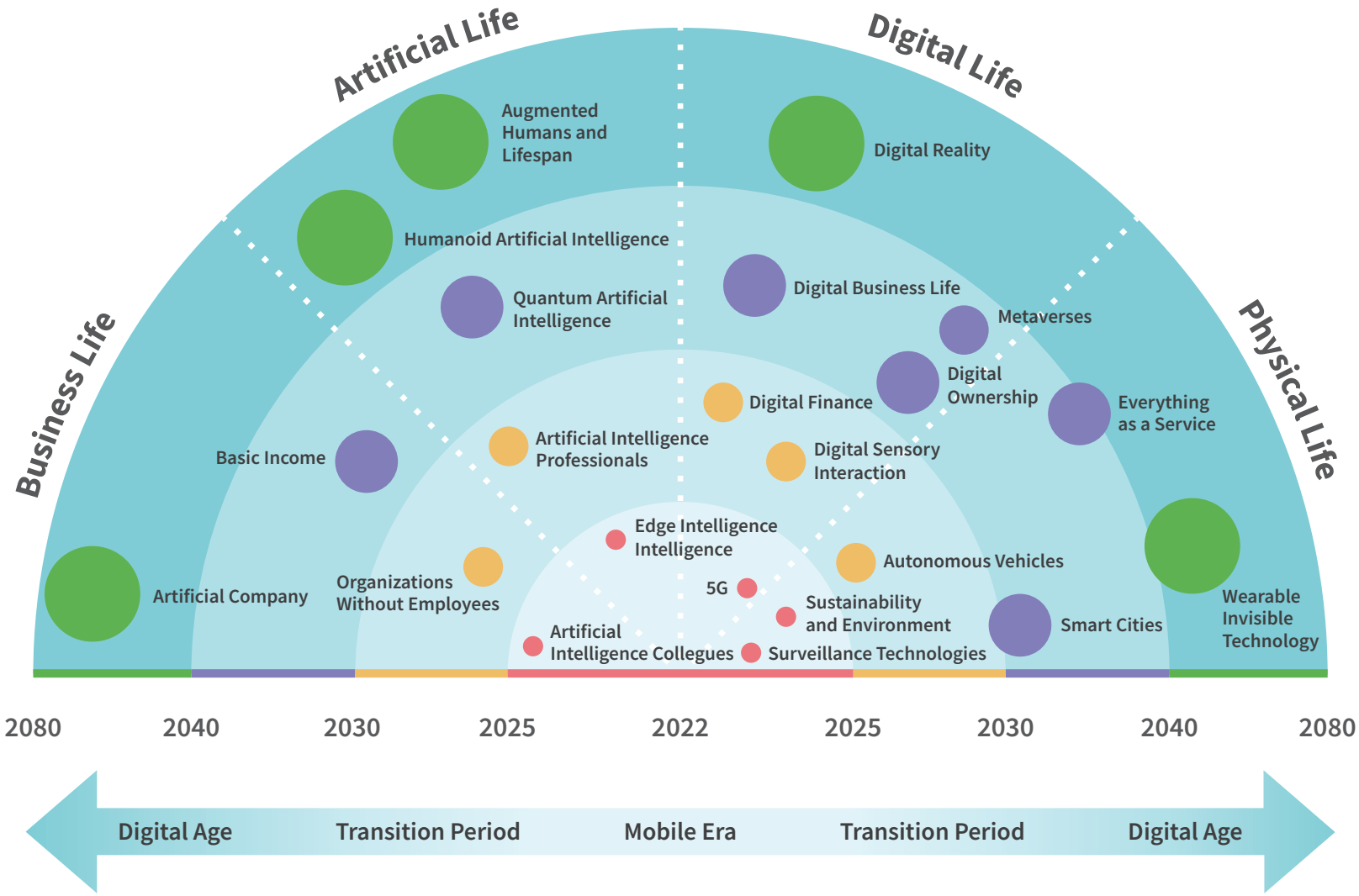
Any company without a viable AI strategy will be marginalized by the end of this decade. You'd better get ready!"

I also expect to see important steps in Central Bank Digital Currencies (CBDC). Governments have been strongly showing their intentions to compete with the cryptocurrency sector that has been developing so far. Thus, we might see a more decisive war against cryptocurrencies by using CBDCs.

It is inevitable to emphasize that fast decision-making and digital transformation are important in this context more than ever. Organizations adopting decentralization as an approach can make faster decisions during crises. Again, companies investing in technology in a period of crisis and having made progress in digital transformation can emerge stronger. What I have mentioned till now and where we have reached actually give the same message: Crises are challenging exercises in change management, and the organizations should be flexible and ready to be adaptable to successfully come out of these periods.

Despite everything, 2023 brings its own hopes. I wish that our annual Softtech Technology Report, which we proudly present to the reader, would shed light on these hopes, and I also sincerely thank our valuable authors for their shares in the report.

FUTURE OF TECHNOLOGIES AND INDUSTRIES


Artificial Life
Digital Life
Business Life
Physical Life
Augmented Humans and Lifespan
Digital Reality
Humanoid Artificial Intelligence
Quantum Artificial Intelligence
Digital Business Life
Metaverses
Digital Ownership
Digital Finance
Everything as a Service
Basic Income
Artificial Intelligence Professionals
Digital Sensory Interaction
Edge Intelligence
Intelligence
Artificial Company
Organizations Without Employees
Autonomous Vehicles
5G
Sustainability and Environment
Smart Cities
Wearable Invisible Technology
Artificial Intelligence Collegues
Surveillance Technologies
2080
2040
2030
2025
2022
2025
2030
2040
2080
Digital Age
Transition Period
Mobile Era
Transition Period
Digital Age

TECHNOLOGY RADAR AND OVERVIEW OF 2023

FATİH GÜNAYDIN

Softtech
Innovation Director

Technology Radar is one of the most important sections in the Softtech Technology Report, which we have been preparing every year since 2018 as a result of long efforts. In the Technology Radar, some of the items that have emerged as a result of our foresight and research in the past years either completely go off the radar or change place depending on the realization.

The changes in the Technology Radar as we moved from 2022 to 2023 were as follows; Remote Work, Digital Nomads, Virtual/ Digital Workspaces and Voice Assistants, which were included in the period between 2021-2024, left the radar. "Remote Working" and "Digital Nomads" have become part of the working models for companies and employees. Both the policies of companies that give the right to work remotely and the individual preferences of employees to continue their working life as a traveller in different cities and countries have become common approaches. With the proliferation of companies offering remote and hybrid working models, Virtual/Digital Workspaces have become indispensable for maintaining a collaborative work culture in harmony with remote working. The widespread use of both online meeting platforms and digital office solutions that increase the sense of coexistence, as well as collaboration tools that allow us to work together on the same subject/document/application remotely, show us that working in virtual/digital spaces has become widespread and realized. Voice Assistants are with us all the time, both in phones and apps, and with external devices, especially in homes.

Entering the Technology Radar in 2021, “Artificial Intelligence Coworkers” moved itself to an earlier date scale in the 2023 radar, moving from the Artificial Life axis to the Business Life axis. Following the developments in the last two years on “Artificial Intelligence

Coworkers", we expect this topic to be widespread by 2025. ChatGPT, which uses the pre-trained generative language model technology, which we had the opportunity to get to know closely with the GPT-3 Hackathon, a first in Turkey, which we held at Softtech in 2021, and which was announced on the days when we were doing the final checks of Technology Report 2023, once again showed that artificial intelligence could be a colleague that can help us for many jobs and undertake many jobs.

The new topic on the Technology Radar this year was Digital Finance. Considering the words that make up the concept, it doesn't sound like a new thing, and innovations in financial technologies can be thought of as not very new either. However, "Digital Finance" is an umbrella concept that includes many of the topics in the "Financial Technologies" section, which we have treated as a separate category in the past years. Concepts such as Central Bank Digital Currencies (CBDC), Cashless Society, Open Finance and Open Banking Services, Crypto Banking Services, Payment Technologies and Banking Everywhere make up Digital Finance. The spread of all these concepts will mean realising Digital Finance. For example, the Digital Euro is one of the most emphasized and prominent issues within the Digital Finance program run by the European Commission.

What awaits us in 2023?

While preparing the Softtech Technology Report, we try to tell a story from the first chapter to the last article of our guest authors every year, and we take care to stay within a theme. While evaluating the last periods of 2022 and the year 2023, we took the financial, humanitarian and social, climatic and environmental crises experienced around the world into our centre. We tried to find the answers to which technology will be positioned in this ecosystem, how society and individuals will be affected, and whether innovations will save us from these crises.

Benefits of Digital Euro
Source: https://www.ecb.europa.eu/euro/html/digitaleuro-report.en.html

Particularly in 2023, the topics that continue to remain on our agenda from the previous year and that will increase their impact are as follows:

Artificial Intelligence and Human-Artificial Intelligence Collaboration at Businesses

Artificial Intelligence is a technology that has been studied a lot in the past years, trying to learn the information we have and make it usable. Now the situation is changing, these studies have started to give results, and products and services supported by artificial intelligence have started to become widespread, both on the corporate and end-user sides. Now we are seeing AI solutions that work with no-code drag-and-drop so that organizations can easily integrate these solutions into their products and processes. From

retail applications where the heart of consumer shopping beats to automation technologies, there will be no area where artificial intelligence will skip.

However, artificial intelligence solutions that understand your language and interact with you, such as chatGPT, which we mentioned previously, have brought the question and concern of "will artificial intelligence take away our jobs?" to the minds of people from many sectors. While this seems inevitable for some sectors, it also creates the need for a new kind of competency.

Although we cannot name the profession today, "generalists" who can communicate correctly with artificial intelligence, understand its working dynamics and language, and have a certain level of knowledge in many different fields that can make the right directions in the right context may have the opportunity to gain a new profession and income by using artificial intelligence. For example, someone who is not a writer today can write a children's book with artificial intelligence if they are aware of the narrative techniques used in children's books and have read enough books in the relevant field to give examples from a few authors whose style they like, and is aware of being able to convey instructions to artificial intelligence about paying attention to pedagogy. Moreover, they can also have the illustrations drawn for the book. For example, if they follow Rafael Mayani or Camila Nogueira, then they know about texture&brush or retrowave movements, know perspective enough to describe what kind of visuals they want in which angle, and is competent enough to give details of what kind of character and environment they want on which page, they can complete all drawing processes with an artificial intelligence tool that can produce visuals such as Dall-e or Midjourney and make their book suitable for printing. This person is neither a writer, an illustrator, a photographer, nor a graphic designer. But they are aware and knowledgeable enough about the sub-branches to know how to describe a job. This is a real example and the specialization of using AI is already creating its own market. Many people working as "Gig-Workers" are able to generate output with artificial intelligence and earn income by taking such jobs from freelance work platforms.

Of course, having artificial intelligence produce new works in this way, inspired by the existing works and styles of the artists, brings with it some ethical discussions. In the coming years, "Artificial Intelligence Ethics" will be one of the most debated issues regarding the delivery of products and services using artificial intelligence.

As experienced in previous eras of history, we are at the beginning of a transition period, and while some jobs are disappearing, new jobs will inevitably emerge for those who can adapt to new technologies. Human beings are beginning to change how they work by collaborating meaningfully with AI.

Metaverse, Blockchain, Augmented and Virtual Reality

In 2022, one of the most talked about concepts worldwide was undoubtedly the Metaverse. However, in the second half of the year, especially with the losses in cryptocurrencies, it lost a significant number of people who embraced it in its early days and became a concept that everyone tried to use as a marketing tool and remained on the agenda of only those organisations that really want to take part in this field in the future and invest in its technology. In this context, in 2023, Metaverse will be a subject where large companies

Current and Expected Use of Artificial Intelligence in Specific Business Functions at Their Companies, According to Executives Worldwide, June 2022
% of respondents

	Not applicable	Trials in progress	Limited area of use	Wide range of uses	AI is critical
Current Utilization Rate					
IT	2%	9%	22%	47%	20%
Supply chain/production	6%	16%	32%	34%	11%
Product development	6%	17%	42%	23%	11%
HR	4%	19%	42%	23%	10%
Finance	6%	19%	42%	23%	10%
Marketing and advertising	4%	34%	37%	20%	5%
Sales	4%	26%	46%	20%	3%
Expected Utilization Rate for 2025					
IT	2%	9%	17%	22%	49%
Finance	3%	10%	22%	21%	43%
Supply chain/production	4%	8%	18%	30%	38%
HR	3%	11%	19%	39%	27%
Sales	2%	12%	26%	37%	24%
Product development	2%	13%	18%	46%	21%
Marketing and advertising	3%	12%	21%	44%	20%

Note: The number of senior positions in technology = 600; "not applicable/not sure" responses not shown; numbers may not add up to 100% due to rounding.
Source: MIT Technology Review Insights, "CIO Vision 2025: Bridging the Gap Between BI and AI," sponsored by Databricks, September 20, 2022

Source: https://www.insiderintelligence.com/chart/259261/current-vs-expected-adoption-of-ai-within-select-job-functions-their-company-according-executives-worldwide-june-2022-of-respondents

from many different sectors, such as banking and finance, media, entertainment, and education, over a certain scale, as well as institutions producing technology in this field, will continue to invest. As Digital Twin applications continue to become widespread, especially in the manufacturing sector, these studies will provide an essential infrastructure for Metaverse applications in the future. Of course, all this does not mean that in 2023 we will live in a digital reality that works completely end-to-end.

Metaverse, in which we can say that the Internet can be a 3D experience layer, actually suffers from the disadvantage of having made a significant impact at a very early stage and is going through a process similar to the spread of the Internet in the early 1990s. Likewise, the concept of "Augmented Reality", one of the important pillars that will form the Metaverse, together with Virtual Reality, entered the literature as a term with Thomas Caudell in 1990 but did not reach wide audiences until Niantic published the Pokemon Go game in 2016. The Metaverse will also wait for its own "Pokemon Go" moment, but the exponential speed of development of technology may not leave it as far away as it was in the past.

	Metaverse	Web3
Evolution	From computers to smartphones, augmented glasses and headsets	The journey from web 1.0 (reading) to web 2.0 (reading and writing) and to web3 (reading, writing and owning)
Basic principle	Immersive and virtual world	Decentralization, insecure environment
Key technologies	Augmented, mixed and virtual reality	Blockchain, crypto assets (NFT, DAO...)
Competitive environment	Corporate organisations and the siloed/differentiated metaverse	Authorised users instead of legal entities where no one is predominant

[3]

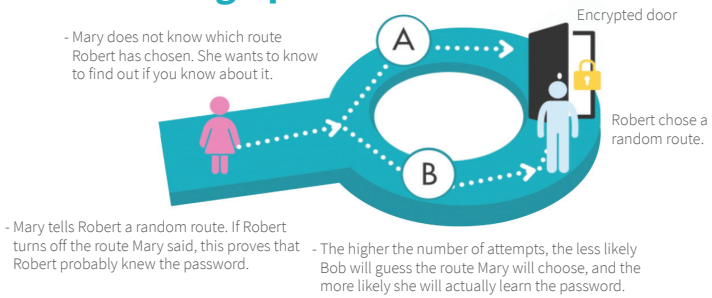
Source: https://www.eiu.com/n/campaigns/telecoms-in-2023/

From a blockchain perspective, 2023 will be a year in which more corporate use cases and scenarios will be tested. Institutions experimenting on the Metaverse side will try to integrate blockchain

technology and web3 applications into their platforms, and NFTs will increase their use in areas such as loyalty programs, ticketing and subscriptions. The use of the web3 approach in the field of loyalty and rewards, which Starbucks called the "Starbucks Odyssey" experience, was an important pioneer for corporate examples that could emerge in the new year.

One of the important issues that will stand out in 2023 on the technology side of Blockchain is "Zero-knowledge Proof (ZKP)". ZKP is based on a paper published at MIT in 1989 and allows you to prove that you know a piece of information without giving it to the other party. It can be used to eliminate the risk that anonymity can be deciphered in public networks, especially in ensuring data privacy. To give another real-life example, during a loan application, it makes it possible to prove to the bank that you receive a salary at the income level expected by the bank, without giving the bank your actual salary information. In the next step of this technology, with Zero-knowledge Machine Learning, various artificial intelligence models can be developed with data that can be proved to be completely real but whose anonymity is preserved.

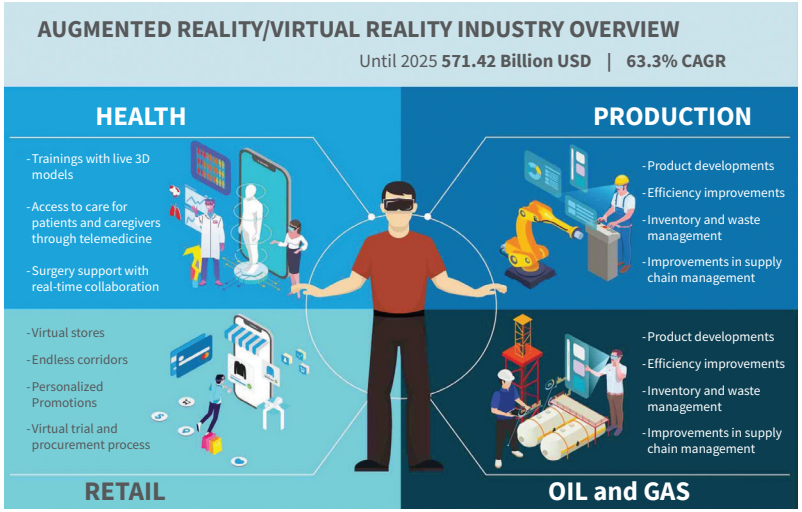
Zero knowledge proof



Source: https://www.mangrovia.solutions/en/zero-knowledge-proof-how-it-works-and-why-its-important/

On the Virtual Reality (VR) and Augmented Reality (AR) side, significant breakthroughs took place in 2022 with the Metaverse effect. Of course, VR/AR is not limited to the Metaverse, but since Google Glass, which Google released in 2013 and could not become widespread, there has not been AR hardware that can enter the daily life of the end user. In 2023, manufacturers such as Meta, Microsoft and Pico will try to improve the experience on the end user side. Still, commercial growth and expansion of usage areas will occur in the corporate market.

Virtual Reality equipment will be able to provide the opportunity to change the reality we are in with approaches such as Metaverse in the longer term, but in the first stage, Augmented Reality equipment, which will create a complementary experience over the assets around us in the real world, will be faster to spread on the end user side. In the field of VR, immersive VR applications that focus on



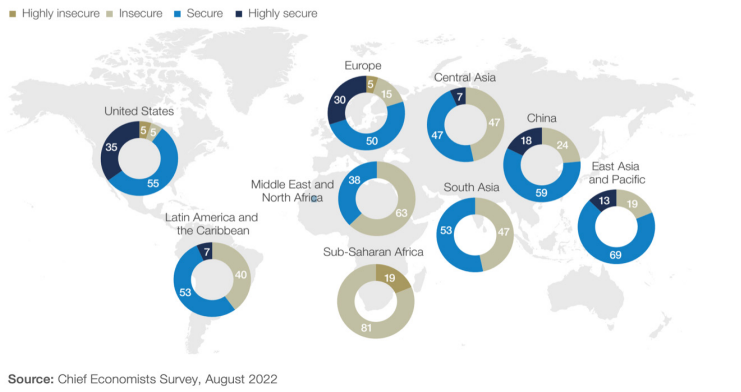
Source: https://services.harman.com/blogs/leveraging-ar-and-vr-to-drive-seamless-customer-experience-across-industries

the feeling of being physically present in non-physical spaces with your real identity rather than with avatars will also be among the prominent issues.

Sustainability, Energy and Food

Climate change and its negative effects are making themselves more and more evident with each passing day. In December 2022, when we made the final touches to the Technology Report, it was possible to see news from almost every city in our country that a lake or dam was in danger of drying up completely. At the same time, geopolitical tensions and ongoing wars mean that many countries face significant challenges in accessing food and energy. More than ever, the world needs to focus on both sustainable food production and consumption and green energy.

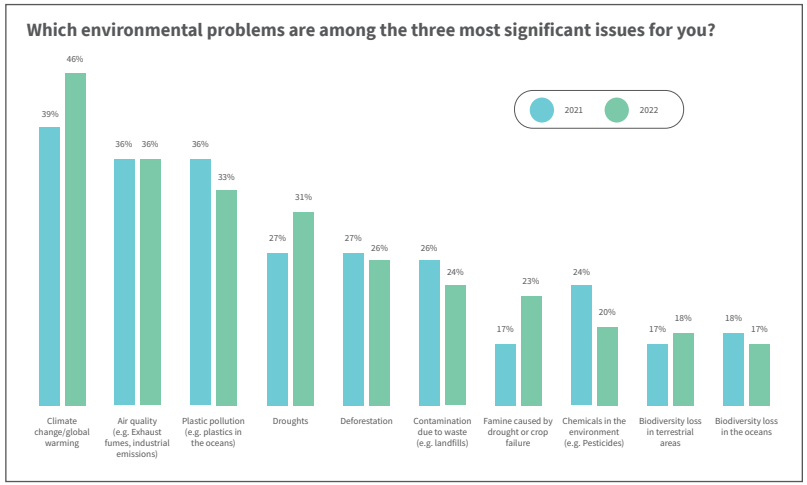
Figure 8. Food security
What is your expectation for food security in the following geographies over the next three years?



Source: Chief Economists Survey, August 2022

Source: https://www3.weforum.org/docs/WEF_Chief_Economists_Outlook_2022.pdf

However, while awareness of sustainability is high among organizations and individuals, there is a gap between awareness and action. At this point, the fact that some institutions use the concept of sustainability only as a marketing tool and turn it into greenwashing and the difference between rhetoric and action draws a lot of reaction. In 2023, organizations are expected to make more sustainability-oriented investments and take more steps towards action.

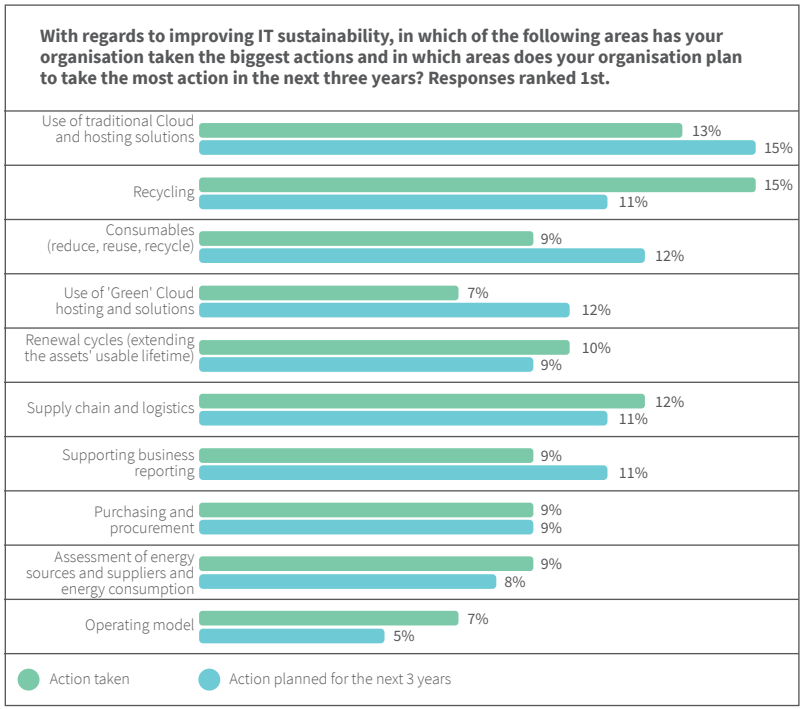


Source: https://www.nourish.marketing/trend-report

The use of technology and innovations are critical for companies pursuing certain goals from a sustainability perspective, such as net zero carbon. However, the sustainability-related moves of organizations on the information technology side have difficulty going beyond migration to cloud computing. At this point, the collaboration between IT and the roles that carry out the sustainability strategy of the organization gains critical importance. IT sustainability must also be prioritized in order for organizations to operate their overall sustainability policies.

On the other hand, organizations should consider sustainability a parameter when developing new products or services beyond transforming their existing processes and practices. Structuring new

or improved products or services to provide positive environmental and social impact in addition to economic benefits will close the gap between the awareness and behaviour of institutions and individuals regarding sustainability and turn the relevant product or service into a reason for preference.

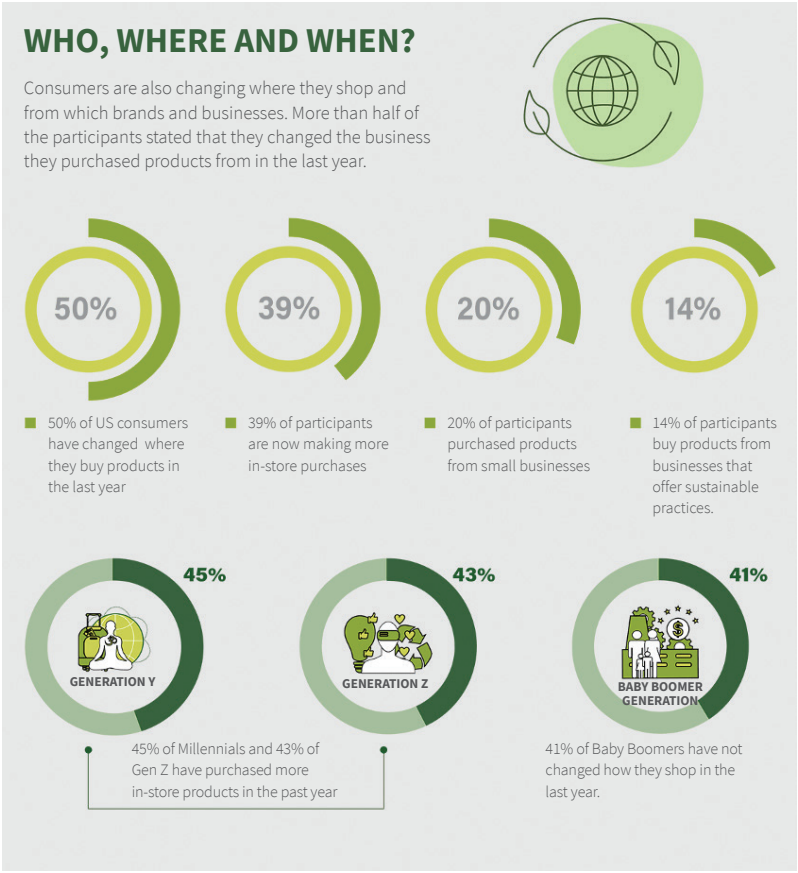


Experience in Every Field, Communication and Industries

2023 will be a year in which economic pressure will continue to be felt on the consumer side on a global scale. This will affect consumer habits and, therefore, the strategies of all organizations that offer products and services to end users. With increasing price sensitivity, consumption habits are likely to change, and brand loyalty is likely to change in proportion to price. While research shows that spending budgets can be cut, especially in food, entertainment and travel, 38% of consumers say they will cut this budget from wasteful and show-off products, and 30% say they will prefer cheaper brands. In such a period, organisations can find a way out by focusing on how they can differentiate their services by improving the experience as well as campaigns and discounts.

On the other hand, no matter how challenging the economic conditions are, social media and the influencer ecosystem are the most important communication channels that can turn into purchases and drive offline action. This can be possible by individual interaction and trust. The issue of offline action and purchasing opens a different window; the perception that physical shopping would be entirely replaced by e-commerce during the pandemic period showed that this would not be the case, with e-commerce volumes slowing down in 2022. Consumers' demand for physical stores has increased. In the coming period, both retail stores in the classical sense will continue to maintain their importance, and the "Experience Store" concept will become widespread.

On the other hand, for a single item purchased via e-commerce, to give an example from our country, it is not very environmentally friendly if it comes from Gaziantep to Istanbul via cargo and the buyer orders regardless of the seller's location. In this context, there are some options that e-commerce companies are trying to implement; to carry out a neutralising activity for each order by matching it with the order, packaging with recyclable materials, operating a model that can be ordered from the nearest local sellers for products, or creating shipping alternatives that will generate less carbon emissions through local warehouses.



Source: https://www.cgsinc.com/en/resources/interest-sustainability-surges-consumer-products

Going back to the social media and communication side, we will see more decentralised social networking apps positioned as alternatives to Twitter, some of which we have already seen some trials. The fact that users, who are both producers and consumers in social networks, can share the cake among themselves instead of leaving it to large companies, and more importantly, that the communities have a say in matters such as what can be published and what will be censored instead of the control of the platform by a particular company, may increase the orientation towards decentralized social networks. Apps like Mastodon and Steemit have already reached millions of users. Decentralized social networks, which are also trying to establish their financial ecosystem with blockchain, NFT and cryptocurrencies, may not reach a point where they will dominate the market in 2023. Still, they will continue to develop as an area where big players will have to pay attention.

In the Technology Report 2023, we tried to shed light on the future of sectors such as Banking and Fintech, Proptech, Healthtech, Insuretech, Gaming, Transportation, Agriculture and Food, as well as technological developments, with the contributions of our esteemed guest writers.

In addition to these, we examine our human problems, our happiness and the changes we experience, as well as how technology affects us in this process, in the "Human, Life and Motion" section. “Motion”, in philosophy, means the transition from one state of mind to another, the beginning of a thought process, movement and change of state in time. The developments that we sometimes follow with concern and anxiety, and sometimes the technological transformations that take place in the middle of our lives, make us feel that we are in a state of motion. I hope you enjoy reading the content in this

section as much as we do.

In our last section, we discuss Innovation, which is the most important way to build our future and development and which should be performed with great discipline. Are there solutions that will take us out of the financial crisis periods through innovation? What about solutions to environmental and sustainability problems? Again, we are looking for answers to these questions and more with our esteemed guest authors.

Enjoy your read!

Resources

[1]*https://people.csail.mit.edu/silvio/Selected%20Scientific%20Papers/Proof%20Systems/The_Knowledge_Complexity_Of_Interactive_Proof_Systems.pdf*

[2]*https://www.vericast.com/insights/report/14-trends-that-will-define-marketing-in-2023/*

DEEP WAVES IN TECHNOLOGY

AKAN ABDULA

FutureBright Group
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Global inflation will continue to increase at an accelerating pace. Problems in food security, rising commodity prices, supply constraints in some sectors, especially energy, and rising transportation costs will continue to increase producer and consumer costs. When we look at the inflation figures, high inflation is permanent in developing countries, including Turkey.

What we have to take into account lately is what the PMI, the producer index, tells us. This index shows us that the raw material we need to produce will take longer to arrive in our country than in developed countries. Therefore, it is evident that Turkey has a sustainable economy problem, as in the rest of the world. Especially the problems in the supply chains will form the basis of the sustainability problems we experience.

When we look at the economic contraction, we can see that so far, on average, 69% of society has been severely affected. There is a decline in the purchasing power of 69% of the society.

How does the economic contraction and financial crisis affect consumption.

Let me tell you how retail customers are clustered.

Despite all these uncertainties, the largest cluster is still Experience Explorers. The average size for this group is 34%. If we define experience explorers in one sentence, "I forget what they say and what they do, but I never forget how they make me feel".

The second cluster is The Crafty Mukhtars. The size of this cluster is 30%. Their biggest problem is knowing, knowing more, and knowing the most. What would be the sentence that would describe them? The most important station of wisdom is to know more.

The third cluster is The Alchemists of the Delusional. Here, what we mean is housewives. They became alchemists because they have less magic power. And they have to manage the kitchen of the house with alchemy. This audience is 19%, and their motto is "I mix everything, transform it big time and create incredible value".

The fourth cluster **Hedonists.** Their size is 8%. As the name suggests, this cluster's greatest demand is pleasure. New pleasures, new tastes, new smells, etc.

The fifth mass **Sophisticated Pedants.** Size 5%. They seek elegance. They say: "Elegance is synonymous with friendliness, balance and harmony".

And the sixth cluster is Technological Smarty Pants. For them, anything they discover in technology is very important and nothing short of magic. Their size is 5%.

In 2023, brand-new technology models will work in these clusters:

- **Freemiums, i.e. products they can access for free and services. Technological innovation, starting with free offers products, will continue to rise.**
- **New subscription systems and technologies in Turkey will continue to rise.**
- **Marketplaces will continue to be popular.**
- **Demand for sharing and collaboration technologies will increase.**

Another emerging trend is premium consumer experience technologies. Despite all the general decline in purchasing power, there are those who have seriously increased their purchasing power, and these segments will seek a more premium experience to feel that their standards have risen.

More attention will be paid to brands that transform into technology ecosystems. For example, let's take Nike. It has already turned into an ecosystem brand with running technologies.

On the other hand, in the next decade, some of the deep waves in Turkey will cause other, larger shifts in technological needs.

We will continue to urbanize very rapidly. The country will be 90 million, and 75% of these 90 million will live in fifteen mega cities. Today, 70% of our country already lives in big cities. But in ten years these big cities will turn into megacities. This means an even more

digitized consumer base. Therefore, the fact that 40% of Turkey does not use any banking products, which is the reality of today, will change the situation very quickly. Fintech brands will rise.

The growing population, the population flowing to the metropolitan cities and the transformation of metropolitan cities into megacities will further increase the sustainability problems. As the number of people who need to be fed increases, the number of farmers to feed them will continue to decrease. Our problems about agriculture will increase. We will need to solve agricultural problems with technology that we cannot solve with human power. The next decade will be a decade where we talk about agricultural technologies.

As internal migration continues, family typologies will continue to change. Turkey will rapidly move from the concept of the extended family, which today is only 14%, to the micro family. Prices per square meter in mega cities are very expensive and, therefore not suitable for a large family. This will take Turkey from a collective culture to an individual culture. Collective technological product needs will evolve into individual technological product needs.

This phenomenon of internal migration and megacities also means fewer children and an acceleration of Turkey's ageing. The aging process in Turkey started in 2012 and will be completed in 2039. We will experience this change in 27 years. Let's look at France for reference. France has aged in 115 years. Therefore, Turkey is one of the fastest ageing countries in the world. This will push us from talking about technologies for young people to talking about technological needs for middle-aged people. We urgently need to stop thinking only of young people when we talk about technology.

Let's get to middle age...

Turkey lives to an average age of 78, but lives well until 58. There is a big difference of 20 years. It is unclear whether we are living the last 20 years of our lives. And the middle age group went through the Covid process very traumatic way. Health concerns were very high.

This middle age will turn to health technologies with the impact of this trauma. Health technologies will gain great momentum in Turkey.

Finally, let me return to sustainability issues in Turkey and conclude by touching on their relationship with technology.

Prior to Covid, the rate of those who gave importance to sustainability in Turkey was only 1.5%. It went up to 48% during Covid. After Covid, with economic problems, it went up to 78%.

Of course, people don't call it sustainability. In Turkey, people understand sustainability by saying it is important for the homeland to be self-sufficient. I like it better this way. How simple and how beautiful. Sustainability is the homeland for our people.

So what do they care about when it comes to sustainability? The first issue is our water. Technologies related to water use will be in vogue. The second issue is energy. Our energy consumption will increase by 40% in the next 10 years. We will talk about energy technologies. The third issue is health. We have more important issues than the pandemic. Heart attacks, blood pressure and obesity. 30% of Turkey is obese today.

As I conclude my article, let me make a disclaimer here because it may all seem a bit dystopian. And so it is. There is a lot of tension in Turkey, but we should not forget that this also means that there will be a lot of opportunities for technology and tech entrepreneurs.

In this period, we will talk about technologies and technology brains that understand these tensions and take steps to address them.

IS METAVERSE IN THE FUTURE?

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What is Metaverse?

The concept of the Metaverse has made a rapid entry into our lives in recent years as a prediction of how information exchange and communication between internet users will be in the future. Some equated it with the discovery of the internet, while others saw it as a game. Some expect this concept to bring about the most significant change in human history, and others expect it to fade into oblivion. In this article, I have tried to compile up-to-date information for you, our esteemed readers, about the studies carried out to predict whether new technologies, projects or platforms created around the concept of Metaverse will benefit or harm humanity. I will try to discuss what the Metaverse means for young people belonging to Generation Z, what awaits us in the future and what this concept will bring us in the near future.

Let's start with the question "What is the Metaverse?". The first sentence that greets us when we open Wikipedia is: "The Metaverse, or virtual universe in Turkish, is a hypothetical iteration of the Internet that supports persistent, online, 3D virtual environments through virtual and augmented reality devices, as well as traditional personal computers." I don't think this is a statement about what the Metaverse is now, but what it wants to be. The biggest reason for me to think about this is that the concept of the Metaverse has always defined the future of the internet, the coming together of 3D worlds, a universe where people can meet, do things and socialize. So why can't I answer someone who asks me right now, "There is such a thing as the Metaverse; what is it good for?" with the present tense? Let's clarify this together.

What Does Metaverse Do?

Most of us met the remote working model instead of physically going to the office/work during the pandemic period. In fact, we have seen

that things work without actually having to go to the office and that, for some positions, not going to the office produces more effective results. We have witnessed that distance education is a blessing for some students and a nightmare for others.

In the banking sector, we have experienced how mobile applications and internet banking will play a critical role in the future instead of physical branches. We realized that with video calls, doctor's examinations can be done quickly, that we can attend trials from wherever we are without going to courtrooms, and how much unnecessary energy resources and time we actually waste on transportation. And if the pandemic had not happened, would we have been able to reach these awarenesses?

Times have changed. Some giant companies are powered by people and have R&D teams working day and night for similar use cases. International companies are researching the future for humanity and investing heavily in pioneering technologies such as mobile gaming, the Metaverse, artificial intelligence and blockchain. These emerging concepts and technological infrastructures can increase inequality and conflict between countries/societies, or they can be used to create a more egalitarian and brighter future. This will again be determined by the human factor.

History of the Concept

The concept of the Metaverse actually dates back to 1992 but resurfaced in 2021 when Mark Zuckerberg rebranded Facebook and other platforms under the Meta name.

The idea of the necessity of a digital universe where users can take on a completely different identity/appearance, interact easily with other users, and the transactions you make will not be deleted each time you log out, have been around for a long time. Although it was first mentioned in writing in 1992 in the science-fiction novel "Snow Crash" and was aimed to be created by some game developers in the following years, a tangible product could not emerge due to harmful user activities and was shelved. When it was tried again in the early 2000s, developers realised that faster data streams and incredibly large amounts of data needed to be kept in order to provide multi-player environments and had to return to R&D studies to develop scalable systems. Technology inadequacies, especially in video games, hardware and social media, have been an insurmountable obstacle for many companies. Today, Mark Zuckerberg, one of those who think that technology has reached the necessary level, has managed to bring the work around the concept of Metaverse back to the forefront - albeit for a short time - with his launch.

Meta

Meta, formerly known as Facebook, is a social media and media conglomerate based in California, United States. Founded by Mark Zuckerberg and his partners, the company has quickly become one of the most valuable companies in the world.

The company's product portfolio includes social media platforms, messaging applications, database products, virtual reality glasses and many next-generation technology tools.

Zuckerberg, who displays a calmer profile than Elon Musk, Jeff Bezos and similar billionaires who are active in the public eye, is known for his robot-like behaviour in front of the camera. He is red-green colorblind and values his privacy. He also bought the houses next to his house just for this purpose. Zuckerberg speaks fluent Chinese and is also the owner of 23 patents.

Image 1: Zuckerberg in the courtroom

Source: https://mashable.com/article/mark-zuckerberg-android-phones-after-apple-ceo-tim-cook-criticism

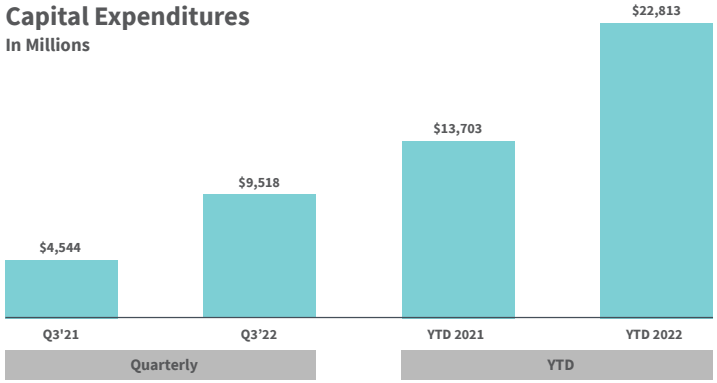
Did Meta come from Metaverse or Metaverse from Meta?

When we analyze the name change process, we can see that this change was a strategic move. We can say that Mark Zuckerberg's ultimate goal is not the current conjuncture, but to foresee that the future of humanity will be shaped around the concept of Metaverse and to invest and shape the future accordingly. Just as we still ask, "Do you have Kleenex?" when asking for a tissue today, it seems that Facebook (now Meta) is doing its best to make Metaverse the first company that comes to mind in the future.

Did it work?

I think the best way to predict how a company will do in the future is to examine its investments, the deals it has made, the steps it has taken, and most importantly, its pricing on the stock exchange. Especially when we look at the share pricing between the beginning of the pandemic period and the month of this writing (October 2022), we can say that things are not going very well.

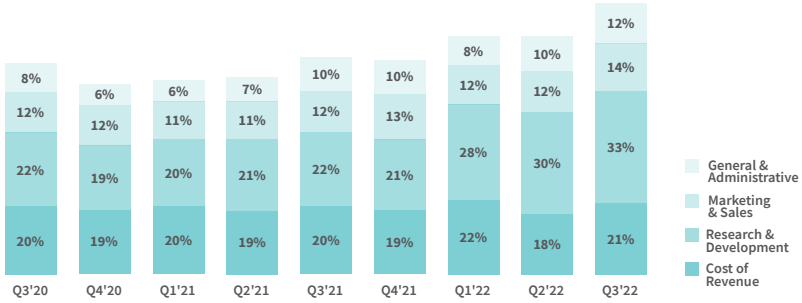
Source: https://s21.q4cdn.com/399680738/files/doc_financials/2022/q3/Q3-2022_Earnings-Presentation.pdf (slide 7)



Source: https://s21.q4cdn.com/399680738/files/doc_financials/2022/q3/Q3-2022_Earnings-Presentation.pdf (slide 9)

While it is encouraging to see that the company's spending on R&D is increasing, the decline in net income has become an incredible source of fear for its investors. We can say that Mark Zuckerberg is in trouble with her investors, as commodity share prices dropped below the $ 146 level she was trading at the beginning of the pandemic, that is, on March 16, 2020.

Expenses as a Percentage of Revenue



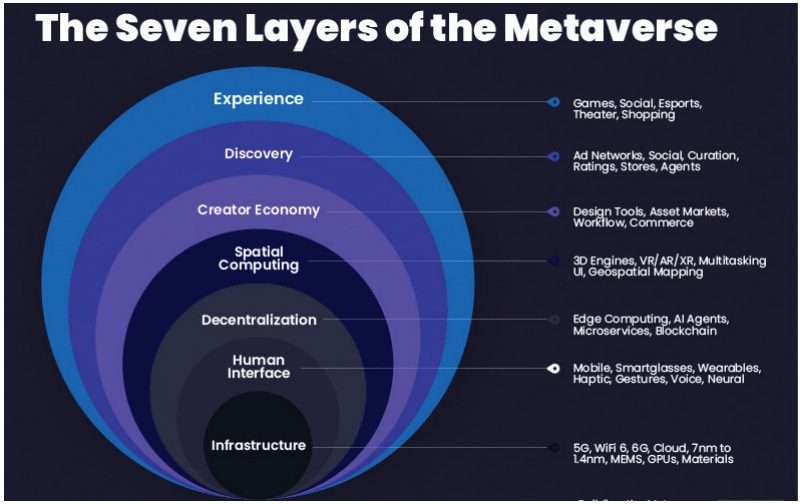
https://s21.q4cdn.com/399680738/files/doc_financials/2022/q3/Q3-2022_Earnings-Presentation.pdf (slide 5)

The company's name change was announced on October 28, 2021. When we look at its performance over the last 12 months, we see that the share price has fallen by almost 59%, while the Nasdaq, the stock exchange where the stock is traded, has fallen by only 15%. This shows that Meta shares have performed much worse than similar companies and have been bleeding year after year.

Despite these results, Mark Zuckerberg remains hopeful for the Metaverse and is convinced that the company's vision will play a crucial role as soon as 2030.

What is the Metaverse Made of?

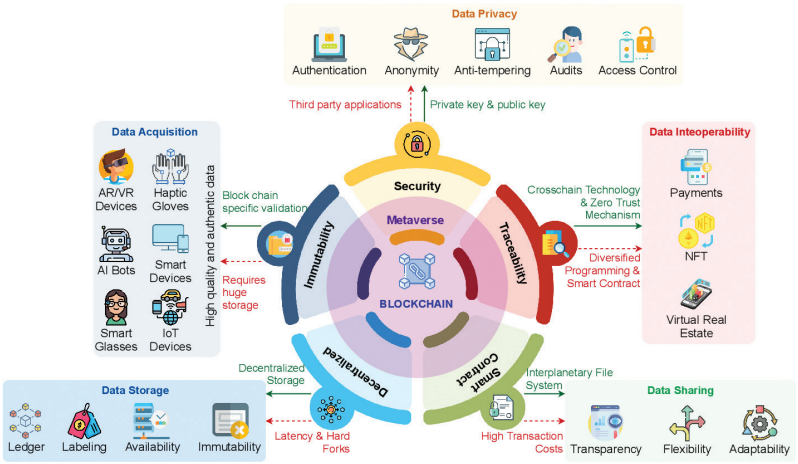
Although many layers are included in the image, it would not be wrong to think that the blockchain is at the centre of the Metaverse. When we remove the features provided by the blockchain, we are left with virtual reality games instead of the Metaverse. I would therefore like to list the most critical layers and features as follows:



https://medium.com/building-the-metaverse/the-metaverse-value-chain-afcf9e09e3a7

- **Hardware layer**
  - 5G & WIFI 6 technologies
  - Wearable technologies (Virtual reality glasses etc.)
  - Devices with haptic feedback
- **Blockchain layer**
  - Decentralization
  - Cross-platform value transfer
  - Accessibility
  - Interoperability

The most important use cases emerging from these layers are the Metaverse concept, which brings together platforms that offer virtual reality or AI experiences under a decentralized roof.



Source: Thippa Reddy Gadekallu, Blockchain for the Metaverse: A Review

Let's examine some use cases that emerged during the pandemic. In education, creating more comprehensive educational content, increasing interest through gamification, creating remote one-to-one training opportunities with instructors and providing more concrete examples with 3D visualization have entered our lives. In the real estate sector, we see that the features that allow us to move independently from space and time are at the forefront. Important scenarios such as virtual modelling, displaying more real estate listings and finding suitable construction projects easily have been actively developed during the pandemic.

Virtual bank visits, remote access to bank services and new customer experiences have emerged in the banking and finance sectors. As the travel and tourism sector has suffered due to the pandemic, Metaverse has proven how beneficial it can be in this area in terms of remote access to panorama museums, the ability to visit virtual exhibition venues and facilitating choices while making reservations. The gaming sector, one of the most valuable markets, showed that it has the most concrete use cases. There has been a lot of interest in experiencing augmented reality, decentralized games that can be played simultaneously with other users and earn rewards, and the creation of gaming assets that can be transferred between other decentralized platforms.

Metaverse and Blockchain

When we talk about decentralization, the first thing that comes to mind is blockchain technology. As it is a technology that cuts horizontally across modern technologies, we can integrate it almost everywhere, allowing us to bring together various third-party environments without a central authority. This means it is a critical foundation for the Metaverse.

We have seen dozens of Metaverse projects emerging over the past years, eager to utilize blockchain technology and, in particular, to incorporate the concept of a unique and unalterable digital asset called NFT (Non-Fungible Token), which translates to Qualified Intellectual Property.

Though we are happy that blockchain technology is included among dozens of projects with a particular use case, such as protecting the ownership of digital assets, the fact that decentralized finance and exchange tools that come with blockchain infrastructure have been used for fraud/theft activities has both caused us concern and showed that these technologies have a long way to go to appeal to the masses.

Owning property in the Metaverse

In today's internet, when you buy a digital asset such as a song, video, etc., a central authority invoices you and certifies your ownership.

However, when we try to build a decentralized universe in the Metaverse, the absence of a central authority is the source of most problems. So what do we need to buy/sell a digital asset on the Metaverse? The answer to this question is straightforward; we need an infrastructure that enables secure and transparent data sharing, i.e. blockchain technology, where the data written cannot be changed, and third parties that do not know each other can easily integrate and work together. Thanks to blockchain, we can enable the joint maintenance of a digital asset between platforms that are unaware of each other but integrated into a shared blockchain network. In short, blockchain plays a critical role in preventing the creation of multiple copies of an asset and tracking its ownership.

NFT in the Metaverse

Decentraland is one of the largest decentralized Metaverse platforms today. In the digital plots on this platform, we can see users displaying their NFTs within the structures they have created. However, these exhibited NFTs do not go beyond the links provided by popular NFT markets such as OpenSea and Rarible. When you click on an NFT while on the platform, it redirects you to the relevant web page, and you are expected to make transactions such as buying, selling, and exchanging through the redirected site. There is not much difference when we compare it to the galleries that sell online today. Online sales, just like e-commerce sites, are made through advertisements and ownership changes when purchased. So if we aim to create a truly decentralized virtual universe for the Metaverse, is the mediation of websites like OpenSea compatible with the Web 3.0 concept? Is it right to leave the NFT on display as a mere directional button when you can interact directly with the blockchain network within the platform? Such examples of misuse are far from the true purpose of the NFT and, unfortunately, can be very discouraging for people who want to get involved in new technologies.

Current Trends

Decrease in excitement

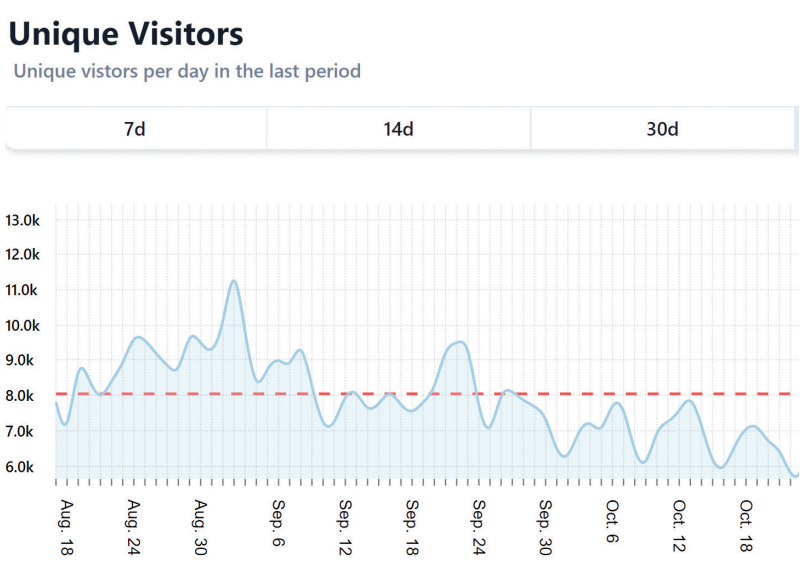
The generation most affected by the excitement following Mark Zuckerberg's announcement was supposed to be Generation Z. After all, this generation would shape the future and adapt very quickly because it grew up with technology. However, after the launch, I did not see any movement or interest, especially among my peers from Generation Z. I noticed that my friends, who had already been using virtual reality glasses for years, could not make sense of the launch. I think that apps like "VRChat", which have been around for years, already provide the features that Mark Zuckerberg is advertising, and the problem is that what is being offered with the launch is not yet there.

The problem is not limited to this; you cannot capture a generation that used to run to internet cafes after school and play MMORPGs, or multiplayer role-playing games like Metin2 or Knight Online, without offering concrete activities or interesting new features. Naturally, it would be wrong to expect the platform touted as building the Metaverse to be at the centre of our lives in its current form.

Statistics in the Metaverse

With the cryptocurrency markets entering a recession, we see that Metaverse projects are also experiencing a decline in user numbers. When we look at the number of monthly active users obtained

through various tracking tools, we see an incredible downward trend in the number of unique monthly visitors, even in large projects like Decentraland.



Source: https://dcl-metrics.com/

Promising projects and their current locations

- Tamadoge - Create your own virtual universe targeting game platform
- Battle Infinity - Multi-Use Metaverse NFT Platform
- Lucky Block - NFT Offering Exciting Rewards Platform
- Decentraland, The Sandbox - Investors' virtual NFT platform to buy and sell plots
- Axie Infinity - The most popular blockchain-based one of the games
- Adidas into the Metaverse - by Adidas a limited collection of NFTs created
- MetaCity - A virtual world with Human NFT Avatars
- League of Kingdoms - played with Dragon NFTs a play-to-win type of game

Some of the companies working on Metaverse

Game developers	Software providers	Social networks	AR & VR hardware
Epic Games	Unity	Facebook	Facebook
Microsoft	Adobe	Tencent	Lenovo
Roblox	Epic Games		Logitech
Activision Blizzard			Valve

Issues

We see that the Metaverse has some challenges to overcome if it is to develop in the way it is intended.
We can list these problems as follows:

Infrastructure problems

We can observe incredible differences between the universes created with the most widely used game engines in the world, Unity and Unreal Engine.

Unity has become a must-have for projects that can run on most virtual reality devices, thanks to maps that can be created with low polygon counts and are easily accessible even from average home computers or browsers. However, the visual impact was sacrificed to achieve this, so Metaverse projects created using Unity have similar graphics to the simple browser games of the early 2000s.

The good things about this are:

- **A more accessible environment for everyone,**
- **Cheap costs and low internet speeds to be accessible,**
- **Eliminating the hassle of installation.**

The disadvantages are poor visual experiences and technical inadequacy for future work, and because virtual environments can be created so easily, it has become a tool that malicious people use and abandon to promote their crypto-asset or similar projects.

When we look at the Unreal Engine side, it plays a key role in projects that can impress, attract and immerse the gaming audience more, thanks to high-resolution graphics. However, no step can be taken to make it accessible to the majority of the population because the cost of the graphics cards, hardware and peripherals required is incredibly expensive, especially for third-world countries, which begs the question, "Will the Metaverse only be accessible to people who can afford this expensive hardware?"

In addition to graphics issues, low internet access speeds, the lack of modems capable of 5Ghz broadcasting, and the pricing of mobile data usage constitute a major obstacle for users to access the Metaverse wherever and however they want. Unfortunately, projects such as Starlink, which are being developed to provide accessible and quality internet worldwide, have not yet reached a level that can be financially afforded.

If you have used virtual reality glasses before, you probably had problems with the issues I will discuss in a moment.

Nausea

The leading cause of these problems is nausea, especially during first or prolonged use. We can define this health problem, called motion sickness, as a condition in which the sensory organs, such as the eyes and ears, perceive that we are moving while the body is still and not moving, the brain has difficulty maintaining balance, and as a result, nausea occurs. We see that genetic and environmental factors have a great influence on the occurrence of this problem and that efforts to prevent it have not yet taken a concrete step. And this is one of the biggest obstacles to an immersive Metaverse.

Central authorities

The first thing I did when I bought the VR headset was creating a new Facebook account. Because it was not possible to access the Oculus Quest 2 glasses produced by Facebook without opening an account with the central authority, that is Facebook. Although the account requirement has disappeared in recent months, we can understand the position Facebook aims to be in virtual reality worlds.

Wireless access problem

One of the most important things needed to deliver an impressive user experience in the Metaverse is wireless access. Telecom providers have an enormous task to provide low latency,

highthroughputand secure services wherever there is a signal. Thanks to wireless communication revolutions such as 5G and 6G, the infrastructure required to enable users to participate in the universe from wherever they are, as desired, and to maintain this uninterruptedly, does not exist in most countries today.

To create genuinely fascinating Metaverse products, 5G needs to support thousands of devices and sensors, and it is expected to do so quickly, seamlessly and with low latency.

What Should Happen?

There are some requirements that the Metaverse must meet if it wants to touch everyone's lives in the future.

Let's summarize these features as follows:

Effectiveness

The Metaverse needs to be a visually impressive place. It is vital that when we enter a virtual environment, it should be in a way that connects us for hours, that requires us to devote our attention and all our imagination to it. It needs to become a place that targets not only visual and auditory but also other senses so that it is attractive to most of the population. Haptic feedback tools, especially around haptic technology, can provide a more immersive experience through vibration or pressure, providing incredible appeal for virtual environments.
Lost in space and time

If you've seen the movie Interstellar, I imagine it was an incredible visual and intellectual experience for you. The music used while passing close to the black hole and the scenes that made you feel as if you were feeling the gravity were like taking the audience out of their seats and transporting them to that point in space. In the same way, the Metaverse needs to become a technology platform that can transport the user from their current location to any point in the universe, regardless of time or date.

Compatibility

For the Metaverse to remain open and accessible to everyone, it needs to become a system that can work together and integrate easily with third parties rather than in a disparate and unrelated way, as in the Metaverse projects developed today. For standardization, Meta or international organizations need to create various regulatory and supervisory structures so that the systems developed can be targeted to a large part of the population and easily disseminated.

Scalability

Today, it is safe to say that everyone has at least one phone or computer at home. But quantity alone is not enough here. Today, the number of computers that can run an average video game is unfortunately very low compared to the total number of computers, which is a major limitation of this emerging technology. The number of people who can or want to dedicate a room in the house just for wearing virtual reality goggles is relatively low. Not to mention that the infrastructure investment required to experience high-resolution graphics is in excess of 30-40 thousand liras.

To solve this problem, mass production and widespread adoption of wearable technologies are key because if the Metaverse is to appeal to a large part of the Earth's population, we need to make sure it is easily accessible to everyone.

Differences

Today, countries' language and cultural differences are among the most significant barriers to international cooperation. In the Metaverse, it is expected that this will no longer be a problem but rather an issue that creates new opportunities. R&D projects that use natural language processing and artificial intelligence for instant translation have reached incredible levels in recent years. These projects will build new features for the Metaverse utilizing the latest technologies.

What does the future hold for us?

The Metaverse is fast approaching. The launch by a tech giant or the exponential growth of technology, the increasing capacity of computers and electronic devices to store and share data can be interpreted as the driving force behind the Metaverse, not just because it is a huge revenue opportunity. We have seen that this new world, which we have started to call the Metaverse, has challenges to overcome, not only the threats or problems brought by new technologies, such as security and privacy but also the human factor. Therefore, the best way to participate in this new universe that we are beginning to explore is through a truly multidisciplinary and broad approach combined with technical and social sciences.

Watch/Read Suggestions

¬ Anime

Sword Art online (2012)

¬ Movie

Ready player one (2018)

Her (2013)

TRON: Legacy (2010)

¬ Book

The Network State

Resources

https://cryptonews.com/news/best-metaverse-nft-projects.htm

https://theninehertz.com/blog/metaverse-use-cases-benefits

https://www.coindesk.com/web3/2022/10/07/its-lonely-in-the-metaverse-decentralands-38-daily-active-users-in-a-13b-ecosystem/

https://medium.com/building-the-metaverse/the-metaverse-value-chain-afcf9e09e3a7

Thippa Reddy Gadekallu, Blockchain for the Metaverse: A Review.

INTRODUCTION TO IMMERSIVE TECHNOLOGIES - THE AGE OF VR

ÖYKÜ BAHŞİ

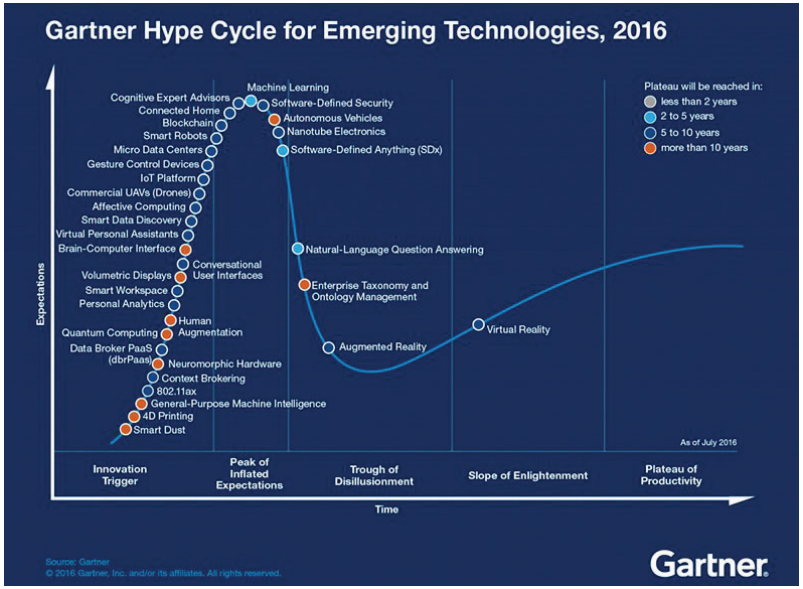
Softtech

Strategy and Product Management Product Manager

Virtual reality is a technology that we have started to hear more frequently with the concepts of Web3 and the metaverse. Although many definitions have been made since the day it started its technological journey, in fact, it can be said that VR is a 3D virtual environment created by computers that differs from the real world with its current definition. Although virtual reality is often confused with augmented reality, they are actually two different technologies. In virtual reality, the user's perspective is wholly equipped with the virtual environment, whereas in augmented reality, this perspective is further expanded with the help of the required technology and becomes interactive without being removed from the real world/ environment. In virtual reality, environments are simulated by computers and created as fiction; however, the scenario developed in augmented reality does not replace reality; it is close to reality. When talking about virtual reality, the term 'Immersive' is used because it is a specialized experience that completely envelops and surrounds the person. This technology, close to reality but isolated from it, is the beginning and necessity of an innovative era in which people develop and improve their experience with technology.

Photo by Kelvin Han on Unsplash.

It is critical first to understand the early stages of VR's active inclusion and adaptation in many sectors and daily life and to analyze the developments after 2017. In this context, the development of virtual reality with augmented reality technology can be seen in the retrospective reports published by Gartner, an American research and consulting company that actively follows technological developments. When the development of VR is analyzed within Gartner's Hype Cycles, it is possible to say that this technology has been followed regularly since the early 2000s, along with Augmented Reality (AR). Today, virtual reality, in particular, is seen as a more mature, accepted and widely used technology. In 2017, before COVID-19, virtual reality, which was stated to need a minimum of 5 years to develop and become widespread, gained rapid momentum with the investments made in the sector.



This development of virtual reality and its widespread use in different sectors are progressing in parallel with Web3. With the concept of "Own", which entered the dictionary with Web3, something that could not be done in the virtual world before has been done: to own! The interactivity of the possession function, which replaces the simple write and read parts called 'read write', has brought creativity and even more popularity to Web3. For users who could only take ownership of and use the internet through a domain in Web2, the borderless world of Web3 is a world where, most importantly, people have their own ideas. The ability to create their own worlds and live with their own 'avatars' in these worlds has inspired different sectors in terms of development, marketing and sales in terms of VR use for the masses. In this sense, the most significant supporting factor for the applications and metaverse universes developed in this sense has been the hardware for a fully 'virtual' experience of the virtual world. It is possible to observe that investments in virtual reality equipment have increased in parallel with this period. In particular, the proliferation of VR headsets (HMD) in the gaming and entertainment sectors has significantly expanded the market. Although glasses are the first thing that comes to mind regarding VR, more and more different hardware is being developed to improve the user's experience in the virtual world. The most widely known and followed by the masses are motion tracking devices (GTD), projectors and displays (PDW).

Photo by XR Expo on Unsplash.

For hardware and accompanying software development, the initiatives of major global companies stand out. In the virtual reality field, a few companies can be key, not as a sector but in general. CyberGlove, Meta, HTC, Microsoft, Sixense and many more...

Companies such as Meta, Microsoft, Samsung, HTC, and Sony are investing seriously in this field. Meta, in particular, has invested in the development of virtual reality along with the metaverse, and many companies - especially gaming companies - have started to invest in VR initiatives after Meta's move. While Sony has invested in Playstation VR, it has also funded Epic Games, supporting Epic Games' metaverse investments and development in VR. It is a strong bet that a global giant like Apple will enter this market with its own hardware alongside other companies. In addition to Oculus Rift, HTC Vive, Samsung Gear VR, Microsoft HoloLens and Sony Playstation VR, which currently dominate the market, many other companies are expected to enter this market competitively in a short time.

In addition to the entertainment and gaming industry, VR has been actively used in many sectors, such as education, retail, health, automotive and defence, for the last three years. For example, thanks to the simulations created in the health sector, doctors can prepare for operations by actively working with these simulations beforehand, while for the retail industry, a structure has been designed where users experience the products and build loyalty with the brand. In April 2022, a VR exhibition of the photos of the winners of the 4 Seasons of Anatolia Photography Contest was launched by Meta Turkey. In this sense, it has a different place as Turkey's first VR exhibition. Also, in Turkey, VR is being deployed in many locations to enhance the experience and storytelling, especially in the tourism and entertainment sectors. Although VR is not yet as widespread in our country as in the US due to the hardware, a serious expansion is expected in the future in different sectors; the most prominent of these sectors can be called the education and defence industry.

The advancement of 5G technology and the connection speeds that will improve in this direction is other positive development that will affect the VR industry. By 2027, the global virtual reality market is expected to be $92.31 billion in light of all developments.

Photo by Maxim Hopman on Unsplash.

Increasing virtual reality trends, both in the world and our country, will become widespread in the retail, entertainment and gaming sectors and later in other sectors. All investments and studies indicate that the future will progress in the Web3 - metaverse channel and VR will become one of the indispensable technologies at this point. With such active

use, it is crucial that the hardware is accessible, that it is developed and improved by more and more developers, and that it is made available to users.

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REVOLUTIONARY ERA IN DIGITAL PAYMENTS

HALİM MEMİŞ

Moka Payment and E-Currency Organization
CEO

Changes in technology have brought innovations in payment systems as they have affected all sectors. On top of that, the pandemic process, which affected the whole world and brought life to a standstill, ensured that technology was used by everyone without exception. In a period when digital solutions and products are so widespread and used, the most important factor that ensured that trade did not stop was actually the invisible element of the process, payment systems. This part did not appear or was not on the agenda because players in payment systems have been investing heavily in digital payments for a long time. This is because consumers now prioritize their experience in consuming financial services and are also interested in how smoothly the payment is completed. We've seen businesses prioritize investing in a seamless, efficient, convenient, personalized and digital-first shopping experience and enabling it across the entire customer journey, from pre-purchase to post-purchase.

As payment processes have become integrated into broader customer journeys, the boundaries of the industry have naturally expanded. Until the last few years, we defined payments as the various instruments, networks, distribution mechanisms and processes that facilitate the exchange of value between buyers and sellers of goods and services. Payment systems have come to include not just the transfer of funds, but the end-to-end value stream, including the services and platforms that enable this journey.

How is the future of payment systems shaping up?

Especially in western countries, banking has historically developed by focusing on the needs of corporate segment customers, which we can

call floor banking. Therefore, the product sets, organizational structures and solutions of banks in these countries have also progressed to support this development. This structure has resulted in the needs of individual customers and/or businesses being relatively secondary.

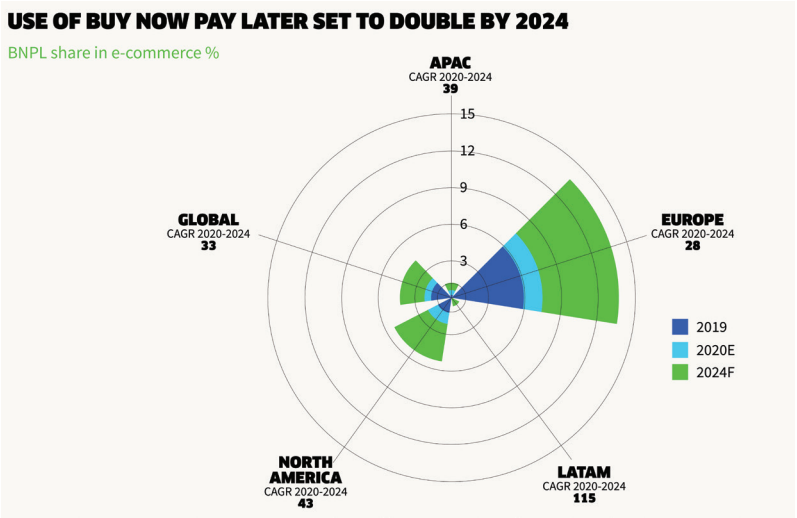
The needs in this area have actually enabled the emergence of many of today's fintechs. Many companies are motivated to make financial services more accessible and inclusive for everyone by effectively using today's technologies and offering a better customer experience at lower costs.

As payments become digitized, "e" has become a hygiene factor for fintechs looking to reach new consumers and provide a seamless experience."mediation", meeting the different needs of customers with advanced solutions, has become a priority day by day.

There were many topics on the agenda of the payment industry this year, from buy now pay later (BNPL) to digital wallets, from real-time payments to embedded payments. In 2023, it is clear that these topics will increase and evolve to shape the future of payment systems.

Buy Now, Pay Later (BNPL) offers an alternative to traditional credit card payment models by allowing consumers to spread their payments over some time. BNPL's growing popularity has forced banks and payment facilitators worldwide to develop their BNPL products or partner with providers to maintain existing customer relationships.

It's not hard to see why the BNPL is an attractive consumer model. The ability to continue shopping after the purchase decisionwith a method that is more easily approved than “normal” credit cards or credit lines contributes to a smoother payment experience as well as financial inclusion by offering more manageable payment



https://www.fisglobal.com/de-de/fintech2030/economies/future-of-payments

options to consumers who cannot benefit from traditional credit types or do not want to deal with that operational process.

Worldwide BNPL transactions are expected to reach $680 billion by 2025. With inflation rising worldwide, it seems likely that more consumers and payment providers will adopt this method in the future.

Digital Wallets have become an important part of today’s payment ecosystem thanks to their easy, convenient and fast payment options.

The number of digital wallets in use was 2.8 billion in 2020 and is expected to reach 4.8 billion by 2025 - a significant number, equivalent to around 60% of the world’s population. (1)

Globally, contactless in-store payments via digital wallets have surpassed in-store cash and card payments for the first time, and by 2024, digital wallets are set to account for one in three in-store transactions worldwide. (2)

MarPay Technology: Old-style loyalty programs now need new digital solutions that benefit both the buyer and the seller, and this is where MarPay technology comes in. MarPay allows loyalty program members to "buy more, pay less" during the checkout process by instantly spending loyalty points at checkout, earning points or getting more for their loyalty. This model also creates value for sellers as it increases the average basket value. MarPay looks set to continue to offer a new and diversified payment experience that will grow hand in hand with BNPL, with models such as uploading consumers' reward points to digital wallets.

Embedded Payments: To ensure a good customer experience and reduce friction in digital payments, merchants are investing more in integrations with payment gateways, and this is where the Embedded Payment trend comes in.

Embedded payments are expected to grow from $43 billion in 2021 to $138 billion in 2026. (3) As financial institutions focus on digital transformation, we will see a broader range of embedded payments in the industry.

Crypto Payments: With growing interest from consumers and payment service providers, the number of crypto payment transactions looks to continue growing. But whether these volumes will rival established payment methods remains to be seen. Payment apps offering cryptocurrency payment options are opening their markets to a growing number of people and helping cryptocurrencies become more and more adopted in the mainstream market.

Still, for crypto to be a private payment solution, it needs to offer a use beyond the payment transaction. Blockchain technology and other emerging technologies will significantly increase the adoption of crypto payments in the coming years as the purpose, and utility use cases mature.

As payment systems are being reshaped, we will continue to see how brands that gradually unify payment processing, loyalty rewards, and even consumer credit in a single interface have more consumer gains.

A report from IDC (International Data Corporation) estimates that 74% of digital consumer payments globally will be made through platforms owned by non-financial organizations by 2030. To navigate the evolving and changing payment landscape, payment providers must continue to keep two consumer demands in mind: choice and flexibility. These two concepts are at the forefront of today's payments landscape, and it is clear that innovation in the payments world will not stop anytime soon.

Resources

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ARE OUR CRYPTO ASSETS SAFE?

HAKAN ŞAHİN

Softtech

Senior Innovation Expert

Cryptocurrencies are digital assets used as virtual currency or assets and do not exist in physical form. The difference from other digital assets is that they are secured by cryptography and blockchain. While a centralized structure controls digital assets, crypto assets are controlled by a decentralized structure. For example, a valuable item in an online game is a digital asset controlled by the relevant game company. An NFT on the Ethereum blockchain network is a crypto asset, and its ownership information is held on many computers on the network.

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Chancellor on brink of second bailout for banks

Billions may be needed as lending squeeze tightens

Francis Elliott Deputy Political Editor
Gary Duncan Economics Editor

Alistair Darling has been forced to consider a second bailout for banks as the lending drought worsens.

The Chancellor will decide within weeks whether to pump billions more into the economy as evidence mounts that the £37billion part-nationalisation last year has failed to keep credit flowing. Options include cash injections, offering banks cheaper state guarantees to raise money privately or buying up "toxic assets", The Times has learnt.

The Bank of England revealed yesterday that, despite intense pressure, the banks curbed lending in the final quarter of last year and plan even tighter restrictions in the coming months. Its findings will alarm the Treasury.

The Bank is expected to take yet more aggressive action this week by cutting the base rate from its current level of 2 per cent. Doing so would reduce the cost of borrowing but have little effect on the availability of loans.

Whitehall sources said that ministers planned to "keep the banks on the hook" but accepted that they need more help to restore lending levels. Formally, the Treasury plans to focus on state-backed guarantees to encourage private finance, but a number of interventions are on the table, including further injections of taxpayers' cash.

Under one option, a "bad bank" would be created to dispose of bad debts. The Treasury would take bad loans off the hands of troubled banks, perhaps swapping them for government bonds. The toxic assets, blamed for poisoning the financial system, would be parked in a state vehicle or "bad bank" that would manage them and attempt to dispose of them while "detoxifying" the mainstream banking system.

The idea would mirror the initial proposal by Henry Paulson, the US Treasury Secretary, to underpin the American banking system by buying

Continued on page 6, col 1
Leading article, page 2

99p

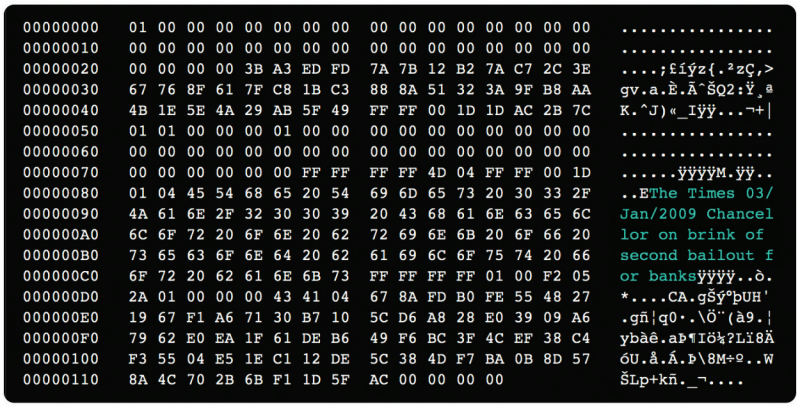
Pub chain cuts the price of a pint from £1.69 to 1998 levels

Business, page 47

Source: https://pbs.twimg.com/media/D48NEuNW0AQZgHp.jpg

After the 2008 global crisis, the US housing and stock markets collapsed, and unemployment rates skyrocketed. The US Federal Reserve launched an emergency loan program worth about $500 billion to resolve the crisis. On January 3, 2009, The Times used the headline "Chancellor on the brink of second bailout for banks", while on the same day, the first block of Bitcoin was created by Satoshi Nakamoto and included this headline by adding a message in the block. We don't know whether the intention was to put a time stamp or to send a message to the financial world, but it sent a big message to the financial world and perhaps started a new era.

Content of Bitcoin Genesis Block



Source: https://www.ledger.com/wp-content/uploads/2021/01/Playlist-1-Article-3.png

Bitcoin was the first cryptocurrency, followed by Litecoin, PPCoin and NameCoin. Announced in 2014, the Ethereum project, which was crowdfunded and launched in 2015, significantly impacted the community. The concept of smart contracts became popular with Ethereum and created different usage areas such as DeFi, Token, NFT. Today, there are thousands of different crypto asset projects. Projects other than Bitcoin and Ethereum are referred to as 'altcoins', meaning alternative coins.

Cryptocurrencies are not created by a state, i.e. a central authority, like fiat currencies. Cryptocurrencies are created through a process called mining. Individuals with mining devices are rewarded with cryptocurrency by the network for their services to blockchain networks. In the early years when we first met the concepts of mining and cryptocurrency, there were two methods to own cryptocurrency. You could either mine for a share of the newly released bounty tokens, or you could ask miners who had earned the bounty to transfer it to your wallet for a fee. Cryptocurrency exchanges have come to our aid to facilitate these processes that require a lot of technical knowledge. The popularity of cryptoassets has skyrocketed in a short period of time thanks to exchanges that simplify these steps for those who want to own cryptoassets. Of course, this development brought along some risks.

- **So, how reliable are cryptocurrency exchanges?**
- **The owner of the exchange can buy all the assets if he wants to can he escape?**
- **Do the assets that we buy on the stock market and appear in our wallet really exist?**

Many such legitimate questions may arise. Because crypto assets are notorious for this.

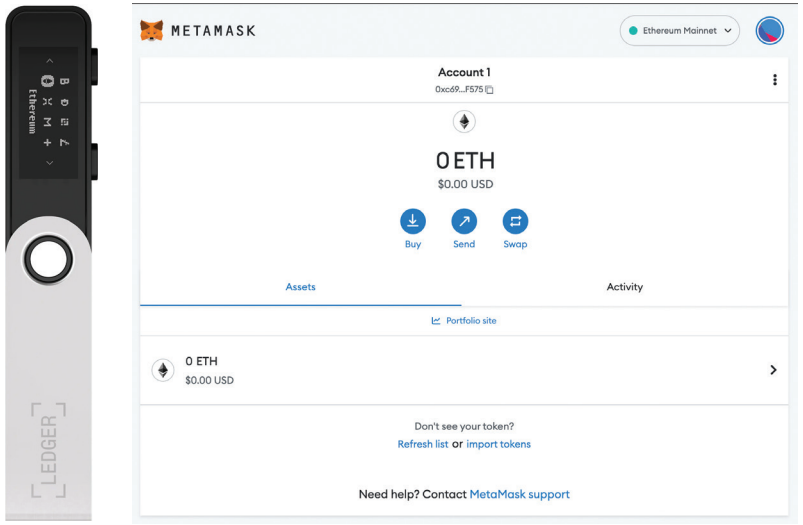
Almost every year there is a major incident where people are victimized. The fact that crypto exchange owners have full authority over crypto assets paves the way for fraud cases. I think severe regulations should and will come in this regard. About this issue, I recommend you watch the Netflix documentary titled "Is the Cryptocurrency King Dead or Alive?" which is about Gerald Cotten, the owner of the Canadian-based cryptocurrency exchange named Quadriga, taking all the assets in the stock market and disappearing.

So how can assets be kept safe? The answer is actually straightforward: By storing it in wallets that have the secret key. Crypto assets are stored in crypto wallets that support the respective asset.

Wallets used to store crypto assets consist of two different keys. One is a secret key and the other is a public key. The wallet address is generated via the public key. The secret key is used in the signing phase to prove ownership of the wallet. The secret key must not be shared with anyone. And if it is lost, there is absolutely no way to access it.

Wallets are divided into software wallets and hardware wallets. If the secret key is stored in software on our computer or phone, this is a software wallet. If the secret key is kept in special hardware, this is a hardware wallet. There are also two other categories of wallets, hot and cold. If a wallet is accessed on a device with internet access, it is called a hot wallet. Wallets stored on devices without internet access are also called cold wallets. Most software wallets are hot wallets; most hardware wallets are cold wallets.

On average, 90% of assets on cryptocurrency exchanges are stored in cold wallets. It is more secure because it does not have access to theInternet and stores its secret key on its own hardware. This prevents the theft of large amounts of assets in the event of an attack.



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The 10% amount stored in hot wallets is used for withdrawals. In deposit transactions, the deposited assets also reach these hot wallets in the first place. They are then transferred from hot wallets to cold wallets. We can transfer fiat money to a cryptocurrency exchange and buy cryptocurrency, then sell that cryptocurrency and transfer the fiat money to the bank.

In these processes, we do not actually own a real cryptocurrency. There is no inflow and outflow of assets to the addresses the exchange has opened for us. So when we follow it on the blockchain network, there are no transactions made in our wallet. The only thing that is done is the accounting record. The record of how much crypto you own in a table in the database has just been updated. When we want to transfer the relevant asset to a wallet we have created

outside the exchange, we can track that it is transmitted to our wallet via the exchange's hot wallet on sites such as Etherscan that show transactions on the blockchain network. When we transfer from our personal wallet to our 'deposit' address on the exchange, we can transparently track on the network that this asset has been sitting in our wallet on the exchange for a while, and then the exchange pulls it out of our wallet and moves it to their own hot wallet. You may ask how it can make transactions from our wallet without asking us. The exchange opened the wallet for us, but we don't have the secret key. Whoever has the secret key controls the wallet. So do exchanges open millions of wallets for every blockchain network, for every asset on the network, and for every user who owns that asset? The answer is yes and no. It is possible to manage this with the Deterministic Hierarchical Wallet. This method allows billions of wallets to be created on a single key. This means that they can create enough 'deposit' addresses for all their customers by storing a single key. When there is a transfer to this address, they know who the address belongs to and update the balance of the relevant customer on the database. They then move the assets to the secure side by transferring them from these 'deposit' addresses to their own hot wallets and from there to their cold wallets, which they have access to in order to pool them together.

The most popular wallet applications for personal use are Metamask, Ledger and TrustWallet. When creating a wallet based on these, we are presented with a secret key, called a mnemonic, consisting of 12 or 24 words.

It warns us to write it down and not to forget it. This key is not actually the key corresponding to a single address but a secret key corresponding to all addresses that can be created through that wallet.

A sample mnemonic of 24 words

The Deterministic Hierarchical Wallet was used here, too, to create multiple addresses.

When we create ten addresses within the wallet application, each has separate secret keys, and we can view and export them from within the application. Or we can just use the 12-word Mnemonic to access those ten wallets again. We can transfer our assets from the crypto exchange to this wallet. To do this, we must ensure that we choose the right network and that our wallet supports it. Once we have successfully transferred assets to our wallet, we can now store them more securely. We can liken this to the gold hidden under the mattress. Actually, it looks more like gold kept in a safe, but I guess most people don't have a safe at home. If someone has the combination to the safe, just knowing the combination is not enough to get the contents. It must also physically access the safe

itself. In the case of crypto wallets, once the secret key is in someone else's hands, they have instant access to all the assets inside. Even if it obtains the key to a hardware wallet, it can now use that key to access assets in any wallet application. As can be seen, the security of the secret key is the most critical security issue in the crypto ecosystem.

Since the entire wallet is controlled through the secret key, the moment the secret key is compromised, all asset control is compromised. This is therefore seen as a security issue. These secret keys can be generated and stored on HSM hardware devices called highly secure Hardware Security Modules. Even the system administrator cannot see a key stored on the HSM. When a transaction is made with the wallet, it can be signed with the secret key stored on the hardware device. There is also the MPC method, where the secret key is divided into multiple parts and stored.

In general terms, MPC enables multiple parties, each holding their private data, to perform a calculation without disclosing the private data held by each party. The multi-key method provides higher security than a single key. Moreover, the corresponding secret key cannot be accessed even if these multiple keys are combined. In addition, anyone who gets hold of a single key cannot perform any operation on the wallet.

Signing with MPC is a very complex process, but for a simple example, let's see how to solve the average salary problem with MPC. Let's set up a system to calculate the average salary of four people whose wages are 5,800, 6,200, 7,300 and 5,100, respectively, without sharing their salaries.

1688	-123	456	-1789
3456	-3478	4128	664
-756	867	-45	9606
1432	8934	2761	-3381
5800	6200	7300	5100

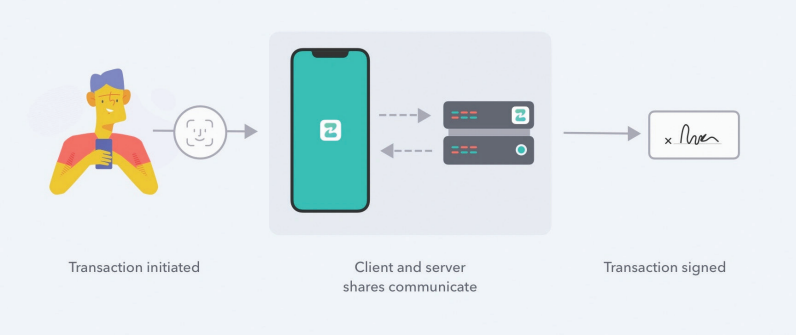
Source: ttps://www.youtube.com/watch?v=90jcXCHsBF0&ab_channel=Safe-DEED

Since we will distribute it to four different devices, we need to divide the wage of each of them into four parts so that their sums remain the same and put one piece in each device. For example, we divide 5,800 into four parts so that the sum remains the same: 1.668, 3.456, -756, 1.432. We repeat this for each one. We then distribute them to the devices.

664	-123	-1789	-3478
867	456	8934	1688
4128	-3381	3456	9606
1432	2761	2761	-45
7091	-3804	13362	7751

Source: ttps://www.youtube.com/watch?v=90jcXCHsBF0&ab_channel=Safe-DEED

Now, none of the devices knows the wage of any employee, but they can calculate the sum of all wages and the average of all salaries together. In both cases, the sum of the wages can be found as 24,400 and their average as 6,100. Signing uses a much more sophisticated version of this. Devices that hold part of the secret key can come together and complete the signing process without revealing the secret key.



Source: https://techcrunch.com/2019/04/16/zengo-wants-to-become-the-crypto-wallet-for-the-masses/

You can download Zengo's wallet app on your phone to experience MPC technology. The mobile app stores one of the shredded keys on your phone for you and keeps the other on its servers. When you want to make a transaction, the keys on your phone and in Zengo's cloud are used to sign transactions. It asks you to use a method like a fingerprint or faceID to back up the secret key on your phone. So when you want to recover your wallet from another phone with the key you exported, you can access it using faceID. When you choose this method, you don't have to store mnemonics (seed phrases) consisting of 12 words. If the company stops working, a system has been set up to ensure that users are not victimized. The master decryption key, which can generate the secret key of the wallets, is stored by a custodian and law firm, and they send it to a GitHub account when they detect that Zengo has stopped working. Having a key in this github account puts mobile apps into recovery mode. With this key, the client mobile application generates the secret keys of its wallets and allows the user to export them. This way, another wallet application can use these secret keys to regain access to the assets.

As you can see, having the wallet's secret key is very important for owning crypto assets. I want to end my article with a sentence that has become a motto in the crypto world. "Not Your Keys, Not Your Coins."

Resources

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https://zengo.com/how-zengo-guarantees-access-to-customers-funds/

https://99bitcoins.com/bitcoin-wallet/zengo-review/

SERVICE MODEL BANKING

CENGİZ KOÇ

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We have all gotten used to using banks' digital banking channels, i.e. internet branches and mobile applications, for banking services without going to a branch. Even those who were reluctant to do so have turned to these practices due to the necessities under pandemic conditions and have quickly become accustomed to the convenience and speed they bring. Could banking transactions become easier, faster and perhaps more advantageous? For example, the financing solution or banking service we will need while purchasing a service or product can be provided at the exact step we need. What if it was designed specifically for us or tailored to us, taking our past transactions into account, and it would give us some advantages? I guess the applications that successfully realize this experience will soon become a new habit for many of us as customers who are used to digital banking services.

Service Model Banking is a structure in which companies that own the interfaces that provide services, such as the purchasing process I mentioned above, can perform banking transactions on behalf of their customers through the integration they establish through open banking services called APIs offered by banks. By using the banking infrastructure banks provide, companies can offer new products and services to their customers or make their existing services easier and more value-added.

Most of us know Service Model Banking by its English acronym BaaS (Banking as a Service). Let's take a look at the written definition of this concept in the "Regulation on the Operating Principles of Digital Banks and Service Model Banking", published in the Official Gazette on December 29, 2021. (1)

Service Model Banking: A service model in which customers can perform banking transactions through the service bank by connecting

directly with the systems of the service banks through open banking services through the interface offered by the interface providers.

In addition to this succinct definition, the Regulation includes two new definitions:

Service Bank: Bank providing service model banking services.

Interface Provider: An entity established as a capital company that enables its customers to perform banking transactions by accessing the banking services offered by the service bank through the bank's open banking services through its mobile application or internet browser-based interface.

To add a few critical pieces of information about these definitions in the regulation;

¬ Any regular or digital bank that has obtained a license to operate under the Banking Law No. 5411 can become a Servis Bank; there is no need to apply for a separate license.

¬ Interface Providers are required to be established as a capital company and residents in Turkey. Companies such as e-commerce companies, tourism, airline companies and financial institutions such as non-bank payment institutions can become Interface Providers provided that they obtain a license from the BRSA. Banks cannot be Interface Providers as per the regulation.

What are the differences between Open Banking and Service Model Banking?

As it is known, the framework of the Open Banking model was determined in the "Regulation on Information Systems and Electronic Banking Services of Banks" dated March 15, 2020. (2) The first ten banks are expected to launch open banking services by the end of 2022.

With the introduction of Service Model Banking applications in the coming period, these two banking models may sometimes be confused with each other.

The Open Banking model aims for banks to open their data and basic banking services, such as Payment Order Initiation, to other banks or financial institutions so that users can see their information and products from different banks in a single app.

Service Model Banking means that banks can share their banking services with Interface Providers and provide services through them.

In summary, while Open Banking is an important threshold for banks to open their data to the outside world, Service Model Banking goes far beyond this threshold and enables banks to provide banking services outside their own digital platforms.

What are the advantages of the Service Model Banking, and what impact will it have on the widespread adoption of the model?

Customer Experience: As with every innovation, Service Model Banking models that offer faster, easier and value-added services to customers will be rapidly adopted by customers. It would not be wrong to say that Interface Providers that successfully implement this model and succeed in making their customers' lives easier will want to move forward rapidly in this area and will be much more willing to increase the variety of services they receive from banks. As

an external example, IKEA wants to buy 49% of the shares of Ikano Bank, with which it works. (3)

Profitability and Customer Acquisition: Firms that skillfully integrate banking services into their customers' experience process will be able to meet their customers' service and product demands quickly. With great ease, they will stand out with their ability to fulfil financial needs within their ecosystem at the exact moment of need. In addition to the increase in customer loyalty, these companies will have the opportunity to increase their revenues through cross-selling opportunities and the advantage they will experience in monetizing potential revenue sources. Banks, on the other hand, will have the advantage of reaching different customer groups in the ecosystem of the interface providers they work with, and of being able to include customers who were previously outside the banking system among their own customers. The most decisive factor for all this will be to come up with the right solutions that will make customers' lives easier.

Increased Technological Competencies: The published regulation stipulates that the interface applications that Interface Providers will offer to their customers must be as secure as digital banking applications. The need for companies that want to become interface providers to offer easy-to-use and secure services to their customers will accelerate further investment in technological competencies and increased cooperation with organizations in the security and technology field. These developments will open new doors to increase financial technology installations and trained manpower.

The Future of Service Model Banking

With the Open Banking regulations and the Open Banking applications to be launched in the coming period, the Service Model The future of banking will include Platform Banking, i.e. BaaP (Banking as a Platform).

In this concept, also called "Banking as a Platform", banks should update their classic business models by taking into account external innovations, creating new business models with innovative strategies and designing them to integrate with current technologies.

In the coming period, platforms that combine technological developments with the right business models and meet customer needs with innovative solutions will be one step ahead in the ecosystem. In order to succeed in the future of Service Model Banking, it seems that it will be decisive to blend competition and cooperation correctly and prioritize producing value-added solutions in collaboration with other stakeholders in the ecosystem.

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FINTECHS IN TIMES OF FINANCIAL CRISIS

OZAN CİĞİZOĞLU

PwC Strategy
Company Partner

Although financial technologies (Fintech) have become more talked about since 2008, their history goes back much further. Especially with the decline in global confidence in the sector due to the banking crisis in 2008 and the development of information technologies, a new wave of innovation in fintech has begun. With the impact of this wave of innovation, the fintech world continued to prosper with peer-to-peer borrowing, payments and blockchain-based business models. Today, there are over 60 different business models in the fintech world. We are now familiar with the fintech ecosystem, which enables consumers and businesses to increase the number of service alternatives for their financial needs, regularly changing the dynamics in the sector with a new innovative idea. However, as global central banks adopt tight monetary policies, there are questions about how a possible recession will affect the fintech world.

When we analyze the developments in the past recession periods by taking into account the current sector dynamics, it is possible to categorize the possible effects under five headings;

1) Decline in fintech investments and investors' shift towards early-stage startups: From 2008 until the last quarter of 2019, the amount of fintech investment, which had been on the rise, fell from the previous quarter of 2021 to the third quarter of 2022, although it recovered after its erratic course at the beginning of the pandemic. In a possible recession, quarterly investment volumes are unlikely to return to their previous levels. The main reason is that investors will not want to make risky and significant investments during economic uncertainty. In addition to the decrease in investment amounts, according to research conducted by CB Insights, investments in early-stage startups accounted for 63% of total investments globally

in 2020, while this ratio increased to 67% in 2022. Investors who are willing to invest lower amounts in times of economic uncertainty may turn to these fintechs because early-stage startups have lower company valuations, and early-stage startups are more agile and can react faster to possible changes in industry dynamics.

2) Increased price sensitivity of consumers and businesses and its impact on selected business models: In times of economic uncertainty, consumers' and businesses' price sensitivity naturally increases. Customers prefer specific fintech business models in this period because they offer cheaper products and services than traditional financial services players. In this way, fintechs can both acquire new customers faster and reduce customer churn rates that naturally occur during this period.

This positive impact may be more pronounced when looking at specific business models. For example, we expect digital banks' customer acquisition rates to be positively affected during recessionary periods. Considering that one of the standard features of digital banks is that they do not charge fees and commissions and offer higher deposit interest rates, they will become more attractive among price-sensitive customers. Considering that digital banks collaborate more frequently with third-party fintechs on average, we can say that fintechs focused on fraud prevention and risk management that digital banks can collaborate with can be positively affected by the increase in the number of digital banks' customers.

As another example, we can expect a possible recession to impact the insurance comparison platform/marketplace business model positively. Insurance comparison platforms enable consumers

to compare policy features/prices and help them make the most appropriate decisions. In a possible recession, as consumers become more price sensitive, we can expect an increase in the proportion of consumers using this platform to purchase insurance.

3) Potential positive impact of interest rate hikes on selected credit-based business models: The high-interest rate environment brought about by tight monetary policy is likely to slow down economic activity through increased borrowing costs. In a possible recession, an increase in credit risk may lead to a decline in banks' risk appetite and an increase in costs, which may cause customers to hesitate to use credit. In such an environment, since fintechs can better manage credit risk by spreading to the grassroots with micro-credit focuses, we can say that fintechs can gain an advantage over traditional financial services providers in this area.

In addition, we have observed that the share of credit cards in total card expenditures in Turkey has decreased, and the share of debit cards has increased in recent years. In this period of rising inflation globally, it would be fair to expect people to turn to credit cards again to delay their payments.

4) A new wave of innovation: One effect of recessions is a change in macroeconomic and sectoral dynamics. This change in dynamics naturally creates opportunities for new business ideas. For example, the decline in trust in the banking system following the economic crisis in 2008 was one of the factors that triggered the enrichment of the fintech ecosystem. In addition, despite the global economic recession due to the pandemic, customers and companies took essential steps in terms of digitalization, which positively affected the fintech ecosystem focusing on digital channels. Despite the recession, the number of fintechs launched in 2020 was almost double that of 2019. We can expect a similar wave of innovation to be repeated with a possible recession that awaits the world in this period.

5) Behavioral changes towards investment instruments: In this period of rising interest rates globally, it is possible to say that interest in specific investment instruments has decreased and will decrease as investors' risk appetite decreases. For example, since the value of crypto assets depends on many factors, it is difficult to say what direction their value will take in the coming period; however, it would not be wrong to say that interest rate hikes will have a positive effect.

At the same time, it is possible to say that in times of recession, companies' future turnover expectations also decline, leading to a decline in company valuations, which negatively impacts stock prices. In line with this, some investors will tend to sell their stocks and be more hesitant to invest in equities during the recession. This may adversely affect fintech business models that actually intermediate investments in capital markets.

In conclusion, in this period when we are adapting to the new world order, we can say that a new era has begun for fintechs around the world when we analyze the possible effects of the global recession under five headings. It is also clear that there are opportunities for fintech companies that understand and manage this process correctly.

INSURANCE TECHNOLOGIES AND BUSINESS MODELS

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The history of insurance, which originates from the Latin word "cura", meaning worry, anxiety and to keep an eye on, dates back to 4500 BC. In Egypt, some artisan groups organized a fund and provided money from this fund to the families of the deceased. Since time immemorial, mankind has needed to secure their risks to protect their loved ones and cover any damage to their property or assets.

As insurance is such a long-established field, it also has some fundamental problems that have become chronic. The most important of these are the inability to offer uniform and customer-specific products, regulations, rising costs and dependence on old technologies.

A system that ensures efficiency and added value for customers and, at the same time, improves the way of doing business for stakeholders in the entire value chain of the insurance industry (such as banks, brokers, agents, and insurance companies). Thanks to InsurTechs, we have started approaching innovative solutions that aim to move the sector forward by facilitating its processes. InsurTech is one of the essential verticals in the Fintech universe, which has reached $2 trillion in value and 65% penetration worldwide.

Figure 1 Insurance Value Chain, Drake Star, Global Insurtech Industry Report 2022

InsurTechs are laying the foundations of the new insurance understanding with technologies that will disrupt the sector by emphasizing customer-oriented business models. Let's talk about a few of these business models and give examples of the technologies they utilize.

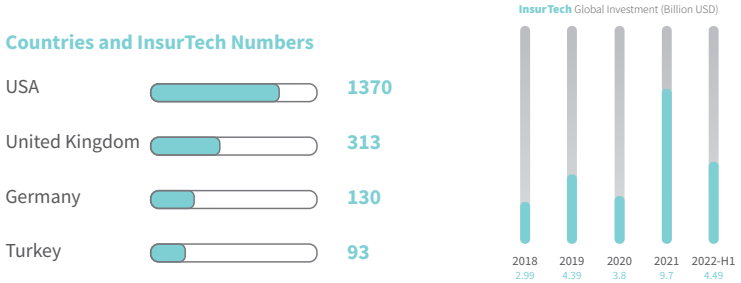

Figure 2 Startup Market InsurTech Industry's Past, Present, Future, 2022

The first and most familiar are Comparison Platforms. These provide customers with comparative pricing while at the same time providing an incredible benefit in terms of speed by digitizing the end-to-end policy production process. Thanks to their simple and useful interfaces, they increase the efficiency of sales processes. Sigortam.net, which we know from our country, is a digital broker and offers offers offers from more than 20 insurance companies to its customers in as little as 2 minutes. With the help of powerful Artificial Intelligence algorithms, it operates a three-alternative bidding process in terms of low price, comprehensive coverage and price-performance.

Secondly, we can talk about Digital Insurers, which are a reflection of traditional insurance. Lemonade, the most popular of these and a company that has received serious investments, enables the seamless purchase of an insurance product entirely through chatbots. At the same time, with Big Data and Artificial Intelligence technologies, it estimates the risk at the time of damage and pays the customer the fastest way possible. In addition, traditional insurance companies make a profit on the premium that remains after paying the costs, where a flat fee is charged on the premium and the money left over after the costs are paid is donated to charity. In this way, they contribute to the establishment of a mutual trust relationship with customers by observing the social benefit principle of insurance.

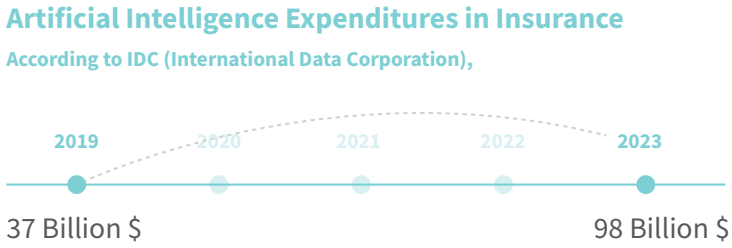

Figure 3 Startup Market InsurTech Industry's Past, Present, Future, 2022

Another business model is Demand-Driven Insurance, which involves initiatives that make insurance more affordable for customers with lower utilization. Given the rising insurance prices and the economic crisis the world is facing, it is evident that interest in this type of insurance will only increase. This model is used mainly for car insurance and dynamically sets prices by tracking driving statistics. Telematics technologies are most utilized here. We can think of telematics as the black box of vehicles; however, it requires serious installation costs. In light of new developments, some companies can observe usage habits from mobile phone sensors with simpler use. These mini devices can be plugged into the vehicle's socket or only with permissions given through the mobile application. In light of these observations (with parameters such as braking, speed, focused driving, etc.) for each driver, the driving score can be calculated, and possible accidents can be prevented as insured people are encouraged to improve their driving score. An example is the business model of Cuvva, which promotes car sharing and

introduces the concept of temporary insurance. Let's say you want to share your car with a friend; it allows you to buy temporary insurance for your friend to use in your vehicle, especially in very variable and tiny periods such as hourly or weekly. In traditional insurance, if there is an accident while someone else is driving your car, unfortunately, your no-claims discount is affected. Another value proposition here is that since the policy works on the driver of the vehicle and not the owner of the vehicle, the no-claim discount of the owner of the vehicle is not impaired.

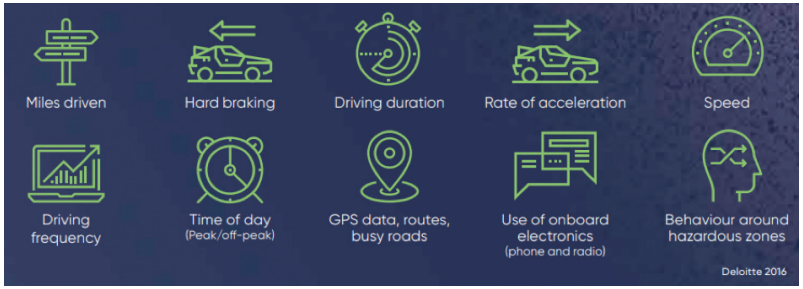

Figure 4 Driving habits that can be measured with telematics devices, Future Of Insurance Special Report, 2017

To get better insights from the data obtained and to make data-driven decisions, we see that Data Analytics is also emerging as a business model. In addition to these benefits, Data Analytics also offers solutions for cost savings and better time management. Especially in the field of health insurance, IoT (Internet of Things) technology is used to create a health score by collecting customers' data such as walking tendency, sports status, time allocated for meditation, etc. and sharing it with health and life insurance companies through APIs. This promotes health and well-being for policyholders and enables customers to take advantage of premium discounts when the expected score is achieved. In a very niche area of work, Church Mutual has saved nearly $1 million in 1,500 houses of worship by remotely monitoring frozen pipe leaks in low-occupancy buildings with IoT technology and detecting potential damage in advance. As a result, we see that a win-win environment is created for both insurance companies and customers by preventing claims.

The Claims Management process is the business model where the insurer has the opportunity to demonstrate its value and deliver on its promise to customers. The main problems in claims processes are that claims are not approved or, even if they are approved, coverage payments are reimbursed to customers after very long periods. Artificial Intelligence technology makes it possible to evaluate a car or house photo pixel by pixel very quickly. Or damages can be assessed again with drones sent to larger, hard-to-reach areas. Artificial Intelligence can then classify the situation or the amount of damage and provide a detailed estimate.

Investors in InsurTechs are not limited to insurance actors; many other sectors, especially the banking sector, also see potential opportunities. The magic word here is the Embedded Insurance business model. Embedded insurance is about offering customers personalized insurance when and where they need it most, and it is not a new concept. In the 1980s, when bancassurance was accepted in France, agreements were made between a bank and an insurance company that allowed the insurance company to sell its products to bank customers through bank sales agents. Banks generate more revenue by selling insurance products, while insurance companies expand their customer base without hiring more sales staff. This reduces sales costs, meaning embedded insurance is profitable for

both parties. Insurance services offered in retail and e-commerce sectors other than banking are an example. When you want to buy a seat on Amazon, customers are also offered the option of insuring the seat with several different offers.

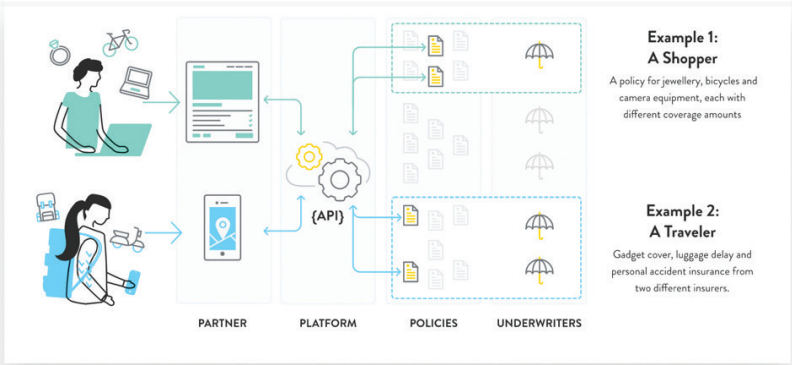

Figure 5 CoverGenius

Conclusion

Markets have also been and will continue to be significantly affected by external variables such as the Covid-19 pandemic, inflation, war and the political environment. To deal with this uncertainty, it is clear that we need to be in favour of technology and digitalization.

We can easily see how modern technologies have made our lives easier in all areas and created time for us to spend on more valuable tasks. Integration and partnerships with embedded insurance translate into effective sales. With Artificial Intelligence and Machine Learning, we can make better analyses from more and more meaningful data. Thanks to Low Code/No Code platforms, it is possible to develop products simply and quickly, providing a competitive advantage in the market and getting ahead of competitors. Blockchain technologies ensure transparency and increase customer trust by carefully storing personal data.

We also use it to minimize the possibility of money laundering and fraud as it increases coordination between insurers. Again, with IoT technologies, we can offer customized products for each customer, which we can call tailor-made.

According to a study by consulting firm Juniper Research, InsurTechs' premium production is projected to exceed $566 billion by 2025. Given that digital transformation in insurance will be inevitable, it remains to be seen whether traditional insurance companies will be able to keep up with this train with agile principles. Actually, we will see those who make it and those who don't...

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INNOVATIONS AWAITING US WITH DIGITAL IDENTITY DETECTION

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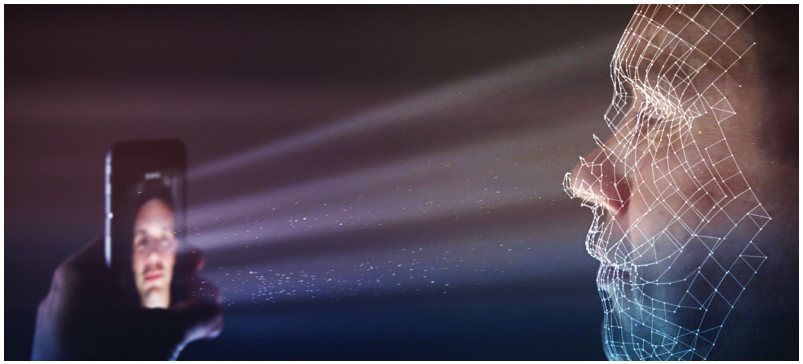
In the history of the world, epidemics have emerged from time to time, threatening human life and order and shaping societies in the aftermath. Like in the 14th century, the Black Plague disrupted the socioeconomic order in Europe and was one of the causes of the Renaissance; COVID-19 has brought about many changes. It is possible to say that the increasing transformation in the field of digitalization is one of the effects of COVID-19. We have tried to take various individual and social measures to protect ourselves from the pandemic and to reduce the effects of the pandemic together by making better use of technological opportunities. As every experience adds to our lives, the pandemic has added the concepts of working remotely, holding meetings remotely, and conducting business meetings remotely. Remote identification technologies and "digital onboarding" are among them. To become a customer of a company or for any transaction that requires identification, instead of going to companies, we can do these transactions remotely and legally with completely digital methods. Although remote identification technologies are already available, their widespread use would be very limited. We would probably not have had the opportunity to experience digital identification technologies individually if circumstances in the world had not pushed us in this direction.

With the sector-based Remote Identification regulations that started to be published in our country since 2021, technology companies and financial institutions/organizations have focused on producing solutions in this field. Today, we see that both organizations and their customers are rapidly learning and using Digital Onboarding technologies with remote identification. Imagine that we have not only experienced these technologies individually; while we were a generation that took our grandparents to the ATM and even tried to get them to make transactions from the IVR; now, in addition to

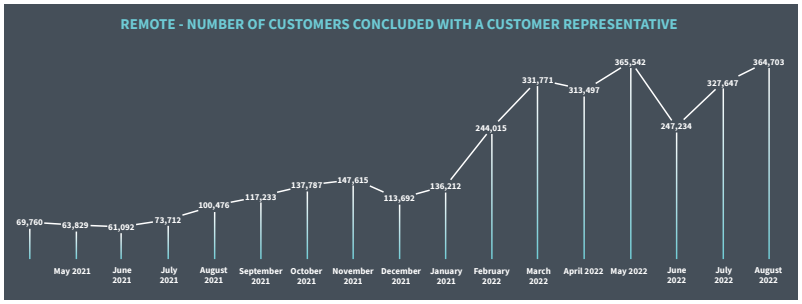
these, we started to say "Mommy, you need to keep your face still for biometric verification" in a very natural way.



In summary, digital identification is carried out by the following methods;

- **ID scanning and verification with OCR**
- **Receive and verify identity data with NFC**
- **Biometric Authentication (Facial recognition and liveness controls)**
- **Video Calling**

When we look at the data, we can clearly see that usage is increasing rapidly. According to the customer acquisition statistics of the 16 banks submitting data to the Banks Association of Turkey, the rate of remote customer acquisition is increasing. The ratio of customer acquisition through Digital Onboarding to all customer acquisition methods (such as courier, branch, and mass application) has increased from 10% in May 2021 to 25% in recent months. This rate will approach 85% within 5 years.



Source: Banks Association of Turkey

According to the Identity Verification Market - Growth, Trends, COVID-19 Impact, and Forecasts (2022 - 2027) report; it is seen that the authentication volume, which was 8.92 billion USD globally in 2021, grew by 12% in one year and is expected to reach 18.49 billion USD in 2027. Furthermore, McKinsey predicts that "expanding full digital identity coverage could generate economic value equivalent to 3% to 13% of GDP in 2030".

Remote identification significantly reduces the operational workload for institutions and organizations and significantly reduces courier, branch and operation costs with the remote establishment of the contractual relationship.

Although the number of branches or representative offices is small, we see that companies aiming to provide services to a broader audience are also making significant use of remote identification technologies, and I hope we will see more of this in the future. These companies will be able to realize more transactions with less costly investments for all digital KYC (Know Your Customer) processes, including customer acquisition, and thus gain financial advantage. Recently, we can point to digital banks without branches as pioneers in this regard.

Using Digital Onbording technologies is not always so simple for all of us. In the process that starts with the Digital Onboarding application, completing all verifications using the technologies I mentioned above consists of several steps. Again, when we look at the statistics, the ratio of people who successfully passed the identification methods and became customers to the total number of applicants (Digital Onboarding success rate) has increased from 25% to 35% in the last year. Even if these rates show us that we have made technological progress, they also tell us that there is still a long way to go in user experience.

We are still at the beginning of the remote identification period in our country; we can consider this period as an adaptation process. The desire of companies to reach more customers faster and at lower costs will undoubtedly push the limits of technologies in this field. Other biometric data such as fingerprints, handprints, retina and voice recognition can accompany existing facial recognition, and NFC controls to identify the customer over time, as needed and as the hardware allows.

When we look at examples from around the world, we see that the number of transactions linked to remote authentication is increasing, especially in the Far East. The most important part is remote authentication processes that integrate with payment systems.

In 2017, Alibaba integrated payment systems with biometric data on the Alipay payment platform under "Smile to Pay". With this system being used in China, after face recognition and liveness detection, people can easily make payments and shop from vending machines without cash or credit cards.

A similar example recently came from WeChatPay, owned by Tencent. WeChatPay announced in October 2022 that it would integrate handprint data with its payment system to process payment transactions.

However, Blockchain KYC solutions are also among the important topics discussed for reliable identity verification. By creating a structure in which individuals create a single identity profile, upload their documents in one go, and share data over the blockchain for the institutions and organizations they allow, the ability of the institutions included in the blockchain to verify data may become a reality in our lives that is not too far away. The blockchain data-sharing model can provide great convenience regarding time/cost for both customers and organizations.

As with all innovations, these recognition technologies will undoubtedly add great convenience and speed to our lives and the customer acquisition processes of companies. However, the confidentiality, secure transportation and storage of personal data used in these processes are issues that need to be considered.

In which countries can the data be stored or processed, and under what conditions can it be shared with others? Personal data privacy and security, the framework of which is determined by legal regulations, is one of the first items on the agenda of governments and, therefore, companies. The areas of use of recognition technologies and Digital Onboarding processes based on them will expand to the extent permitted by law.

With adequate security measures in place, I firmly believe that digital authentication methods will be easier and more secure than traditional face-to-face authentication and physical document sharing.

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ACCELERATING DIGITAL TRANSFORMATION IN HEALTHCARE

BURCU BEKTAŞ GÜNEŞ

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CEO

Innovations in science and technology trigger change and transformation in many sectors. Healthcare is a $332 billion [1] giant industry that has been and continues to be, rapidly impacted by digital transformation. The renewed supply and demand process, especially with the significant impact of the COVID-19 pandemic, has accelerated the transition of healthcare services to the digital space. Value-oriented and patient-centred systems have replaced old, inefficient working conditions. These two concepts have frequently come up in the health ecosystem in recent years. In general terms, these concepts can be defined as a service delivery model in which patients' needs are identified and included in the treatment and care processes, at the lowest possible cost, with high quality and measuring outcomes.

The digital health sector causes service standards to rise day by day. The building blocks of digital transformation, such as cloud computing, artificial intelligence, wearable and portable technologies, the internet of things, big data, virtual and augmented reality, blockchain, 3D printers, etc., are causing significant breakthroughs in processes such as diagnosis, treatment, post-treatment and preventive health in healthcare systems. Digital technologies in health have already entered the daily routine. Applications such as smartwatches that measure heart rate and sleep quality, telemedicine applications that enable online consultations with physicians, artificial intelligence-supported predictive diagnostics, e-pulse, e-prescription, and Hospital Information Management Systems are being used unknowingly in daily routines and are changing the way people manage their health. Research has shown that significant savings will be achieved through digitalising health expenditures. McKinsey Global Institute estimates that the costs saved through various interventions such

as remote monitoring, artificial intelligence and automation could be between $1.5 trillion and $3 trillion annually by 2030 [2].

Digital Transformation Trends in Healthcare

Digital Transformation in Healthcare offers a realistic look at how it can improve factors such as innovation, strategies and processes, efficiency, quality, safety, remote monitoring, and measurable impact. Below are some of the most popular technological developments related to digitalization in health today.

Big Data: The healthcare industry is experiencing an exponential explosion of data every second. Each recorded data is combined to form big data. Today, about 30% of the world's data volume is generated by the health sector. In 2025, this volume is expected to increase to 36% [3]. Big data, if properly stored, processed and interpreted, enables inferences to be made in many areas, such as epidemiological distribution of diseases, health expenditure trends, patients' access to effective treatment, delivery of a newly produced drug to its target audience, personalized medicine applications, decision support systems. Big data holds enormous potential for less waste, improved processes and better medical care.

We can better understand how diseases affect different individuals with advances in genome sequencing and genomic association technology. It is possible to learn more about how a person's disease and response to treatment relates to their genetic profile and/or which drugs or treatment modality to use to treat that disease using the big data generated in this field.

Ingestible Technology: The future of medical devices could be ingestible electronics.

It is a system where a pill containing a sensor is swallowed, and this sensor sends in-body feedback about your health to your phone, or to your doctor. It allows patients and doctors to see how well they are progressing with treatment. Imaging can monitor drug absorption and compliance and measure and regulate the level of flora in the gut. With the notifications that come to the phone after the smart pill is swallowed, a reminder feature is also on the agenda for people who forget to take medication or take an incomplete dose of medication.

Telehealth: Systems where patients prefer to connect with doctors online and will become increasingly popular. It provides access to healthcare services for individuals in rural areas where access to healthcare institutions is difficult, provides quality healthcare services to people in need of care and the elderly, and saves time by making it easier to be examined by a physician in the comfort of home. The fastest growth in the digital health market between 2022-2030 is expected to be in telehealth [1].

Mobile Health (mHealth): The use of mobile health applications on smartphones or tablets is increasing rapidly. It is estimated that more than 50 million people worldwide use app-based self-

triage [4]. mHealth apps are commonly used for calorie and heart rate measurement, step counting, medication tracking, hydration reminders, mobile learning, disease and outbreak surveillance, fitness exercises, emergency medical response systems, and individualized monitoring of infectious diseases and chronic conditions.

Wearable Applications: The variety of wearable technologies is increasing daily as people want to have more say over their health and be able to monitor it continuously. Jewellery such as watches, wristbands, glasses, lenses, e-textiles, smart fabrics, headbands, rings and hearing aids are all wearable devices in use today. Wearable technologies enable long-term monitoring of physiological data, early diagnosis of diseases such as cardiovascular diseases, hypertension, diabetes and obesity, and the development of emergency treatments. For example, by developing a sports bra that can detect early signs of breast cancer, women can benefit from continuous monitoring without exposure to radiation. The information received can be sent directly to the physician or the phone and can be easily used for early cancer diagnosis. It is thought that birth control microchips and birth control pills may be history. With a microchip implanted under the skin, the hormone levonorgestrel, the hormone in the popular contraceptive pill, can be secreted every day. It can be turned off and reactivated at any time by the user with remote control.

Digital Twin: A digital twin is a digital copy of a business's tools, people, processes and systems. In health systems, digital twins are used to create digital representations of health data such as hospital environments, laboratory results, human physiology, etc., through computer models. This allows for optimal solutions and risk reduction, which is especially important in the healthcare sector. For example, by creating an accurate copy of a patient's brain, we can more accurately study their disease and learn how treatments work on human cells. Additionally, by creating a digital twin of a hospital, operational strategies, capacities, staffing costs, and care patterns can be observed to determine what actions to take, facilitating resource optimization and risk management.

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SUSTAINABILITY AND SUPERCRITICAL EXTRACTION

CAN KAYACILAR

Arşen Machinery
CIO, Director of Investments

Sustainability is becoming more and more important day by day. In this context, "sustainable energy" and "sustainable production" are the hottest topics. At the heart of these hot topics stand "agricultural production" and "biotechnology".

Due to the deepening of the climate crisis, increased consumption and changing living conditions, people are now more inclined towards more natural and concentrated foods, more natural ingredients in cosmetics, more alternative and safe treatment methods rather than medication, and also towards preventive medicine.

Biotechnology applications in agriculture are among the leading applications that facilitate the future, increase yield and ensure sustainability. In the future, with biotechnology applications, especially herbal components with scientifically proven health benefits should be purified from target plants with high technology or similarly, yeasts or bacteria should produce the target component with genetic modifications, and the produced component should be purified from yeast/bacteria cultures using high technology. The only technology that can respond to all these purification processes can be used as a green technology and can be applied at the highest scales in terms of energy efficiency and purification efficiency is "supercritical fluid technology".

Due to rising food prices in agriculture, people have begun to reduce their meals to one, having snacks for breakfast and lunch.

Herbal extracts with high antioxidant capacity and nutritious herbal ingredients have been sought to develop these snack foods and enrich food ingredients. In addition, even if our daily diet does not change, the antioxidant content of agricultural products obtained in traditional agriculture is low and therefore, there is a need for this

condensation technology and enrichment of foods in this way since people cannot get sufficient amounts of daily antioxidants that can protect their health.

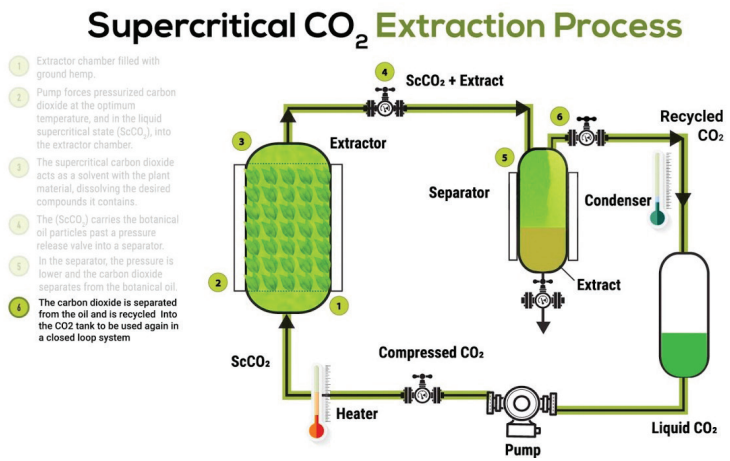
Thus, it can also be realized to increase the protective properties of foods against diseases. Foods with this type of content are called "Functional Foods".

The risk of residue in extracts or oils obtained with solvents such as ethanol and hexane is very high. The length of processing time in such solvents, the lack of the use of environmentally friendly chemicals and the obtained product factors such as the temperature and long time used during the removal of these chemicals from the tobacco, the quality of the extract obtained is very low, and problems such as decreased antioxidant capacity come to the fore.

In addition, in extracts obtained by all these methods, the chemical content of hundreds of active ingredients in the extract is converted into toxic components through different interactions.

"Supercritical extraction technology" comes to the forefront as a very innovative technology to overcome all these problems. While supercritical extraction technology has been used extensively on an experimental basis for the last 15 years, it has also started to be used on industrial scales due to the increasing demand after the pandemic and the rising need for natural ingredients.

Supercritical extraction technologies offer significant advantages in many aspects of herbal extraction. First of all, supercritical extraction technologies are not “expensive” technologies. Because when parameters such as the energy cost of the investment, labour and the installation area of the extractors, extraction efficiency and time



are calculated, supercritical extraction technologies are very cheap and environmentally friendly technologies with very low carbon emissions.

For example, while there is a working time of at least 4 hours to obtain the targeted product in steam distillation to obtain essential oil from rosemary, efficiency is obtained within 1 hour in supercritical. In addition, the antioxidant capacity of rosemary oil obtained by supercritical extraction has 14 times higher than that obtained by the steam distillation method **(https://www.sciencedirect.com/science/article/abs/pii/S0260877416304721)**. This allows to directly benefit from the medicinal benefits of the oil, obtain a standardized product and also to obtain a high-quality oil by extending the shelf life of the oil obtained.

Extracts obtained with supercritical extraction technology can be “full spectrum “ extracts with the full content. It is also possible to obtain single components by varying different pressure and

temperature parameters with supercritical extraction. For example, the direct purification of natural caffeine from coffee or tea can be realized with this method. Supercritical extraction technology can also purify all flavours from medicinal plants, vegetables and fruits.

Supercritical extraction technology mainly uses carbon dioxide as a solvent, but different solvents (such as water) can also be used in supercritical extraction devices. Thus, herbal extracts with very different parameters and very different contents can be obtained.

Advantages of Supercritical Extraction

Supercritical extraction equipment is not only specialized for processing a single product. This means that many plants can be processed with a single unit, and many different products can be obtained. This enables the production of products in very different ranges.

Products obtained with supercritical technologies are used to enrich and functionalize foods, produce different food components, and produce all active ingredients to be used in cosmetics. It is also possible to produce active ingredients for the pharmaceutical industry with this technology.

Supercritical extraction technology recovers the carbon dioxide it uses through recovery; thus, there is no “solvent cost” in the extract obtained. It is also very energy efficient as it provides low energy use.

Considering all these qualities, Turkey can obtain extracts and oils from thousands of medicinal and aromatic plants and high-value-added oils and extracts from waste products such as orange peels and pomegranate seeds.

In the context of the circular economy, supercritical fluid technology offers us many contributions. In this context, issues such as the extraction of oil and active ingredients from oilseeds with supercritical fluid technology and the extraction of vegetable protein and vegetable fibre from the pulp afterwards are among the most important issues that can be produced within the scope of the circular economy. The superiority of supercritical extraction in this regard has great advantages in that it can purify 99.9% of the oils from the target plant with an environmentally friendly technology and thus actually allows the extraction of vegetable protein and fibre from the obtained vegetable protein.

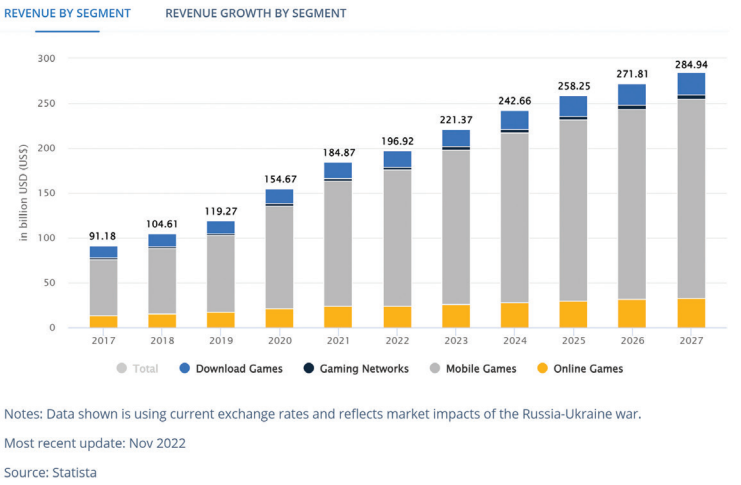
CURRENT STATE OF THE GAME INDUSTRY AND ANALYZES

ALİ CAN IŞITMAN

Maxitech

Corporate Innovation Expert

It is widely recognized that the gaming industry has been an exponential growth market since the early 2000s. Today, the market has reached a size of 197 billion US dollars, with huge production companies such as Electronic Arts, Bethesda, and Activision-Blizzard, electronics and software giants such as Microsoft, Sony and Nintendo, as well as countless independent producers. According to[1] Video Games - Worldwide report published by Statista, it is estimated that by 2027, the gaming market will reach USD 285 billion with an average growth rate of 7.67% and an average of 2.83 billion people will be positioned as consumers in some way. The largest segment in this market is seen as mobile games, with a market share of $150.5 billion, according to 2022 figures.



Source: Video Games Revenue by Segment, Statista, November 2022

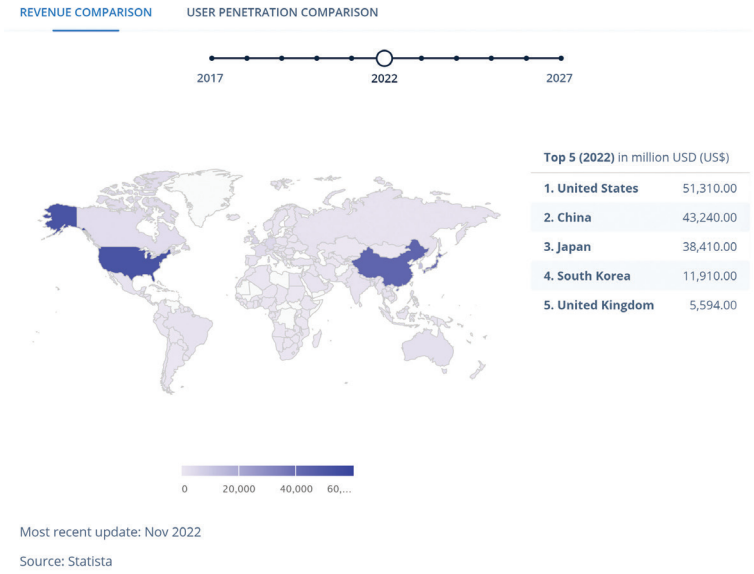
As all other Digital Media market segments have experienced in recent years, the gaming market is undergoing a revolution due to new business models such as subscription structures. Technical

innovations like subscription services such as Ubisoft Connect by Ubisoft, Xbox Game Pass by Microsoft, which allow producers to provide access to all of their games at a fixed price, and cloud gaming services that will enable gamers to stream games by accessing a computer in the cloud are likely to attract casual gamers, known in the market as "Casual Gamer", and revolutionize the way consumers play games in general.

All segments have seen strong growth due to COVID-19; however, the growth rate is expected to increase to 34.4% in 2020.k increase, the Mobile Gaming market was the most robust growing market, reaching a market size of USD 115.1 billion. Although growth rates are expected to decline over the years, the gaming market is expected to remain the fastest-growing digital media market.

Although the Mobile Gaming market started to experience difficulties in 2021 due to the banning of many gaming apps in China, it is expected that the Mobile Gaming market will begin to grow again and continue a steady increase thanks to new crypto-supported structures such as Play-to-Earn and Fun-to-Earn. However, other gaming segments are also expected to see an increase in user numbers from 2022 onwards.

has been progress in mobile game development in the Asian market, particularly in China, with China and South Korea accounting for the majority of the mobile game market.

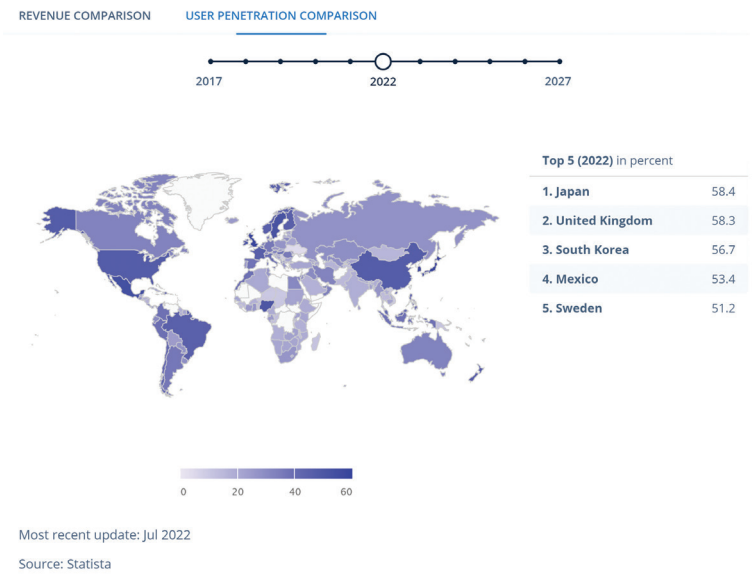


Source: Global Revenue Comparison, Statista, November 2022

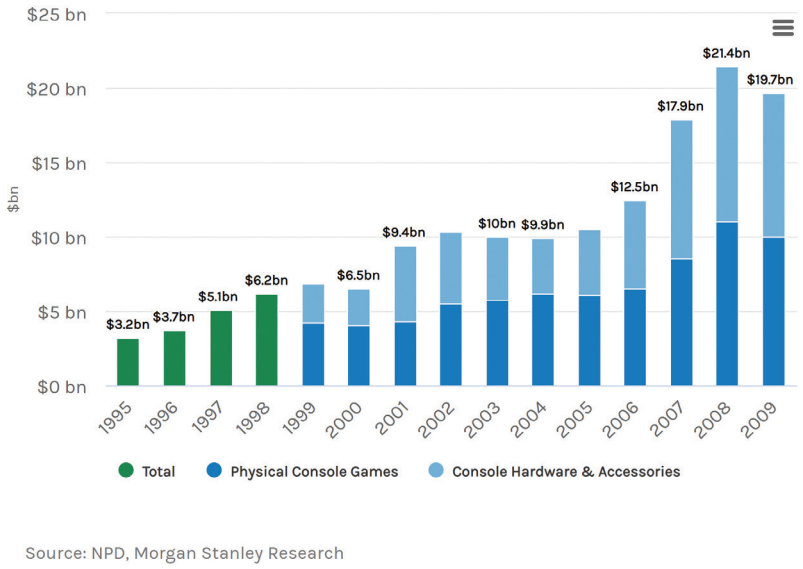
Number of Users and Market Share of the Games by Countries

Today, game development is taking place in many countries, including Turkey. Still, most of the market is dominated by the US (USD 51.3 billion), China (USD 43.2 billion), Japan (USD 38.4 billion) and South Korea (USD 11.9 billion). The high-investment and mass-market Triple-A games are developed mainly by US companies in their professional studios in the US and Canada. In contrast, there

Games developed in these countries are consumed in almost every corner of the world. In Turkey, 21.2% of people with access to such products already consume games. This figure increases in parallel with the welfare levels of countries. Penetration rates on the European continent are between 30% and 45%, reaching 50% in Scandinavian countries such as Sweden and Norway and 58% in countries such as the UK and Japan.



Source: Global User Penetration Comparison, Statista, November 2022



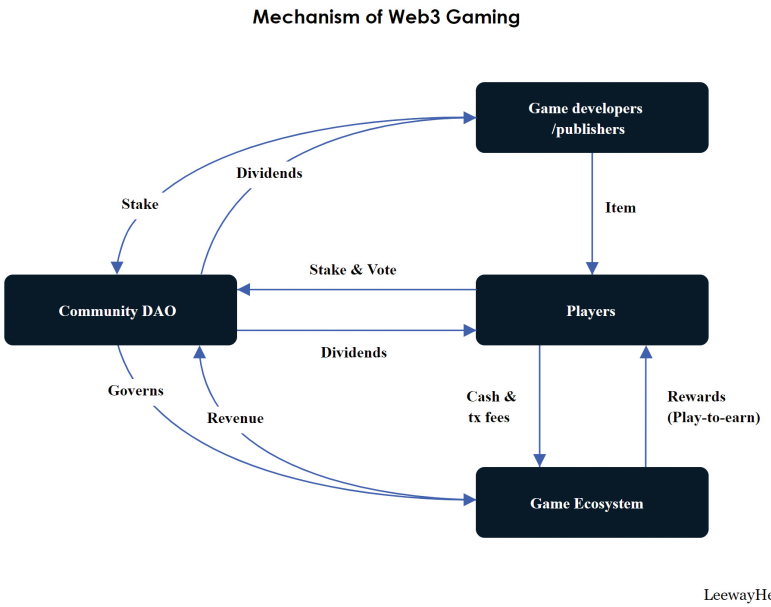
Source: Global gaming expenditure by year, 1995-2009, Morgan Stanley, November 14, 2022

COVID-19 has had a significant impact on both growth and penetration figures, especially between 2020 and 2021. The gaming industry, which had previously experienced record growth and its best performance in history despite the economic downturn in 2008, also experienced record growth during the COVID pandemic. It was seen as a social activity and a way of passing the time, especially at a time when people were staying at home and working remotely, and it continued to grow. Historically, in times of economic contraction, consumers have increased their spending on games[2].

Web3.0 And Its Repercussions In The Gaming World

Since Web 3.0 emerged, it has revolutionized many industries, including the gaming industry. Unlike traditional game structures, it was created in exchange for players spending their time on a game, allowing them to turn this time into earnings through NFTs and cryptocurrencies. This earning structure has democratized games from being 100% controlled by the producers to a medium where players have a say.

Web 3.0 games are being developed by integrating blockchain structures into the gaming ecosystem. Through this structure, NFTs and similar assets are given to players in exchange for time played and achievements. Thanks to this structure that makes players stakeholders, players can communicate to the game makers how they want the game they play to develop and directly impact the game.



Source: Web 3.0 Gaming Mechanics, All About Web3 Gaming, LeewayHertz, 2022

In addition, thanks to the decentralized structure of Blockchain, traditional games controlled by central servers are transformed into decentralized and self-sustaining structures[3]. This structure prevents malicious actors from interfering with the game and exploiting players, resulting in a transparent game. In addition, distributed and single-point-of-failure-free structures are formed, and the maintenance time of games is reduced to a negligible level[3].

Thanks to these developments, in the first quarter of 2022, investment in and play of blockchain-based games increased by 2000%[4] and accounted for 52% of blockchain activity in the first quarter of 2021[4]. Blockchain-based games were used by 1.22 million unique active wallets (UAWs) in the same quarter, leading to USD 2.5 billion invested in these structures in the first quarter of 2022[4].

In blockchain-based games, the possibility of earning while playing, thanks to models such as Play-to-Earn, and the scandals experienced by major US-based game producers over the past year (the European Commission has investigated EA Games for gambling activities in its games. We can see that gamers are also switching to such blockchain-based games as they want to get away from the environment created by the investigation of Activision-Blizzard, the harassment and mobbing incidents experienced by Activision-Blizzard's employees, and Microsoft's threat of monopolization in the industry by acquiring major game producers.

2023 and Beyond

The Metaverse, another new concept brought to our lives by blockchain technologies, has been welcomed by a large segment of gamers with the perception that the environments shown in science fiction movies are now possible, which has led to a broader acceptance of VR equipment and the development of games to use these structures. The rate of people gifting games to others on Amazon increased by 35% in 2022[5].

Although the gaming industry seems to have slowed down and even regressed a bit after the pandemic as people started going out again, the data shows that it will continue to grow more robust than before and reach more people yearly.

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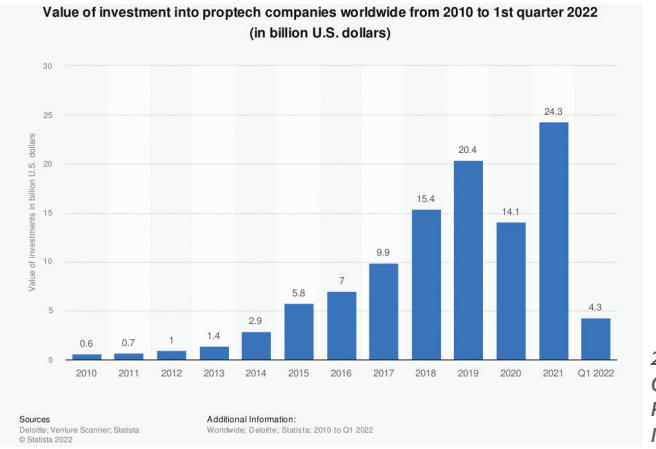
NEW FOCUS FOR ENTREPRENEURS: REAL ESTATE

ERDEM ESER EKİNCİ

Maydanoz
Co-Founder

Real estate has been the locomotive of domestic markets, one of the primary metrics of economists, and the most trusted investment instrument of investors in almost every country for a long time. Global developments in recent years have also reinforced the perception that it is the most profitable investment instrument of all times. These habits are cited as one of the biggest reasons for the delay in reflecting current technologies in the real estate sector. So much so, why take the innovation risk when you can already win with standard methods?

But this is not likely to continue. Because technology is in search of new markets. The labour-intensive, non-digitalized real estate sector is the target. Initiatives that innovate in this direction using information technology to search, buy, sell, finance and manage the property, are classified as PropTech (or Commercial Real Estate/CRE Tech). According to Statista's data, the value of investments made under the PropTech banner since 2010 has tended to increase in the big picture, despite the pandemic and the economic downturn that followed. It reached a new peak of $24.3 billion in 2021.



2010 - 2022 Q1 Worldwide Proptech Investments[1]

We see that not only the value of investments has reached, but also the startup population has increased significantly in the last 10 years, reaching 9000[2]. It is challenging to classify interference in this atmosphere. This is made more challenging by the fact that PropTech is heavily involved with FinTech and ConsTech solutions. However, if one still wants to analyze the initiatives, evaluating them under five sub-headings will provide a remarkable convergence in perceiving where the solutions are focused.

- **Ad Publishing Services: Platforms for listing properties for rent and for sale,**
- **Property Sales Platforms: Platforms that facilitate cash flow in the procurement of a new property by purchasing it without waiting for moving from the current property during the property change process,**
- **Financial Instruments: All financial instruments used in the trading process, from payment methods to debt services,**
- **Termination Tools: Tools that speed up contracts, insurances and similar bureaucratic processes in sales and rental processes,**
- **Property Management Tools: Solutions that can be monitored and managed even when away from the property, supported by IoT solutions,**
- **Mortgage/Lease Management Systems: Income/expense tracking tools integrated into digital wallets.**

Despite this inflation of investments and startups and the growing number of global unicorns in the space, no one major has managed to dominate the market. This further increases investor appetite. A survey[3] conducted in 2019 pointed out that more than 80 per cent of commercial real estate capital investors expect PropTech to have a significant or moderate impact on the sector globally; however, in 2022, this target has still not been achieved. At least in terms of data integration, we have yet to see a solution that can shape the market standard and take the form of a super app.

It is clear that for this standard to be established, it will not be enough to look only at the problems in the field but must be evaluated simultaneously. When we look at the life cycle of a real estate property, we see that it is spread over a much more extended period of time than other products. However, if we evaluate interactions through changes in ownership and tenure, we can analyze the phases of the life cycle and stakeholders much more realistically.

There are 5 phases in the real estate, landlord/tenant relationship. The first is before the move. The need to acquire property is identified as a result of changes in living standards, changes in circumstances such as marital status, job and school changes, or needs arising from security or environmental changes in the area. The information collected here is used for analyses that many institutions and organizations can use in their activities, from investment companies, advertising companies or construction companies to identify investment areas. The second phase is market entry. Once the need is clarified, this phase includes activities such as searching on advertisement sites, conducting market analysis for the person who will acquire a property, and making the right decision by getting support in managing the property portfolio, if any. Then comes the closing phase.

This phase includes bureaucratic steps such as completing payment, contract and insurance procedures. The fourth phase is the transportation phase. Here, necessary renovations and decoration work, if any, are carried out in addition to the physical transportation of goods. The final phase, post-move-in, involves interactions regarding the physical health and safety of the property, as well as payments.

Considering both the length of the life cycle and the high volume of transactions in financial terms, each round creates a significant intensity of activity for real estate. Since this intensity is also a sign of significant changes in human life, PropTech's coming of age is a harbinger of changes and developments for other markets as well. Initiatives such as Cohesion and HqO are positioning themselves as "property operating systems" and claiming that properties will be able to collect data and interact as much as mobile devices in the future. In-home and office environments that are constantly monitored by sensors and cameras, it is possible not to collect much more comprehensive data on the standard of living due to the individual's preferences and social relations. Still, first of all, there must be a change in the field to ensure standardization. At this point, it is necessary to see the formation of a striking application that will grow by utilizing artificial intelligence, the internet of things or blockchain technologies and the atmosphere that will take shape around it.

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CYBER SECURITY AND CYBER WARS IN DEFENSE INDUSTRY

ÖMER ÖZKAN

HAVELSAN Information and Communication Technologies

Vice President

The structures that human beings have created throughout history and their lifestyle have gained an integrated structure with information systems. Today, communication between people and institutions is primarily carried out with infrastructures and digital systems that communicate over the internet and mobile networks. Governments, public institutions, the private sector, the defense industry, social media platforms and many other areas generate huge amounts of data to communicate. In order for data to be securely transmitted, stored and evaluated for the future, it is imperative to ensure the security of the internet environment, which is the communication path of digital systems. Today, there is an intense threat to the data available on the internet, especially in critical industries and infrastructures such as energy, health, finance and communications. Such threats are designed and implemented as software/hardware attacks focused on the data or system targeted to be captured in the cyber environment and are generally referred to as cyber attacks. For this reason, cyber security activities have emerged in the integrity of software, methods and efforts to ensure the security of data that provide benefits for the security of the cyber environment. Cyber security is defined as the common area of work that uses technologies, processes, individuals and security controls to protect large-scale systems, devices on networks and the critical data they contain from attacks and reduce the risk of attacks.

It can be stated that the first cyber-attack in history, which is similar to today's scope, was in 1988 when a computer-centred malicious program belonging to the Massachusetts Institute of Technology (MIT) was uploaded to the internet. Nearly 10% of approximately 60,000 computers connected to the internet were negatively affected and came to a standstill (Federal Bureau of Investigation, 2022). Based on this information, it is evident that there is a phenomenon

that cyberattacks started 34 years ago. Another piece of information that it would be healthy to consider about cyber-attacks that show a rapid increase over time is that there was a 102% increase in ransomware attacks from early 2020 to the first half of 2021 alone (The New Ransomware Threat: Triple Extortion, 2022). As a result of the studies and research conducted within the scope of cyber security, it has been determined that attack techniques such as Malware (worms, viruses), Ransomware (ransom), Phishing (phishing), DoS (denial of service) and DDoS (distributed denial of service) and Man-in-the-Middle (man-in-the-middle) are mainly used in cyber attacks. With these techniques, computers or networks can be rendered inoperable by the involvement of a third user, phishing can be carried out via a link sent via e-mail, and the system can be overloaded and crashed with multiple false signals. As a result, real and legal entities have the potential to suffer financial and moral losses and, subsequently, reputational damage on a larger scale. The largest structures affected by reputational damage are states, and states respond to the reputational damage caused by attacks by exercising their right to self-defense. In this way, attacks in cyberspace can essentially turn into international wars. Cyber wars are situations in which a country uses cyber-attacks to attack the computer network systems of another country's high-level institutions or technologies, causing permanent damage, destruction or gaining advantage through activities such as espionage. The number of cyber wars has increased exponentially over time, with the number of cyber-attacks between countries approaching 1 million per day, which is considered inevitable. One of the most important cyber attacks in the history of cyber security is the Stuxnet incident. Stuxnet is a malicious computer worm software, a type of malware cyber-attack discovered in 2010 and allegedly developed over more than five years (Schneier, 2010). The Stuxnet attack is believed to have originated from US and Israeli sources against Iran's nuclear facilities in Bushehr and Natanz, despite Iran's suspension of its nuclear program. One of the current events that is likely to have a significant place in the history of cybersecurity is the state of war between Russia and Ukraine. On February 24, 2022, Russian troops launched a full-scale attack on Ukrainian territory, including physical attacks and simultaneous cyber attacks by Russian cybersecurity experts. These cyber-attacks' primary objective was to permanently damage and neutralize Ukraine's infrastructure. The cyber attacks caused power outages in the country by taking control of energy centres, water outages by infecting water supply systems with malware, and damage to command and control systems to enable Russian troops to advance quickly on the ground. It is worth mentioning that the financial loss from cyber wars and cyber-attacks has doubled globally from USD 3 trillion to USD 6 trillion between 2011 and 2021. The loss is estimated to cumulatively reach nearly USD 10.5 Trillion by 2025 (Braue, 2021). These figures reveal how critical the activities carried out in the cyber environments of today's world are.

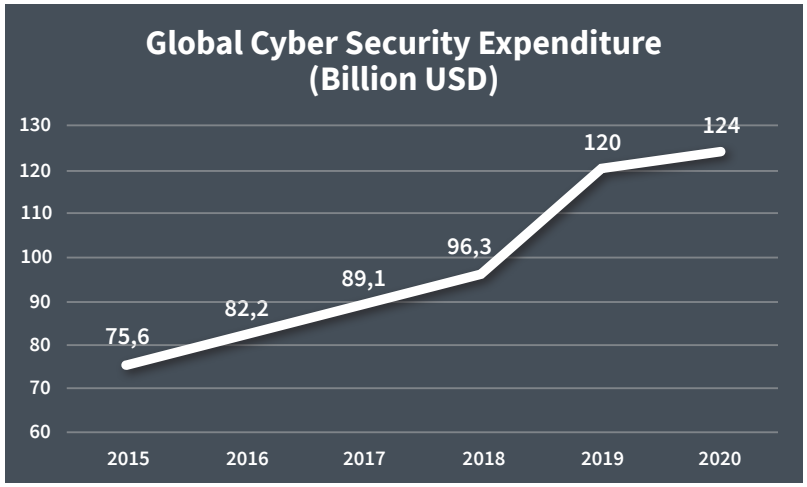
The figures obtained are evidence of the increase in spending on cyber security needs with the increase in data generated on the internet. It is clear that the spending has more than doubled in just one year due to the intensified use of the internet environment and the increase in the data generated, especially with COVID-19. In this context, we believe that the expenditures made to ensure the security of cyber environments have increased yearly and will continue to do so. The work carried out in this field should be increased to higher levels. These are presented in Table 1, Table 2 and Table 3.

Within the Turkish defense industry's scope, cyber security activities focus on products and solutions that aim to benefit our country

with Information and Communication Technologies competencies. The studies and services provided in the fields of informatics and security are of great importance in terms of establishing the security of our country in the cyber environment.

The cyber environment, which is expanding in volume especially in the digital age, also incorporates research and development in the military field. Today's defense industry activities require full protection of the security of the cyber environment in order for physical munitions and vehicles to work in the most accurate way and to ensure uninterrupted communication. Studies, exercises and critical parameters such as military power in areas such as land, air and sea have traces in the cyber environment.

The fact that the internet broadly supports the software and feasibility capacities of military technologies and that data is exchanged for evaluation between devices and personnel in the internet environment makes it necessary to eliminate the security vulnerability of technologies in the cyber environment. In light of the evaluations, the efforts to prevent unauthorized data output, balance the network traffic and ensure the sustainability of the works, to focus on areas such as the establishment of security in the transfer of critical data such as energy and finance, will affect the Turkish defense industry as high value-added works. As the Turkish Armed Forces Foundation, HAVELSAN, which has the necessary responsibility for informatics and trust, successfully undertakes its responsibilities and offers its value-added works ready for the use of the Turkish defense industry. A domestic data leakage prevention (DLP-Data Leakage Prevention) product focused on preventing unauthorized data exit outside the institution such as "Barrier",



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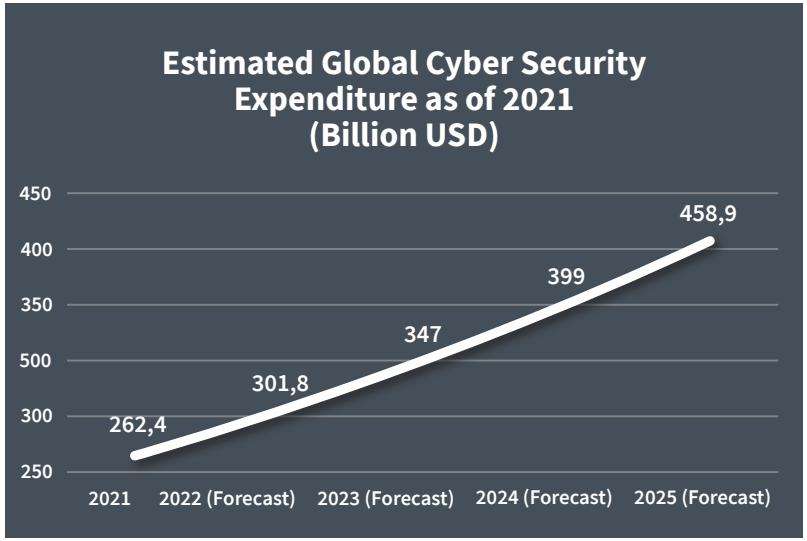
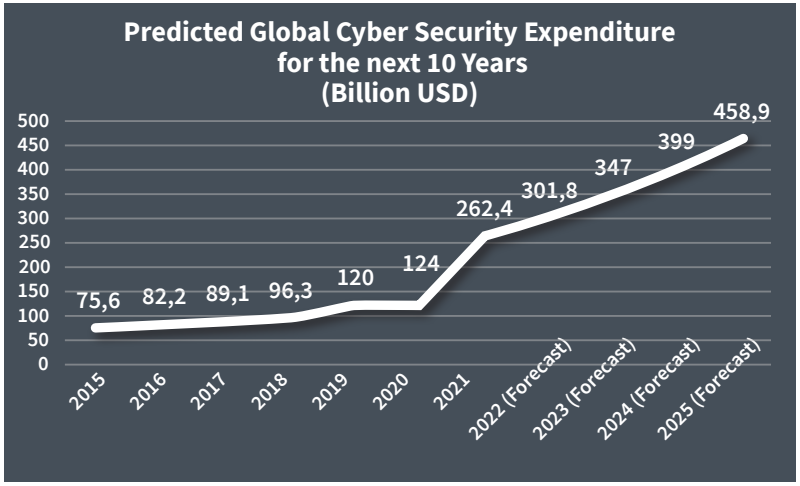


Table 2

Firewall software developed with 100% national opportunities such as “Shield” and providing load balancing for very high-level network traffic, Data A modular solution that enables the transfer of sensitive data such as diodes with isolated networks; It is actively defined and in use within the scope of the Turkish defense industry and military technologies. In addition, the "Cyber Security Cluster Project", supported by the Presidency of Defense Industry and the Digital Transformation Office, was commissioned in 2017. In this context, it has been taken as a duty to ensure the complete security of the cyber environment data in which our country has a trace and which has a path in our country, and efforts have been made to support the development of our country's cyber security sector and to increase its competitiveness. Under the leadership of the Cyber Security Department of the Digital Transformation Office of the Presidency of the Republic of Turkey, information security for public institutions and organizations development of control systems, identification of critical infrastructures, and support of national cyber security efforts at home and abroad (Department of Cyber Security, 2022). Social adoption and prioritization of the cyber security factor within the Information and Communication Technologies, our country's defense industry cyber security even security products and solutions to be more useful and to accelerate efforts to increase their impact.



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QUANTUM ENTANGLEMENT, SAFER COMMUNICATIONS AND THE FUTURE OF THE INTERNET

JALE İPEKOĞLU

Maxitech
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In parallel with the recent surge of interest in quantum computers, quantum computing and quantum technologies in general, the Nobel Prize in Physics, one of the highest honours given to scientists, has supported these developments. In 2022, it was awarded to three scientists for their experimental work in quantum mechanics. *The story of the prize shared between John Clauser, Alain Aspect and Anton Zeilinger for their "pioneering work in quantum information science with their experiments on entangled fo tones and their demonstration of the violation of Bell inequalities"* begins in the 1930s and the experiments that led them to the prize were only finalized in 2017. Theoretical thoughts that started about 90 years ago continued with Clauser's transfer of these theories to experiment at the end of the 60s, and after Aspect in 1982 and finally, Zeilinger in 2017, concluding their experiments in a way that almost clears all doubts, they are now awarded the Nobel Prize—considering that Alfred Nobel's will should be "the award given to those who provide the greatest benefit to humanity" it indicates that we are on the threshold of the days when quantum entanglement will lead to breakthroughs from university laboratories to inventions that humanity can benefit from.

Quantum entanglement, along with superposition, another phenomenon unique to quantum mechanics, is a property that underpins current quantum computing research and hardware technologies. According to this property, when two particles become "entangled", they remain in a state of connection that lasts until they are observed, even when the particles are many kilometres apart. That is, even though they are not physically next to each other, their behaviour depends on each other. When one of the particles is observed, the other particle in the entangled state changes its state *instantly* depending on the other, and the entanglement is over.

This means that an observer measuring one particle can accurately predict the corresponding measurements of a second observer observing the other particle far away.

The units referred to here as particles can be atoms, photons or electrons, and entanglement can be observed through measurements of physical properties such as position, momentum, spin and polarization.

In addition to being one of the fundamental building blocks on which the computations in quantum computers are based, other applications being explored on the commercial side range from secure communication via quantum internet to the teleportation of information by exploiting the mutual influence of two quantum entangled particles far away from each other, to innovative blockchain infrastructures. For example, establishing unbreakable secure communication channels using quantum entanglement is a current focus of researchers interested in quantum technologies.

In the encryption of traditional communication channels, the sender uses a key to encode the information, and the receiver uses a key shared between the two parties to decode the message. However, there is a possibility that a third party may try to obtain information about the generated key and compromise the security of the information. In classical communication without quantum technology, it is tough to crack the cyphers used today, but with the advancement of quantum computing research, it is not impossible. For this reason, researchers aim to completely close this security gap by ensuring that quantum entanglement, by its very nature, maintains its state until it is observed. So while quantum technologies are seen as a threat to today's passwords, they are also seen as the next step in making classical communication channels more secure. This prediction is based on the fact that particles in quantum states, when observed, instantly reveal information and lose their quantum state.

Establishing unbreakable communication lines using quantum key distribution *[Quantum Key Distribution (QKD)]* technology, quantum entanglement is no longer just a strange phenomenon whose behaviour is being understood academically but is now a promising commercial tool for humanity. In quantum key distribution, information about the key is transmitted via randomly polarized photons. The polarization of the photons is adjusted either up/down or left/right. The receiver can use polarizing filters to decode the key. Encrypted data is still sent over normal communication channels, but no one can decode the message unless they have the quantum key. Due to the rules of quantum mechanics, observing polarized photons means that the photons will change their state, and any eavesdropping attempt alerts the communicating parties to a security breach.

Since the beginning of the 2000s, research on the subject has been carried out rapidly. For example, the first bank transfer using entangled quantum key distribution took place in Austria in 2004.

Current developments in this area are driven by research by major telecommunications companies and private initiatives in the areas of secure data communications, quantum encryption and quantum internet.

In April 2022, British telecommunications company British Telecom and Japan-based *Toshiba* launched a quantum internet trial project connecting two areas in London. With this project, which started in 2021, British Telecom undertakes the operation of the network infrastructure, while Toshiba, which received an award from the Institute of Physics *(Institute of Physics)* for the technology it developed in 2021, provides quantum key distribution hardware and software. The UK-based consulting firm *Ernst & Young* has become the first commercial customer of the application and announced that it would work on the benefits of quantum key distribution for its clients.

In June 2022, the Canadian-based company Quantropi, which aims to provide secure data communication based on quantum technologies, will launch quantum key production and distribution in Berlin, thanks to their collaboration with German telecommunication giant Deutsche Telekom and Calian Group. This consultancy company offers innovative solutions in the fields of communication and security. They published a study in which they tested the technology.

OpenQKD, which brings together academic institutions, large telecommunications companies and small and medium-sized enterprises, continues its efforts to develop and deploy quantum-based secure communication systems across Europe.

One of the ultimate goals, the quantum internet, is another long-term research topic that utilizes quantum entanglement. The quantum internet applications, which have attracted global attention, go beyond secure communication. Another technology currently being explored is creating a quantum information network by interconnecting quantum computers and processors that need to be kept small and isolated, which is still under development and using quantum processors for even more complex calculations.

QuTech, a quantum computing and quantum internet research institute in the Netherlands, has put forward a roadmap for quantum internet on a global scale. Firstly, the widespread use of the quantum key distribution, the use of quantum repeaters (quantum repeaters), which are also being developed by utilizing quantum entanglement, and then the development of quantum memory technology.t is aimed at enabling quantum computing through fully distributed systems by interconnecting quantum computers and enabling quantum states to be maintained for longer periods of time.

In 2020, the US Department of Energy published its quantum internet plan for the coming years. US officials and scientists have begun laying the groundwork for a next-generation Internet network based on quantum computing technology whose security is virtually unbreakable.

Within the scope of the Quantum Internet Alliance *(Quantum Internet Alliance)* project, which is one of the 25 projects of the Quantum Flagship *(Quantum Flagship)* program launched in 2018 and led by QuTech, Europe is supporting academic institutions, telecommunication operators and quantum technology startups to create the world's first prototype of a large-scale quantum network. In October 2022, it was announced that the goal of this three-and-a-

half-year project, the first phase of which has a budget of 24 million euros and is planned to last seven years in total, is to test quantum network experiments set up in laboratories to see if the quantum to transform it into a general quantum internet infrastructure that will allow communication between any two points on earth.

With the 2.8 million Euro state-supported project called AQUNet, launched in 2021, Austria aims to make the fiber optic infrastructure between Vienna and Innsbruck capable of handling sensitive quantum signals within a five-year plan. The project partners are the Vienna University of Technology, the Universities of Vienna and Innsbruck and the Federal Office of Metrology and Measurement (BEV). The project aims to investigate whether a quantum internet infrastructure can be established by utilizing existing communication infrastructures, the technical challenges, environmental impacts and how far quantum signals can be transmitted without distortion.

SK Telekom, a South Korean telecommunications company, has carried out pilot quantum key distribution projects for many industries with ID Quantique, a Swiss-based quantum cryptography company owned by SK Telekom. In addition, the company announced in July 2022 that it is working on expanding into defense and government markets in cooperation with Korean cryptography companies.

Again, China, one of the leading countries in quantum communication research, sent its Micius satellite into space in 2016 to develop quantum encryption and quantum teleportation technologies over long distances. With this project, which has a total budget of 100 million dollars, China aims to establish a global quantum internet network by 2030.

Within the scope of the Europe-based European Quantum Communication Infrastructure *[European Quantum Communication Infrastructure (EuroQCI)]*, which has a similar vision to this project of China, the European Space Agency *(European Space Agency)* plans to launch its satellite named Eagle-1 in 2024.

Challenges to Overcome

Establishing secure communication, distributed and more powerful quantum computing networks face several obstacles that are not encountered in classical communication and must be overcome. In classical communication, information can be encoded into thousands of photons, or extra copies of that information can be created. For photons lost in the path, a repeater *(repeater)* can be used to read the signals and amplify the existing ones with additional photons. In quantum communication, the main difference is that it works at quantum scales, and it is necessary to use a single photon to encode the quantum state and entangle it with another single photon.

If this single photon disappears, the information is lost. It is much more difficult to transmit a single photon while perfectly preserving its quantum state. The signal amplification in the classical sense by multiplying photons, i.e. copying information, is not possible at quantum scales due to the "no-cloning theorem" or "no-cloning theorem". This theorem simply states that "an arbitrary quantum state cannot be copied to create two separate particles with the same state." Only through entanglement can the transmission of information be made possible so that information does not need to be copied. It should be emphasized that this does not mean that it allows faster-than-light communication or teleportation of real matter since a classical channel is still needed to observe information and draw meaningful conclusions.

Conclusion

The main commercial focus of recent research is on government agencies and companies operating in the military and defense sector, which require high security. In the coming years, quantum entanglement is expected to bring groundbreaking progress in the field of communications when implementation challenges can be overcome and faster, more secure and more efficient infrastructures can be built with lower budgets. The fact that the Nobel Prize was awarded nearly 50 years after the start of experiments on quantum entanglement is one of the proofs that these discoveries have had a positive impact on "the greatest benefit to humanity".

You can access similar use cases in quantum technologies, quantum encryption and quantum internet through Maxitech's new innovation platform entrapeer.

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SMART SOCIETY AND TECHNOLOGY OF THE FUTURE

EMRAH TOMUR

Ericsson

Head of Ericsson Research Türkiye

Digital infrastructure plays a critical role for today's societies in addressing social, environmental and economic challenges worldwide. The Covid19 pandemic has shown us how important networks, digital maturity, literacy, connection speed and security are. If we had caught the pandemic at a time when the network infrastructure was not mature, it is not difficult to imagine how our economy and integration with the world would have been affected.

As Ericsson, we serve an essential purpose in technological transformation: The Smart Society of the Future. And we believe that with 6G, completely different experiences will emerge that will exceed today's expectations. The intelligent network platform (the intelligent network platform) is being reimagined as a structure that is not limited to connectivity but goes far beyond that, meeting brand-new needs and providing brand-new features.

While we continue our digital transformation with 4.5G in Turkey, many countries are experiencing 5G, and Ericsson is preparing for 6G. Today, a quarter of the world's population now uses 5G. 5G has become the fastest-expanding mobile communications technology in history, and it is estimated that by 2027, 5G will cover 75% of the world's population.

By the end of 2021, 4G covered 85% of the global population. This rate is expected to reach 95% in 2027. A total of 809 commercial 4G networks are currently in operation, 336 of which have been upgraded to LTE-Advanced and 54 to Gigabit LTE.

In addition, 5G technology, the successor of 4G, has entered the implementation phase with 210 commercial networks. By the end of 2021, 5G's coverage of the world's population was recorded as 25%, while 4G took 18 months longer than 5G to reach this level of

population coverage from the year it was introduced. In summary, 5G is spreading much faster than 4G.

Legacy network technologies are coming to an end in Europe

Service providers are approaching the retirement of network technologies in different ways worldwide. European service providers are implementing different strategies. One of Switzerland's major service providers has retired 2G network technology by 2021 and plans to retire 3G technologies before 2025. In Germany, different service providers discontinued the use of 3G technology last year, and by 2025 at least one service provider is expected to discontinue the use of 2G.

Similarly, the Czech Republic and Norway have seen several 3G phase-outs in the past year, and both countries are expected to phase out 2G technology by 2025. In the UK, there are also efforts to phase out 3G before 2G. Unlike their European neighbours, service providers in France plan to phase out 2G and 3G after 2025.

There are various reasons behind the different plans to phase out 2G and 3G. IoT dependency on GSM is one of the reasons. Today, many IoT devices operate with 2G support and have a longer lifespan than regular cellular devices. 3G, on the other hand, supports electronic devices in IoT in general, and their lifespan is close to that of regular cellular devices. Therefore, while retiring 3G technologies can benefit service providers considerably, the same cannot be said for 2G. The retirement of 3G frees up a significant amount of spectrum that service providers can use for 4G and 5G applications. In addition, from a spectrum perspective, keeping 2G technology operational can be achieved without requiring many resources. As a result, reducing the number of actively used network technologies is seen as essential for service providers to reduce the total cost of ownership.

5G's share of mobile data traffic grows

With the continuous adoption of smartphones and increases in video consumption, mobile data traffic is growing. 5G will account for around 10% of total mobile data traffic by 2021.

By the end of 2021, total global data traffic (excluding fixed wireless access (FWA)) reached 67 EB per month. This value is expected to grow 4.2 times by 2027 and reach 282 EB. When the traffic generated by fixed wireless access is included, total mobile data traffic will be 84 EB per month at the end of 2021, while total mobile data traffic is expected to reach 368 EB per month by 2027. It is estimated that video traffic currently accounts for 69% of this mobile data traffic. This rate is expected to increase to 79% by 2027.

Mobile data traffic growth is projected to outpace forecasts in markets with large populations integrating 5G early. As of 2021, 5G accounts for approximately 10% of total mobile data traffic. By 2027, according to forecasts, this rate will rise to 60%.

Mobile data traffic growth varies across regions

The growth of mobile data traffic varies widely across years and regions. Given the global situation, the growth in mobile data traffic per smartphone is driven by three main factors: increased device capacity, an increase in data-intensive content and an increase in

data consumption due to continuous improvements in the network performance.

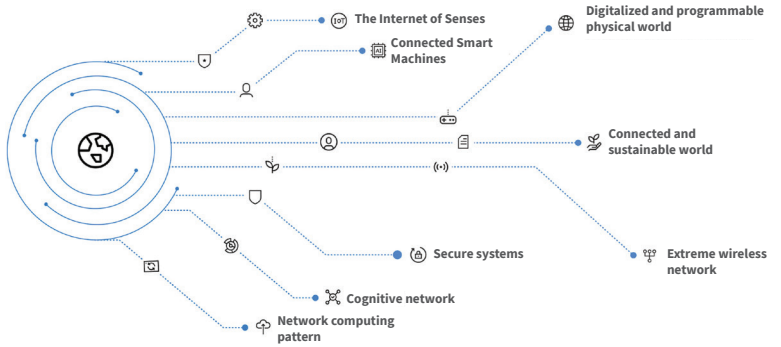
Differences in these factors are directly reflected in the regions' mobile data traffic size. For example, as of 2021, the average monthly mobile data usage for a smartphone in the Gulf Cooperation Council for the Arab States region is recorded as 22 GB, while the average monthly mobile data usage for a smartphone in sub-Saharan Africa is recorded as 3 GB. Globally, while the average monthly mobile data usage for a smartphone is 15 GB, this figure is expected to rise to 40 GB by the end of 2027. In summary, mobile data traffic, the main revenue item for service providers today, is growing exponentially and will continue to do so. Service providers are accelerating their investments to grow this revenue line.

What will the future bring?

At Ericsson, we are working towards a future where application areas such as the "internet of senses" and "communication between smart machines" will be possible. We are already investing in R&D to ensure that today's robust 5G network platform continues to evolve into the 6G era.

Our research agenda includes a series of technology journeys towards 2030 and the 6G era. These technology journeys outline our view of technology development in the coming years and guide our research activities.

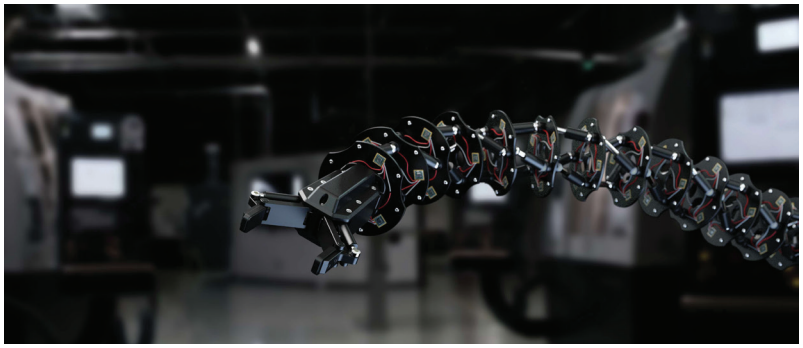
Our 2030 vision can also be expressed as our 6G vision. 2030 will be the time frame in which we see 6G emerging as the intelligent network platform of the future. We now have a broad definition of 6G, including all the aspects highlighted by technology journeys.



What technologies await us?

The internet of the senses

The internet of the senses is a vision of the future where extended reality offers a whole sensory experience and where extended reality is indistinguishable from physical reality. With the Internet of Senses, we will be able to touch and interact with hologram objects and even smell and taste them.

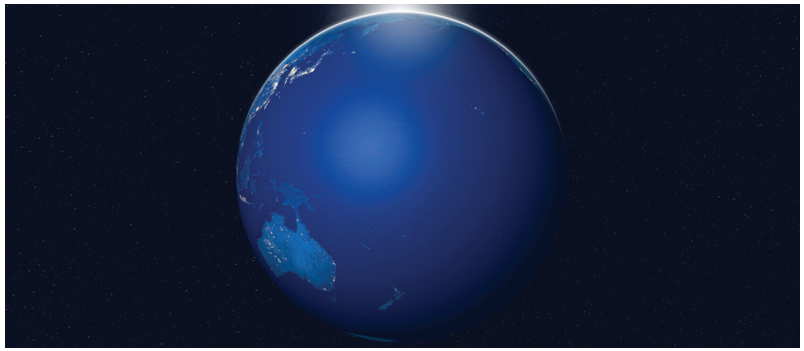


Connected smart machines

Connected smart machines are a future scenario where traffic on mobile networks is dominated by ubiquitous systems of machines, intelligent agents and communicating artificial intelligence, rather than traffic consumed and generated by humans.

A digitized and programmable physical world

A digital representation of our planet can be created in a digitised and programmable physical world. Every physical object can have a digital twin that captures its state and behaviour in real-time - past, present and even future.



Connected sustainable world

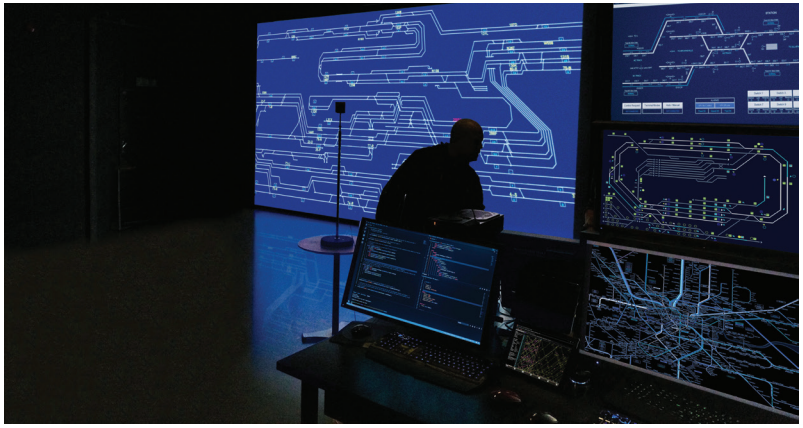
In a future scenario of a "connected, sustainable world", information and communication technology (ICT) can enable us to live on a better planet. Technology can enable us to tackle global challenges and realize the United Nations Sustainable Development Goals.

Extreme wireless network

Extreme wireless is a vision of mobile networks enabling unlimited connectivity for all applications, enabling everyone and everything to be genuinely connected anywhere and anytime.

Reliable Systems

Trusted Systems is to improve network security to encompass privacy, reliability, availability and elasticity, making it available for even the most mission-critical applications in the future.



Cognitive Network

A Cognitive Network is a fully autonomous network that can learn independently and make inferences from what it learns. It has the ability to solve new kinds of problems on its own without involving humans in the loop, using the knowledge it has gathered in the past.

Network compute texture

The network computing fabric integrates connectivity with real-time computing and storage at the network edge, turning the network into a unified execution environment for distributed applications.

Each technology area has its own transformative potential. But the cumulative effects of technological developments will bring about fundamental transformations. As an example from the past, smartphones have combined technology development in processor, memory, cloud, connectivity and battery to realize a fundamental change. More recently, additional transformative technologies have emerged, such as artificial intelligence, edge computing, the Internet of Things (IoT), extended reality, new computing paradigms and smart materials.

Over time, the advancement of technology will create an entirely digitized, automated, and programmable world of interconnected people, machines, objects, and places. All experiences and sensations will be transparent across the boundaries of physical and virtual realities. In this new world, humans and machines that serve us will be enriched by intelligent interactions with each other and autonomous systems.

The network platform will act as the backbone of the digital infrastructure, with the ability to carry important messages, commands, intelligence and all the necessary sensory information.

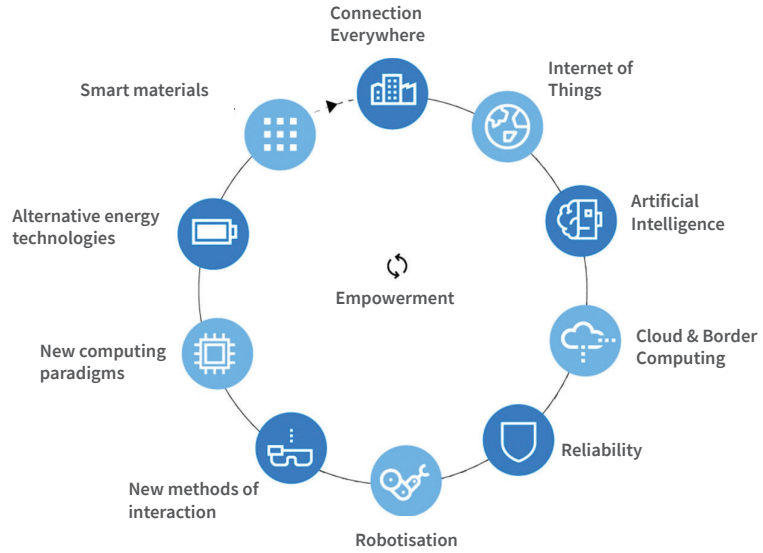
10 technology trends of the future

As a foundation for our technology journeys, we have identified ten key technology trends that will be important in the next decade.

We are constantly observing a wide range of technological forces in the fields of artificial intelligence, smart materials, new computing paradigms (towards quantum), sensor technology, robotization, smart materials and many more, considering both their relevance and how they can adapt to each other.

The real impact will come from the tendency of combinations of these trends to support each other.

IMAGINE POSSIBLE...



As Ericsson Research Turkey, we create technology and represent Turkey in the journey of technological development.

Ericsson's Research Center in Turkey was established in 2018 with the TUBITAK 1515 Support Program for Predecessor R&D Laboratories. Ericsson Research Turkey is one of Ericsson's 13 research centres worldwide, operating under the global organization. Ericsson operates in 180 countries worldwide, but its research centres are located in only 13 countries. The fact that one of these centres is located in Turkey and that our centre contributes to strategic projects is a result of Turkey's trained human resources and academic accumulation. Leading the standardization of future mobile systems since its inception, Ericsson Research Turkey develops patentable advanced technologies and system concepts. It works intensively to research innovations that will reshape the telecommunications industry in the next decade. In this context, it actively contributes to Horizon Europe, the European Union's main funding program focused on research and innovation. As the main partner of the program's flagship 6G research project Hexa-X and its follow-up project Hexa-X-II, Ericsson Research Turkey is the only organization from Turkey to participate in the project officially. Within this project's scope, the groundwork is being prepared for future usage scenarios that will enter our lives with 6G, distributed multiple input multiple outputs, Artificial Intelligence, Machine Learning and the overall 6G vision and architecture.

WHAT AWAITS US IN 2023 USER EXPERIENCE AND INTERFACE DESIGN?

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The possibilities of modern technology are constantly expanding, and with them, new directions in digital design are emerging. 2023 is fast approaching, and the concern for new ideas and expressive design in how user interfaces and experiences are created is reviving again, as in previous years. First, let's talk about what the definitions of User Experience (UX) and User Interface (UI) mean and how trends are shaped.

While 'User Experience', one of these two concepts, which still has problems in defining the difference between them, is about how a user feels when interacting with a product or service, 'User Interface' refers to screens, buttons and other visual and interactive features that the user uses to interact with the product. User Experience Design is the careful planning and creation of the user experience and everything it includes, and focuses, above all, on creating a product or service that solves a specific user problem, making the proposed solution easy and enjoyable to use. User Interface Design is the process of designing how digital interfaces look and behave. It covers all visual and interactive features of websites, software and applications, from colours and typography to buttons, scrolling functions, animations and more.

Professional designers are constantly working on new features and driving the trend. Trend analysis enables the prediction of trends and queries for UI/UX design. The current trend in UI/UX is innovation and uniqueness in design. It helps attract a new audience and attention. A problem-solving design and an easy-to-use interface are the basic rules for successful brand promotion. These parameters are the pillars of brand image and attract users to the platform and products.

Furthermore, the measurement of service quality estimates depends on user experience design.

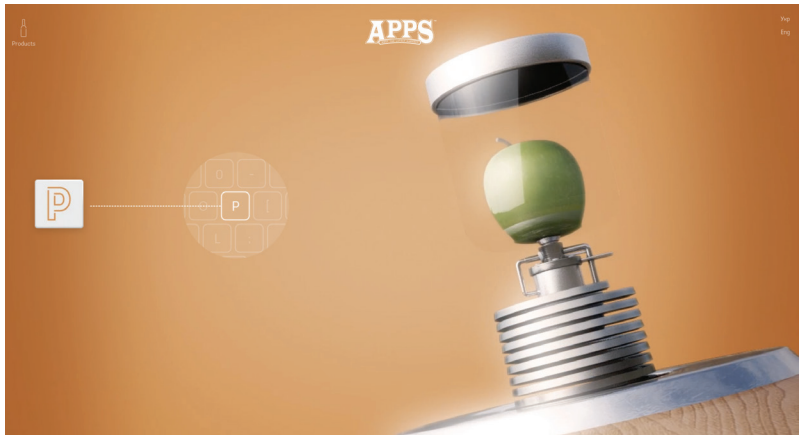
Statistics show that around 88% of users will not use apps again if they find them difficult to navigate or if they don't like the design. Analysis by Google shows that 61% of users are fed up with a brand if the UX design is terrible. In these cases, interest in brands is irrelevant.

Let's take a look at a few trends that await us in UI/UX in 2023.

Narrative scrolling instead of conventional scrolling

Using interaction design to create an immersive scrolling experience is crucial. Most designers today still think about scrolling in terms of content ranking, as this is how people are used to navigating websites. For example, a trivialized structure was used for many years to express the stories customers wanted to share. A large image, product images that we see as we scroll the action button, tiny descriptions, and a follow us area.

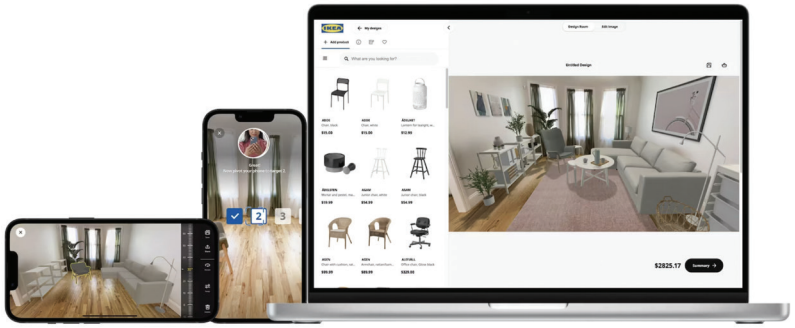
With evolving software methods, smooth scrolling experiences are now inevitable. Instead of following a boring hierarchy, storytelling supported by animation transitions attracts users' attention more. For example; in Apple product introductions, we can clearly see an example of how the 'scroll' experience can be improved with parallax design. Content can now be presented more strategically, narrative-centred way, and designers can have complete control over what users see and how it appears. With the advent of immersive scrolling, creating engaging stories is much easier. The sample images below are examples of interactive storytelling explaining the production process on the APPS wine company website.



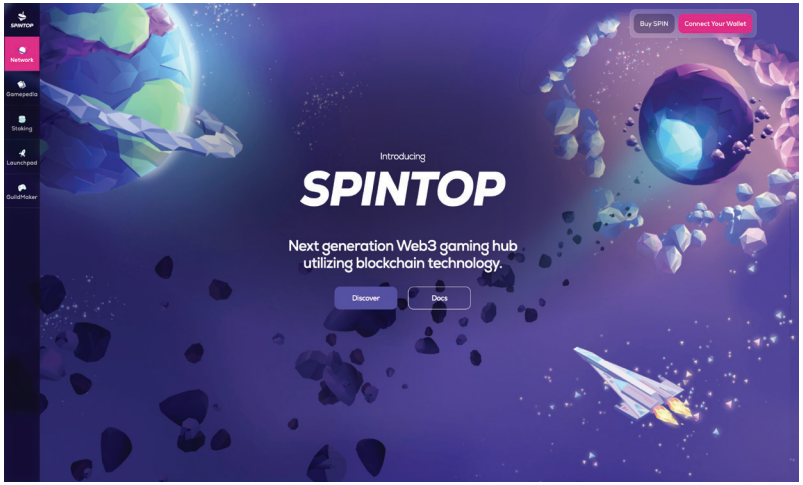
Source: 'APPS'

The potential of 3D Design

There is an extraordinary interest in interactive animation because users remember it better. The main idea is to involve the user; the 3D effect positively affects brand reputation and helps promotion by expanding the target audience. Metaverse and AR/VR supporting 3D are part of this movement. The three-dimensional spatial design allows for improving customer interaction, uniting different worlds and bringing a whole new level of user experience. In 2023, more and more industries and companies may follow this trend, including e-commerce, marketplaces, healthcare institutions, etc. 3D logos, non-typical texts, visiting museums from any corner of the world with virtual reality glasses and using additional software for AR and VR implementation in design, to name a few.



Source: IKEA

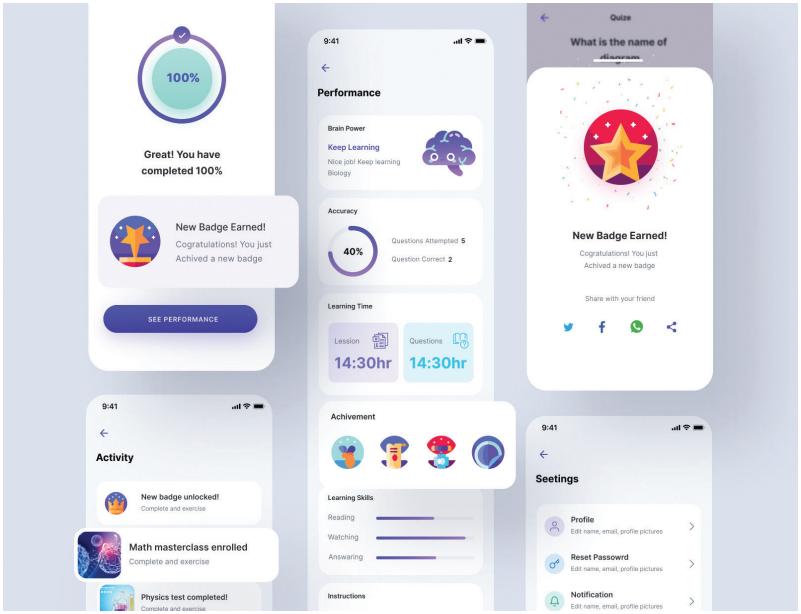


Source: Spintop

Emotional Design

Whether you are using a smartwatch, tablet, phone or car, you display your interactions on something. The app gives you feedback and the feedback combined with visual data gives you context.

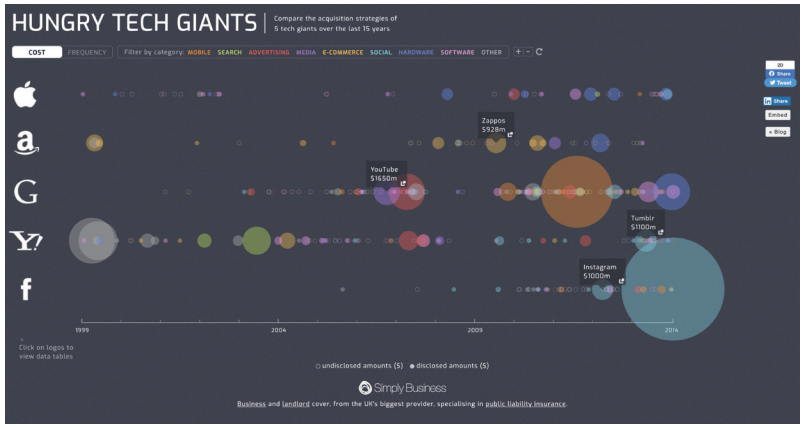
'You were able to save money this month', 'You set a record for running a mile', 'You collected more business contacts than you did in the previous quarter. Congratulations!'. We cannot deny that feedback not only informs us but also affects our emotions. Designing these messages, often a mix of a microcopy and a graphic brings users closer to their goals. It also creates customer loyalty. The role of emotional design will increase even more in the coming periods.



Source: 'codeandpepper.com'

Meaningful verification

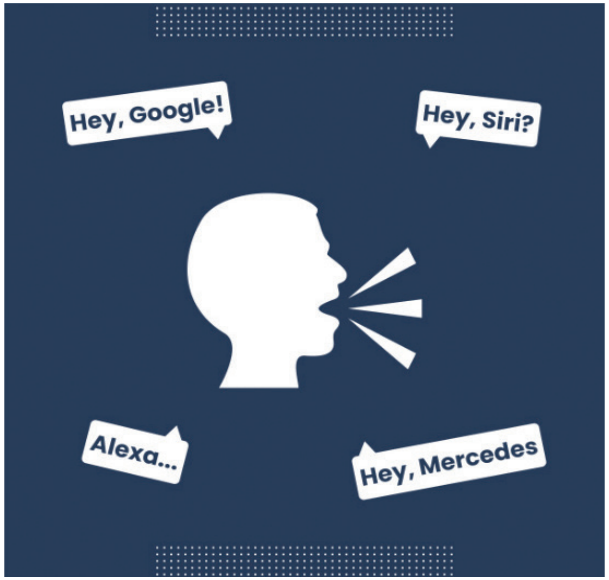
Users are fed by the data that apps collect. Applications such as finance, health, and operational systems convey summary information to users, and users try to understand this data. In 2023, it will be even more important to simplify the display of data and the resulting messages. Because with digitalization, the actions taken and the results started to be shared transparently with the user, and we see that if the information the user needs is not conveyed with the right user experience, it causes problems instead of being a problem solution. In addition, it is also true that visual sloppiness in data visualization results in boring data and distracts the user's focus. Users now want to see fun, new and interactive structures alongside meaningful and concise data presentation. Designers can combine data visualization tools and illustration creativity to influence the user.



Source: "Hungry Tech Giants"

Voice Search

Typing for search is slowly becoming obsolete, and voice technology is becoming more and more useful and promising. Voice search actively enters the daily routine because it is simple and saves time. In 2023, this trend will evolve and enter our lives more, as voice assistants offer more effortless connectivity with critical queries and artificial intelligence.



Source: komododigital.com

Next Turn: Design for Wearables

If you're unsure about wearables' sustainability, you can look at the statistics on their growing adoption. While mobile devices have become more prevalent recently, wearables are the future. That's why it's so important to focus on the user experience for wearables too. These devices have more design limitations than others due to differences in size and some interactions. But on the other hand, with advancing technology and the right experience design, it is possible to create a more functional and popular product. Going forward, the contextual design will come to the fore and shed light on lightweight interactions.

We went through a few trends together. Let's not forget that not only following the trend leads to success in product design. As not every trend will be suitable for every product, it is always a priority to recognize the user, implement appropriate design processes and solve the problem with the proper methods. After conducting a trend analysis, it is also necessary to conduct a suitability analysis. Also, trends are fluid and no design should stand still.

Resources

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UNDERSTANDING LOW-CODE AND NO-CODE PLATFORMS

KADİR GEYLAN SELÇUK

Softtech

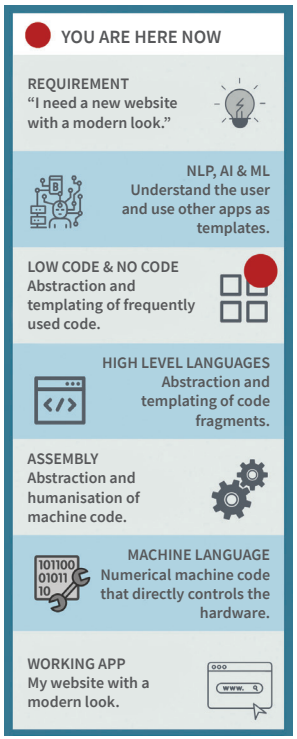
Strategy and Product Management Product Manager

We are in a period when companies that use technology effectively position themselves as technology companies, regardless of the sector they are in. It is obvious that companies such as Netflix, Airbnb, UBER, Trendyol, Peak Games and Martı have achieved success by seamlessly integrating technology into their operations, even though technology is not their core business. The prerequisite for the successful application of technology is to understand it very well and use it in the right place for the right solution.

When we look at the Low-Code/No-Code (LCNC) world, we see a dilemma. As technology development and operational costs are high, companies primarily use LCNC applications to reduce these costs. Low-Code implementations deliver cost reductions of almost half, according to recent surveys. In No-Code applications, it is thought that the cost can be reduced much more under favourable conditions. But is it possible to have a deep understanding of technology while trying to reduce the cost of technology at this level? In addition, we encounter another question frequently asked by those researching LCNC applications. Which LCNC applications can meet which customer needs? Or if we ask the same question from the perspective of the LCNC platform developer, which features and customers should the developed platform target? As a product manager with a technical background, I will try to answer these questions, intersect business needs with technical issues, and contribute to a better understanding of LCNC platforms for managers and business needs for LCNC developers.

Let's start by warming up a bit. To briefly talk about the concepts of Low-Code and No-Code, Low-Code can be defined as developers developing applications with little or no code. In contrast, No-Code can be defined as users with little or no technical knowledge

developing applications using drag-and-drop components. This is the introduction for this article for now. Information on the differences, advantages and disadvantages of Low-Code and No-Code, what the sector and market size is and where it is heading are available in the 2022 Softtech Technology Report.



To better understand LCNC, we first need to understand the historical progress of software development. The purpose of software development can be summarized very simply as "making the processes required for the realization of a business idea work in a digital environment". When we examine how we have done this from the past to the present, we first have machine language, where we control the hardware with direct commands, then low-level programming languages such as assembly, where we "humanize" these commands, and then higher-level languages such as C and Java. When we look at each level, we can easily see an abstraction compared to the previous level.

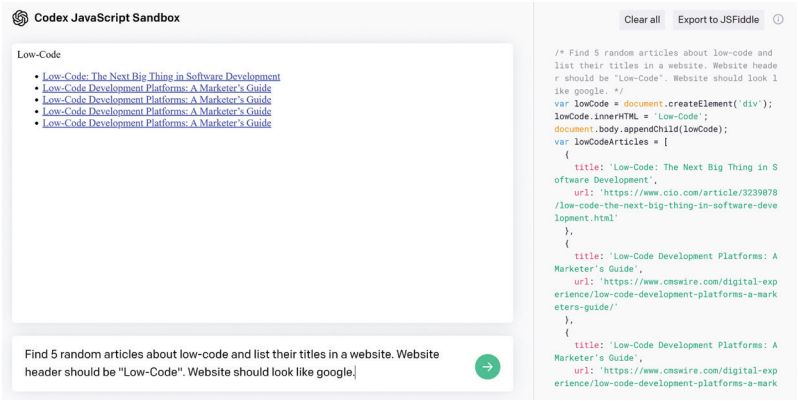
For example, it is possible to develop machine language applications by calculating each bit and numeric address. In practice, we know this is inefficient, and we have to write pages and pages of machine language commands. At this point, we first abstracted the machine language that communicates directly with the hardware and started using low-level languages such as assembly. When we look at the assembly structure, we see that for complex machine language instructions, we only write the part of the instruction that we need to modify; the rest are templatized and automatically converted into machine language.

When we go to the next level, we can see that a loop that requires a long assembly instruction can easily be done with a simple "for" or "while" loop in high-level languages. Here, the structure of the loop can be thought of as our template, the start and end conditions and the code model inside it as our model, and the machine code that runs after compilation as our output.

To apply a similar abstraction to LCNC, when you create a "Customer" model with first name, last name and age, we can apply the information in this model to templates such as API, service, configuration, security and user interface to produce the output of the entire application. Thus, the cost of development that a developer can do in a few days can be reduced to hours and sometimes even minutes. Human error is approaching zero, and as these errors are reduced, the need for debugging, monitoring and tracking is also reduced. Even with no-code applications, an employee with less technical knowledge and therefore lower costs can do the same work in a few minutes. Just like a for loop that would take hours to develop in low-level languages can be done in seconds in high-level languages.

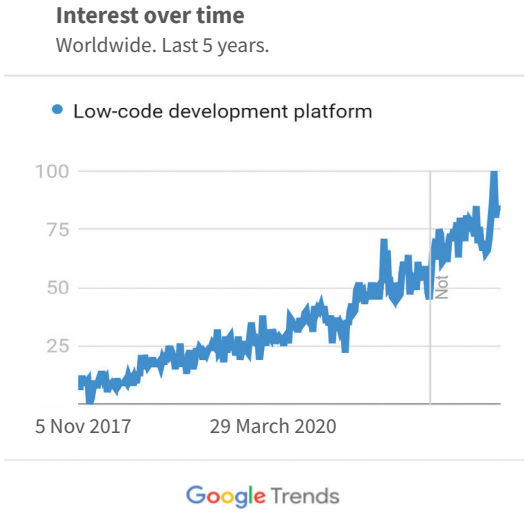
Is it possible to develop faster after LCNC? This is where AI and machine learning technologies come into play to provide an abstraction for LCNC applications. Instead of us analyzing the applications to be developed, it is not difficult to predict that there will be artificial intelligence applications that understand the sentences we utter

with NLP and can create new applications using what they have learned from the applications developed so far- our template at this level is now what has been known from our existing applications - and only consult us where they need to. It is already possible to find examples where you describe the application you want, and this application is developed entirely by artificial intelligence using the GPT-3 infrastructure. For example, I created the following website by describing it to OpenAI Codex.



Now that we have discussed how application development processes have evolved and in which direction, we can continue by slowly introducing LCNC platforms. First, the history of LCNC-like applications goes back to the 1990s, maybe even earlier. We can even look at tools and frameworks that accelerate in-house development processes by generating code as the first LCNC applications.

"Low-Code" as a concept has grown exponentially in popularity every year since it was first coined by Forrester in 2014. We can easily see this when we look at Google Trends, a product manager's best friend. This is a natural outcome given the value propositions such as increased speed of application development, the use of non-technical resources as developers, reduced time to market and a more agile organizational structure.



If we break down the LCNC applications, we come across the abstractive parts of software development. These include user interface development, backend development, process development, other automation, identity and access management, versioning and installation. In short, we can increase the gear by going into the details of these sub-products and examining the points to be considered when choosing each product.

User Interface Development

Let's start with user interface development. In almost all applications, it has become the industry standard

for almost all LCNC platforms to develop with WYSIWYG-like editors that we are used to by dragging drag-and-drop components to the screen and revealing the models of the screens. The first thing to consider is whether the set of components used is sufficient and how well it meets your needs. In addition, whether the interfaces produced for the web are responsive and the product's ability to build native mobile applications are other important issues.

There are two different methods for constructing the user interface. Generating the code from the model to create the application that contains the screen to run or interpreting the generated model on an engine to present the interface to the user. While generating the code from the model is a method mostly used by low-code products, instant interpretation of the model and presenting it to the end user is being adopted by no-code products. Predictably, the first method is more open to customization, while the second focuses on speed. The "extendable no-code" approach, referred to in many sources as "extendable no-code", focuses on no-code as much as possible, with customized low-code components that can be added to the application where needed, offers the benefits of both worlds.

Another topic related to user interface development is the styles. The approach here is to first apply standard styles for components to the extent determined by the application, to apply customized styles as needed, or to meet the need for customization with components developed entirely by users. Especially nowadays, when animations and micro-interactions come to the forefront of mobile applications, such customizations will also be needed.

Non-technical users easily understand user interface development. For this reason, the general feeling is that providing these users with interface development opportunities is one of the quickest gains that LCNC applications offer.

Backend Development

Perhaps one of the most challenging aspects of LCNC applications can be backend development. There are several reasons for this. Some of these are the different infrastructural needs for different types of applications and the necessity of proper architectural design due to the need for backend applications to operate under heavy load. At this point, the need to develop a simple MVP differs from the need for an enterprise-level software development platform. For the former, even an infrastructure where entities are simply designed and a monolithic application is built is sufficient, while for the latter, a microservice or serverless architecture is required. In addition, it is important to consider the potential need to scale a product that starts as an MVP or a draft.

In addition to systems where users with less technical knowledge can design simple table designs or produce mock services and use them in user interfaces, in addition to systems that can design simple domains, there is a need for systems where domain architects can design complex domains such as basic banking in the right architecture, set up event infrastructures and sagas, and develop scheduled tasks.

At this point, it is very important to decide according to your needs. Suppose you need a simple system and will not work under a heavy load. In that case, you should avoid what we call "overengineering", costly systems that give you more than you need, while if you have complex domains that will work under heavy load, you need to turn to infrastructures that will meet this need.

Workflow and Process Development

Workflow and process development applications can be considered the heart of many enterprise-level LCNC applications. Since the priority is usually given to enabling business needers to design their own processes with drag-and-drop tools, the prominent approach to processes can be considered an abstraction, with the user filling in only the fields they need. This way, process development will also be democratized in a way that does not involve coding, and increasingly limited technical resources will be freed up a little more. In addition, other basic needs can be considered as easily transferring variables from the user interface and APIs to the process, making API calls and opening new interfaces in the process, and transferring variables in the process to these services and interfaces.

At the enterprise level, the ability of processes to handle workload and work in a distributed manner, built-in process management screens and the ability to run parallel processes are other important issues. In addition, if the application to be developed is a simple website or mobile application, there may be no need for process development.

Since process development generally proceeds through flow structure and drag-and-drop components, the use of process development flow infrastructure in the flows that can be used instead of code development in frontend and backend applications will positively affect the integrity of the application development experience.

Other Automation, Verticals and Marketplace

There are many applications that add value to LCNC platforms. Some no-code products can even offer value propositions entirely through these apps. Examples of these applications are e-mail, SMS, notification sending, document management, API management, and RPA capabilities.

In addition, verticals such as ERP, XRM, accounting, stock, and human resources applications that are ready with the support of the ecosystem of the preferred platform and the marketplace that hosts the platform components developed and offered to the service of users can be shown among the features that may be needed.

Identity and Access Management

One of the important value propositions of LCNC applications is the offering of identity and access management (IAM) products for developed applications as a part of the platform. Definitions related to many security components such as Role, Resource, Profile, and User are made within these applications.

Versioning and Installation

The platform's versioning infrastructure and installation performance are also factors to consider when making a choice. First, the backward compatibility of the engines that render the developed models or generate code from the models should be evaluated. The speed of deployment, how many environments can be stood up, and how autonomously these environments can be stood up are other essential issues. Test automation and configurability are other topics that should be considered here as they are closely related to the DevOps pipeline. Whether On-Premise installation support is provided can become critical depending on the needs.

Speaking of installation, we have already mentioned the extension features of the applications developed with the platform. On the contrary, your need may be that the applications you have developed can be run within other applications. For example, It may also become critical in some cases that the mobile interfaces you develop can be published as SDKs and run on other native mobile applications or Superapps or that the screens you develop can be exported to work within your existing web application.

Other Needs

There are many needs to consider when evaluating LCNC applications. Each sub-products mentioned earlier is an important part of the app's development. So, how synergistic can they work, and how much do they feed each other? For example, can user interfaces be generated automatically using the domain model? Can the maximum length specified for a field in the domain model be reflected in the generated user interface model as validation? When you define a new user interface or API, is the related resource information automatically saved in your IAM application, making your work easier? How easily can interface, process and backend development variables be managed? Are there data migration, import and export options? What is the stance against the approach we call vendor lock-in? So are we free enough to log out of the platform at any time? Do needs such as dashboards, reporting, monitoring, error capture, and database lifecycle management meet the requirements?

Also, how old is the platform to be used? Does the synergy between components we just mentioned also slow down the platform by creating a dependency between components, thus hindering the modularity and development of sub-products?

What are the pricing criteria, are there any hidden costs? What are the hosting costs in addition to the platform license? Does it meet my needs mandated by laws and institutions such as KVKK (personal data protection law) and BDDK (banking regulation and supervision agency)? At this point, the need to host the data in Turkey or within the company may limit the solution options that can be chosen. Again, applications developed on products hosted on cloud servers abroad can expose their customers to a serious latency problem.

The world of software development is a world where the solutions are as limitless as the needs. Nevertheless, as we approach the end of our article, let's try to evaluate what kind of LCNC platform should be preferred through a few example scenarios.

LCNC Scenarios

For a simple website or mobile application that does not need process development, mostly simple content management systems will meet your needs. Depending on the complexity of your mobile app needs, the solution you should choose may differ, but generally, no-code solutions will be more than enough.

If possible, simple and fast no-code applications can be considered the first option for the rapid development of various MVP applications. However, for a corporate company, if the workload of applications will increase in the future or if you will integrate with your domains, enterprise low-code platforms can be considered.

Before we talk about Shadow-IT applications that can be easily converted into processes, let’s start with the concept of Shadow-IT. Shadow-IT is the name given to the execution of certain processes

by business units independent of IT teams through applications such as Excel, Outlook and Access. For example, processes where employees of one department initiate a process and have Excel fill in various information, and then forward this Excel to employees of another department to fill in other information needed, are called Shadow-IT. Although, at first glance, the ideal method for professionally managing Shadow-IT-originated applications seems to be no-code applications with process capabilities, it should not be ignored that these applications need to be incorporated into the general IT system later. Ultimately, it's about designing the system, not a single application.

Enterprise low-code application development platforms (Enterprise Low Code Application Platform, LCAP) can be evaluated for applications that need to meet all needs at the enterprise level and for applications where security and reliability are at the forefront, although not at the enterprise level. When choosing such applications, attention should be paid to whether their ability to work under load, especially for backend applications, can meet the needs.

As can be seen, there are many scenarios and criteria for LCNC platforms. In order to answer the questions that may arise in these scenarios, there are also benchmark comparisons made by companies such as Gartner, Forrester and McKinsey, especially for applications that we classify as "Enterprise Low-Code Application Development Platforms".

As Softtech, we offer app development and LCNC solutions on our next-gen software development platform. If you have such a need and would like to know more about our platform, we would be happy to hear from you.

Resources

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DATA VIRTUALIZATION

ERSOY TEZEL

Softtech
Product Manager

Data virtualization is an approach to data management that can enable the creation of a single view of data, allowing a user or application to retrieve and process data without the need for technical details such as how the data is formatted at its source or where it physically resides. Although at first glance, it may seem like an alternative that will allow us to discard existing data management approaches, it is necessary to position Data Virtualization correctly within the data architecture. In order to clarify the place of this approach in architecture, it will be useful to look briefly at the history of the problem to be solved in this field.

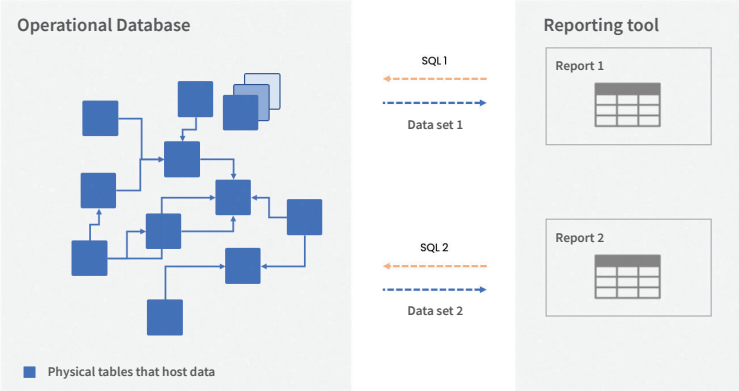
Evolution of Data Access

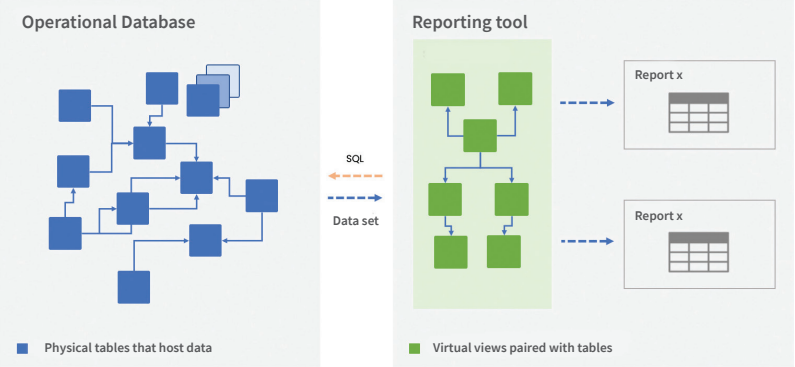
At the heart of any well-crafted solution are data integration and query logic. Query generation logic is the logic that tells the database what data is requested and how to process it. We can say that this logic has been integrated into reporting systems step by step over time.

Operational Reports

In the first applications that emerged to meet the reporting needs, reporting the daily operations of the business was seen as the basic need. In operational reporting, query tools are usually connected directly to operational databases or to the application via APIs. The data is thus up to date.

In operational reports, however, the logic for data collection was embedded and designed to be embedded as part of each one. In other words, the reporting logic was positioned as part of each report.





With this approach, organizations found themselves with a multitude of disparate reports with SQL queries that either had their own reporting logic or no generalized logic at all. Predictably, the drawbacks of embedding query logic in this way quickly became apparent.

Organizations often have to consider how the data logic needs to change when there is a change in the underlying applications. These changes require a large number of reports to be opened and edited manually, so the changes are applied to each report individually.

However, BI applications have developed more innovative ways to access data over time.

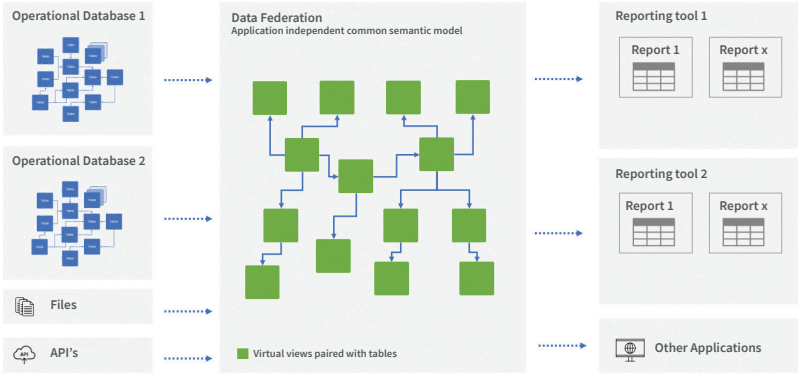
Common data model for analytical applications

Instead of embedding the data model inside reports, a virtual central data modelling layer emerged as the solution. This way, reports get all their logic from a single data modelling layer. This layer is called the metadata layer or semantic model. When applied to the semantic model, changes that needed to be made in this way could affect all reports using this model.

However, since the semantic model is specific to the reporting tool, the solution provided by this approach could only be used by the relevant reporting tool, and other operational or analytical applications in the organization could not benefit from this convenience. In other words, if you wanted to access the data, you could act within the flexibility that the reporting application gave you.

Application independent common data model

To remove these constraints, the data integration industry has introduced the “Data Federation” concept. These technologies basically made this virtual logic layer not exclusive to a BI application. Thus, companies have become able to connect multiple analytical applications to a common data model and thus to one or more systems that are the source of the model with SQL queries using standardized connections such as JDBC, and ODBC from any analytical application.



Early on, the concept of the Data Federation was seen as the approach that would soon replace Data Warehouses. However, this misconception was quickly debunked as Data Warehousing failed to deliver the other benefits that it does, primarily speed of data access, which we will discuss below.

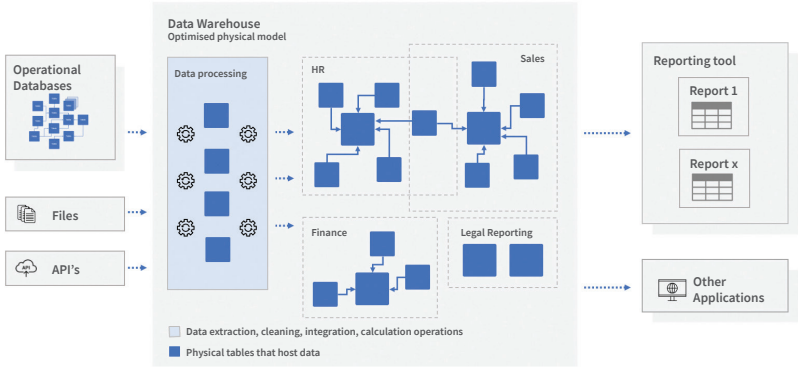
Is Data Warehousing No Longer Necessary?

The most fundamental feature of the Data Warehouse is that it has a physical data model (dimensional model) that stores all data in an optimized way.

Unlike data warehouses, the data model in operational system databases is designed for fast processing (writing and reading) of atomic-level data.

Data warehouses are mainly intended to optimize analytical queries. They often contain large amounts of historical data (up to 10 years) and this data is collected and integrated from many different systems.

One might think that the sole purpose of the data warehouse is the performance to be achieved from this physical model, but the real purpose is to achieve this performance through integrated data. The integration process that populates data warehouses determines how data from different systems will be brought together, how it will be updated, how key performance indicators to be monitored on an organizational basis will be calculated, and allows all business units to see a "single correct figure" that they agree on. Other processes, such as deduplication and data quality enhancement, take place within these processes, which sometimes take hours for large volumes of data.



The main benefits of Data Warehouse solutions can be summarized as follows;

Integrated - Data pulled/sent from/to different systems is available after the integration processes mentioned above.

Subject-Oriented - To make it easy and understandable, the data model is limited and shaped according to the needs of the business units.

Persistent - Data entering the system can be persisted independently of the source systems.

Historical - Even if the data is updated in the source system, the data warehouse can be designed to show the data as it was at a certain date when needed.

High Performance - The system is optimized to handle analytical queries at the data model structure and database level.

Due to these benefits, Data Warehousing is still seen as an indispensable part of data architecture as the first point of reference for analytical applications.

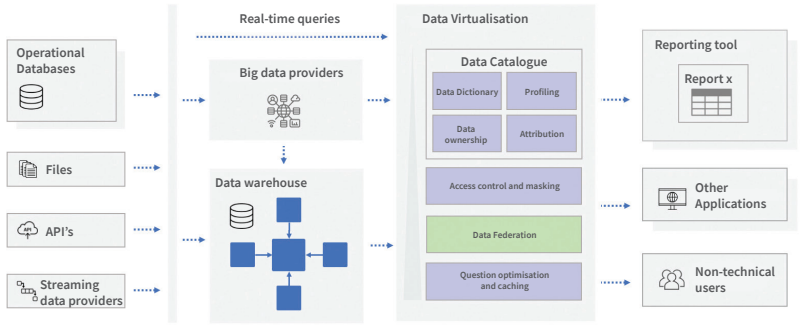
With these benefits of Data Warehousing come some challenges. In today's systems, where operational systems change very fast, new data enters the source systems every day, data is not kept in a schema, and unstructured data is increasing, the time-consuming design processes mentioned above may also cause the data warehouse to create a bottleneck between users and data.

In addition to analytical queries, users are increasingly demanding to get real-time reports on operational systems or to quickly access data sources for prototyping, for example, data mining projects, before a systematic study.

Data Virtualization

As user needs and the industry have matured, Data Federation's position in the data architecture has become more mature, and Data Federation is positioned as a complementary solution rather than an alternative to the Data Warehouse.

Data Virtualization can be seen as the next generation of Data Federation platforms that builds on the Data Federation approach of holding data connections by adding advanced (in-memory) cache layers to improve query performance and data governance capabilities such as data profiling, data catalogue, data quality insights, data ownership, etc. All information within the organization can be made easily accessible, easily understood and authorized with user-friendly interfaces by maximizing query performance.



Data virtualization is used to create virtualized and integrated views of data rather than moving it to another data environment and physically storing it. It provides an abstraction layer on top of physically held data to simplify query logic.

As a result, users can access both processed data, such as Data Warehouse and real-time changes from operational systems in an accelerated process.

The main benefits of a modern Data Virtualization solution can be summarized as follows.

Abstraction - End users can access the data they need without knowing where the data resides and how it should be related to each other.

No need for data migration and multiplexing - Access to data is based on caching mechanisms and optimized queries that are activated only when needed instead of constantly moving data on a schedule.

Real-time access to data - Users can access operational system databases, APIs or streaming data in real-time when needed, without time-costly processes.

User-friendly communication - Users access meaningful data through the Enterprise Data Catalog without the need for technical knowledge.

Centralized security and governance - Data security policies, such as access authorization masking, logging, etc., are managed from a single centre.

Location-independent access - On/off-premises data, including cloud or multi-cloud systems, can be made available.

Although those mentioned above are significant gains, as with any solution, Data Virtualization should be considered in the architectural design process; the impact of instant queries on operational systems brings limitations, such as the inability to create historical data views in the absence of a data warehouse solution, and the performance impacts of calculations or merges with high volumes of data.

Properly positioned Data Virtualization solutions give businesses agility in accessing data and accelerate decision-making processes.

Market size and forecasts show that more organizations will give these solutions a shot in the future. The Data Virtualization market in 2021 is estimated at 3.7 Billion USD, and the size it will reach in 2028 is estimated at 10 Billion USD.

Resources

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CONVERSATIONAL ARTIFICIAL INTELLIGENCE

ZEYNEP TUNCA

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Conversational AI Product Manager

In the last few years, chatbots have become a regular part of many people's lives, especially in the area of direct communication with businesses. More and more companies are incorporating these types of conversational solutions into their mobile and web applications to improve work efficiency, reduce costs and simplify the recruitment process.

How it started

A few years ago, chatbots often answered customers' frequently asked questions (FAQs). These bots, which were usually rule-based, did not have very high comprehension skills. These bots, which look for matches in the sentence or word, were not successfully extracting data from the sentence and were rule-based, not predictive. Therefore, their comprehension was low and they were not very popular.

How it continues

Then personal assistants like Siri and Google entered our lives. Thanks to these assistants, which are frequently used, especially by the new generation, interaction with chatbots has increased, and our distant stance has softened a bit. These NLP (Natural Language Processing) based assistants included complex algorithms for making sense of language. These assistants, which are mainly aimed at understanding the user's intentions, consisted of large training sets and could predict what the dialogue meant and what intentions it was based on. The main driving force behind the success of such assistants was the sheer volume of data involved in the training and, of course, the success of the NLP algorithm used.

Mutual dialog with chatbot

So how does the dialogue continue in conversations with companies or personal assistants like Siri?

When we try to make a transaction with a company's chatbot, the moment we feel that it adds value to our lives is when it makes us think that it understands the question we ask and realizes our goal as if we were talking to a real person by asking appropriate questions. The most appropriate example can be found in banking:

Clearly understands the intentions of the customer who says, "I want to send money." In return, there is some information it needs from you. It acts just like a branch officer, asking you, "To whom?" and "How much?". This dialogue is context-based. So as soon as it catches the intention, it assumes that you are in that context and starts asking questions about it.

The biggest challenge for chatbots here is that while waiting for the answer to the question "To whom do you want to send money?", the customer tries to exit the context with a different intention such as "How much do I have in my account?". It is challenging for an AI to manage a situation where you answer a question with a question. Adapting to the situation when you come up with a different sentence than you expect shows the quality of the chatbot.**Popular areas of use in our country**

The first things that come to mind are customer support services, chatbots for omnichannel distribution and voice assistants.

Most AI personal assistants include extensive analytics that help them provide human-like conversational experiences for their users. Let's take a look at the areas in which they are used and for what purpose:

Banking and Finance

In banking and finance, we frequently encounter personal assistants in mobile applications. These assistants provide benefits such as directing customers who cannot find what they are looking for to the right menus as mobile applications contain more and more transactions, providing 24/7 customer representative service by answering frequently asked questions, and enabling customers to make dialogue-based transactions for often performed banking transactions. In this way, it is aimed for customers to perform their banking transactions faster and easier by talking to the chatbot.

In-House Bots for Employees

Especially after the transition to working online, large-scale companies with many employees have turned to personal assistants for employees to reduce the operational costs of Human Resources, IT, Procurement or Legal teams.

These chatbots provide significant corporate efficiency by integrating into companies' internal communication tools. In addition to realizing

employees' leaves, insurance rights, payroll or various form requests through dialogue over the bot, it also aims to increase employee productivity by integrating with various internal systems and realizing transactions such as authorization, opening requests, etc.

Voice Transactions

We see the greatest benefit in personal voice assistants for frequent transactions and standardized information. When you call an organisation's customer service, you can perform several transactions by saying a few words without waiting for the customer representative and without listening to long menus. These processes are being developed to solve more and more complex problems.

Some statistics on Chatbot usage in the world:

- According to Juniper Research, chatbots will save the retail industry USD 7 million in 2019 and USD 439 million annually by 2023.
- Retail sales through this channel will reach USD 112 billion in 2023, compared to USD 7.3 billion in 2019.
- At the end of 2020, the global Conv. AI industry was valued at USD 5.78 billion. It is expected to grow at a CAGR of approximately 18.9% from 2021 to 2030, becoming a multi-billion market vertical and valued at USD 32.62 billion.
- Since the pandemic, the volume of interactions by conversational tools has increased by up to 250% across multiple industries.
- Chatbots currently represent the highest level of use of AI in businesses, and their adoption rate is expected to almost double in the next two to five years. (Forbes)
- One-third of the founders of AI startups predict that chatbots will be the main application using AI in the next five years. (Emerj)

Consumer Surveys

- 40% of consumers do not prioritise chat with a human or chatbot as long as they get the support they want (HubSpot)
- Among the new generation, the percentage of those who communicate with a Chatbot every day is 40%. (Mobile Marketer)
- In the US, 67% of millennials shop online using Chatbot (eMarketer)
- 90% of companies agree that problems are resolved faster after they start using Chatbot in their support lines. (MIT Technology Review)
- Chatbots are mainly used (more than 77%) in post-sales and customer service operations (Accenture)

¬ **Over a 12-month period, 67% of consumers worldwide have contacted a chatbot for support (Facebook)**

What awaits us in the future?

In the next two years, we will see chatbots in various applications we use initiating communication with us with personalised questions. These are; "Your car insurance is due. Would you like me to renew?" or for a frequent purchase, "You may be out of cat food; would you like me to reorder?" In fact, what we are currently working on in banking is: "You spent more than the average on stationery this month. Would you like to review your spending?" can give you insights to help you manage your personal finances.

Contrary to popular belief or expectations, chatbots are not only about reducing operational costs or increasing brand prestige.

It is necessary to think of chatbots as a different channel of communication with the customer for the brand, to realize that they increase efficiency and sales, and to adopt that the future is towards dialogic artificial intelligence. Corporations allocate more and more budget to AI investments to catch up with the era of conversational AI.

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NEW FOCUS AREAS OF ARTIFICIAL INTELLIGENCE IN CHINA

TUFAN AYGÜNEŞ

Softtech China
Head of Enterprise Innovation Services

While Chinese tech companies spent 2021 complying with the Chinese Government's personal data protection and anti-monopoly laws, in 2022, they are struggling with both toughened pandemic measures within China and deteriorating economic conditions. As a result of all these developments, Alibaba shares have fallen to their lowest levels in the last six years, while other Chinese tech giants such as Tencent are also having a hard time.

On the other hand, companies such as Bytedance and Alibaba, the owner of Tiktok, which have so far predominantly offered AI-powered, personalized approaches to the end user, are keen to use their AI capabilities in other sectors. In particular, within the framework of the 14th National Plan announced by China, the use of artificial intelligence, one of the focus areas, is strongly supported, not only in end-user-oriented areas but also in areas such as automotive, logistics, production and health. This recent breakthrough made by China, especially in artificial intelligence, has led China to be among the top 3 countries in the artificial intelligence index research conducted by Stanford University. China, for example, produced about one-third of both articles and citations related to AI worldwide in 2021.

Giant technology companies that have made such a stride in artificial intelligence will transfer the adoption of artificial intelligence to sectors such as automotive and logistics, manufacturing and health rather than end-user-oriented retail, finance and entertainment industries in the coming years, according to the research carried out by McKinsey in 2022. They can generate a dollar economic value.

1. Automotive, transportation and logistics

China's automotive market will be the largest in the world, ahead of the US, with the number of active vehicles expected to exceed 300 million in 2030. Considering that a significant portion of these vehicles will be electric and internet-connected, this size presents significant opportunities for AI companies. Autonomous vehicles will inevitably face new AI-powered solutions in personalization for vehicle drivers and fleet asset management. In the next ten years, it is estimated that artificial intelligence will create an annual economic contribution of 388 billion dollars as it creates areas of use in the automotive, transportation and logistics sectors.

https://www.pexels.com/tr-tr/fotograf/yukseltilmis-otopark-icine-park-edilmis-ara-clar-63294/

A. Autonomous Vehicles

Of the projected annual economic contribution of 388 billion dollars, it is estimated that about 86% will be generated by autonomous vehicles. With the elimination of factors such as distraction, one of the biggest causes of vehicle accidents, with artificial intelligence, the decrease in accident rates will be one of the most concrete indicators of this contribution. WeRide was established in 2017 and made strategic agreements with OEM and Tier-1 suppliers such as Renault-Nissan-Mitsubishi Alliance and Bosch, and Pony.ai, which was established in 2018 and made strategic agreements with Toyota, are examples of companies focusing on this field. These companies are also piloting their unmanned taxis in many different Chinese cities.

B. Personalization for vehicle drivers

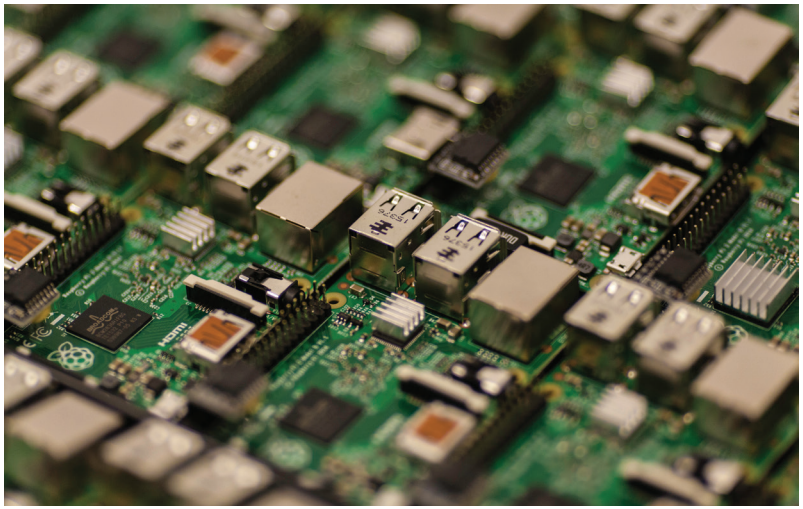
Especially after the increase in data obtained from vehicles with electric vehicles, it is predicted that many artificial intelligence-supported solutions will create added value in this field. Electric vehicle manufacturer NIO makes changes to optimize battery life with the data it collects from the vehicle and instantly notifies users if the vehicle needs maintenance by making sense of the real-time data it collects. Many companies like this continue to work on products that will offer personalized solutions in the vehicle.

C. Fleet Management

The use of China's interconnected transportation networks - road, rail, air - by fleet managers in the most optimized way and at the least cost is one of the areas of focus for Chinese companies. Different solutions are expected to emerge in this area in the coming years. By determining the most suitable route with the help of artificial

intelligence from the data collected through IoT devices, it is estimated that approximately 15% in fuel and maintenance savings will be achieved. There are already many Chinese companies providing this and similar optimization services.

2. Production



https://www.pexels.com/tr-tr/fotograf/yesil-ve-gri-devre-karti-57007/

China's position in terms of production with cheap labour will continue to be sustained for a long time to come. The Chinese Government, recognizing that the Chinese economy is not sustainable, intends to move to a higher level by focusing on value-added production and technology. The chip crises between the US and China, which we have heard a lot about lately, and the US imposing restrictions on the supply of highly critical chips in the field of artificial intelligence to China are concrete indicators of the technology war in this field. China's interest in chip production, which requires advanced technology, and other high-end production products, and the shift of cheap labour-based output to Southeast Asian and African countries clearly tell us which areas the country's strategy will focus on in the coming years. According to the report prepared by McKinsey, artificial intelligence-supported production areas will provide an annual economic added value of 115 billion dollars in China.

3. Enterprise Software

Artificial intelligence solutions to support companies developing enterprise software are expected to become even more popular in the upcoming years. In the coming years, we will hear more and more about solutions that make AI models accessible and applicable to everyone. In this way, medium-sized and small software companies will also try to make their companies more efficient by harnessing the power of data science. In addition, advanced solutions in certain verticals, such as image processing and NLP, will be combined with existing solutions by relevant companies, resulting in innovative solutions in many areas such as finance, human resources, supply chain and cyber security.

4. Health Solutions

China's "14. Five-Year Plan" targets 7% annual growth in R&D expenditures by 2025. In this context, in recent years, China has significantly increased its investment in artificial intelligence and healthcare innovation. In the healthcare sector, areas where artificial

intelligence will be prominent include drug discovery processes, disease detection and patient care. According to research, using machine learning algorithms to predict diagnostic outcomes and support clinical decisions could provide China with an annual economic value of around $5 billion.

SUMMARY

We anticipate that in the upcoming years, Chinese technology companies will focus on offering artificial intelligence approaches, which they mainly use with B2C applications, for B2B companies operating in various industries such as automotive, logistics and health. The fact that SaaS companies operating in the B2B field are not yet mature enough compared to developed markets such as the USA presents an important opportunity in the Chinese market. Technology companies, which have been struggling due to regulations, the pandemic and the global economy, may look for new doors with artificial intelligence in different sectors. We will see how China, looking for different methods to get out of the middle-income trap and is in a technological competition with the US, will progress with its new priority areas. As Softtech China, we continue to work at full speed to ensure that companies outside China can access technologies and solutions developed in China.

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WHEN WILL AIR TAXIS ENTER OUR LIVES?

ERAY ALTUNBOZAR

AirCar Technology and Aviation Inc.
AirCar Founder

Flying cars, air taxis, eVTOL, mega drones... These engineering marvels, known by many names and seen as a new means of transportation, are coming to save us from city traffic. But the first question many of us ask is: when?

Of course, the first issue for determining the timing is the readiness of the technology. The second issue is that regulations are in place on an appropriate basis. The technical compliance standards and expectations for aircraft are sharply drawn. It is only the compliance of new technology with these regulations that creates tension. There are many studies on this subject.

If we look at the technology, there have been developments that paved the way for air taxi platforms—as of 2016, developing lithium-ion batteries have reached 200 wh/kg levels. The first models at these figure levels have also started to emerge. Artificial intelligence also developed in this period, allowing deep learning systems to work onboard. In other words, the software and hardware are now capable of implementing fully autonomous systems. Another development was in the main control systems. The first commercial drones began to appear on the market in 2005, and these systems are now capable of safely flying drones, no matter how big they are. Currently, work is being carried out to adapt these systems/software to aviation standards.

All these technological advancements have created the enabling environment for us to develop safe air taxi platforms.

If we dig a little deeper, the development of electric cars and the high-voltage compatible systems developed for these platformscan also be used in flying cars. Automatic on/off relays, EMI shielded cables and connections, advances in batteries and innovations in

battery packaging pave the way for us to build a safe aerial platform. Of course, there have also been technological advances in propulsion systems borrowed from electric cars. Systems for the more efficient and noiseless operation of the engines and, most importantly, FOC inverters developed with advanced silicones were able to provide the best efficiency and control of the propulsion systems. All these developments have led us to develop safer and more efficient air taxis.

Let's take a look at where these technologies sit in regulation. In fact, almost all technologies are covered in aviation regulation. Only some design revisions need to be accepted by the authorities. In fact, the authorities, which did not allow multicore processors for a long time, have paved the way for us in this regard. Multicore processors are used by companies such as AirCar, which produces autonomous air taxis, to enable artificial intelligence modules to run onboard. That is, computers that process and interpret data from cameras and sensors and send it to the primary flight control system. These systems are multicore because they use very powerful GPUs. Developments in this regard are ongoing. The European Aviation Safety Agency plans to use artificial intelligence in aviation with a roadmap that will start in 2025 and accelerate.

The US and European civil aviation agencies are doing a lot of work to bring more autonomy to aviation. Groups are also being set up for the autonomization of airlines for flying cars. As AirCar, we provide consultancy to these studies. Although all these developments are still in their early stages, they are continuing at an accelerating pace.

Autonomous systems are a must for air taxi platforms. Although many leading air taxi companies prefer piloted systems over autonomous systems, it will not be possible to pilot 10,000 flying cars in the skies over Istanbul.

That's why, as AirCar, we first focused on autonomous systems and have been developing autonomous systems with Softtech since 2019. Some of the studies we have completed with Softtech at the POC level have already been published by aviation authorities. Of course, how the authorities will accept these studies or how the absolute accuracy of these results produced by artificial intelligence will be confirmed is a question mark. We are sure that aviation will use artificial intelligence and autonomous systems much more and that starting these studies early with Softtech is the right strategy. Of course, it is important to invest much more at this point. We need to bring these autonomous software technologies we have developed to a level where we can use them in AirCar until 2025 and 2026, the commercialization target of AirCar, to establish a business model that will grow much faster. Otherwise, establishing a flying car ecosystem controlled by pilots may cause significant problems in terms of both safety and sustainability.

With the changing world, city life is increasing rapidly, creating a serious traffic problem. For example, Istanbul is known as the most congested city in Europe. In order to solve this problem, it is necessary to give importance to public transportation, but in cities like Istanbul that receive a lot of immigration in a very short time, it is not possible to establish these systems later.

At this point, as AirCar, we are trying to make pleasant and fast city aviation possible for passengers using our service by following the new technology and pioneering a new era by introducing almost unused airlines in Istanbul and similar cities. Both our business partners and we have essential duties at this point. As long as we can use technology properly, we can make the world more livable and cleaner.

In 2025 and beyond, there is a lot of development to be done for the AirCar, which we will start to put into service. In the coming period, we will create the first areas of use by putting drones with high payload capacity into service with manned tests. In the coming years, city cargo logistics and air transportation will take on a new dimension.

HUMAN, LIFE AND MOTION

WHAT DO YOU MEAN BY “CRISIS”?

ŞANT MANUKYAN

IS Investment
Global Markets

All happy families are alike, and every unhappy family has its own misery. I don't think Tolstoy thought when he wrote the opening sentence of Anna Karenina that it would one day become so popular. But it is such a perfect sentence that it is a constant reminder in the course of life. This is also true for financial markets. No two crises are the same, even if they resemble one another in terms of headlines. Therefore, each crisis must be evaluated and positioned in its own terms. Before every major crisis, you hear analogies to 1929. Or, as happened a few months ago, the stagflation scare of the 1970s manifests itself.

For some time now, I have been faltering at first when I have been asked for my views on the future. When it comes to the future, robots,

software, crypto-assets, etc., must be mentioned! A few years ago, anyone who didn't talk about 3D printers was beaten with a pillow; today, silence prevails. But we need to be able to read the present to understand the future and the past to understand the present. We can only understand what kind of crisis we will face next.

We can define the system we are in today as the American or Bretton Woods system. Before going into the underpinnings of this system, let us recall the conditions under which it was designed. In the industrialized world, empires competed for access to resources and markets in a way that could risk war. So much so that while the British Empire sold its surplus production to its own colonies, it did not allow any other industrialized state into these markets and kept the raw materials from these colonies for itself. Since there was no freedom of navigation in this type of competition, there was rapid armament and competition between navies. In short, a struggle for sharing led to the First and Second World Wars.

At the end of the Second World War, among the victorious states, the US, which had suffered minor damage from the war, had two alternatives. As in previous centuries, to colonize and rule the places they conquer, to dominate their markets or to establish a new order. Either because the first alternative was not feasible in the long term or for some other reason, the US turned to the second alternative. He opened the markets of all countries to trade, especially his own market (since there was no other market because everything was destroyed). Britain did not need to go to war with Germany to sell goods to country X. It put an end to the colonial system and ensured access to raw materials for all states. Thus, it became pointless for Japan to attack oil-owning countries in order to industrialize. He opened the trade routes and the seas to everyone and pointed to his own navy as the guarantor of this. In return, he asked his allies for their support against communism. Thanks to this system, Japan, which had no raw materials, became richer than Russia, which was rich in raw materials and the winner of the war, and Germany, which had been destroyed, became more prosperous than victorious England. Human resources outstripped all other resources. The US, in particular, and the West, in general, thought Russia and China would become "like them" by joining this system. Today, however, they have become two important states that have taken advantage of this system to challenge the system itself.

For the US, maintaining this system in its current form is costly and not in its strategic interests. So when I say crisis, I mean that this time Bretton Woods is really coming to an end. In the transition from a system where the rules are set to an environment where the rules are not yet set, the asset that will come to the fore first is gold. Gold is an asset that does not rely on a legal contract or trust. Therefore it is not worn out from lack of rules. I had hoped that Bitcoin would be in this class, but we haven't seen any clear signs yet.

I just used the word "confidence" as the equivalent of government bonds in financial markets. In particular, bonds of developed countries are considered risk-free. When a company fails, bond and shareholders are left with what is left of the company, while government bonds are always paid in full. Therefore, while stocks suffered a massive collapse in the 1929 crisis, the bonds of the US, which had a balanced budget, were not damaged and benefited from the deflationary environment. But today, we see that developed countries are over-indebted and, as in the case of the UK, politicallyseriously problematic. I would like to ask an extreme question.

If the UK defaults on its bonds (which it doesn't have to, it can pay by printing GBP), can investors claim any assets? Considering the inflation problem, it is not the stock market that I am worried about. On the contrary, I think a crisis is coming in the fixed income markets.

The trigger zone will be the Eurozone or China. Considering that equity markets are an attractive investment instrument mainly for young people with a high-risk tolerance and larger savings, whereas bonds are preferred by more conservative, older and regular income-seeking people, especially pension funds, the social dimensions of a crisis in this market would be very different.

Fixed-income markets, particularly government bonds, are at the centre of the entire financial system due to their collateral character. A crisis at the centre could result in a major loss of confidence. In this case, tangible investments such as real estate that can maintain their value at a specific rate may come to the fore. In many parts of the world, house prices are well above historical averages. Therefore, whether a possible crisis will be deflationary or inflationary, as in currency crises, will be critical for real estate prices.

In an environment where I emphasise the trust or rather distrust in the system, I would like to mention decentralized finance and crypto assets again. If the DeFi projects had come to fruition at the height of the 2008 crisis, I am sure they would have taken some of the money out of the giant banks. We may see this type of trend in the coming years. After the regulations, I think that a small number of crypto assets will find a place in portfolios and will play an essential role as a complement to the current system, even if it fails to be an alternative.

FROM HUMAN EMOTIONS TO HUMANOID TECHNOLOGIES

PROF. DR. ZUHAL BALTAŞ

Baltaş Group
Founder

As the 21st century reaches the end of its first quarter, the interaction between humans and technology cuts vertically through every aspect of life. Technological development starts slowly, almost imperceptibly, but grows irresistibly exponentially. With this growth, the Covid-19 pandemic experienced an explosive transformation. Technologies that were already ready have been deployed. Hybrid layouts and online applications have enabled people to stay connected to the world and their work life. The relationship between academia and the business world has strengthened. New digital applications powered by the metaverse, haptic studies and nudge designs are increasingly meeting people.

Some look at the human intersection of technology with curiosity and want to use it rapidly, as well as those who approach it with scepticism. Some of the employees were in the camp of the enthusiastic, and some in the camp of the anxious. They need to learn new skills while making their jobs easier. On the other hand, they are worried that their jobs will be taken away. It is a matter of curiosity and concern to what extent the technology that changes the way we work will change the jobs we do, which jobs will be deleted from our lives, and which will be added. However, projections of the skills needed in the future world of work suggest that the need for basic cognitive and manual and physical skills will decline, while the demand for technological, higher cognitive, social and emotional skills will increase. Regardless of their industry or profession, they are expected to work digitally, adapt to new ways of doing business and add value to their work beyond what smart machines can do.[1]

As the pandemic has changed how we live in shared spaces, the uncertainties in relationship management and business outcomes have increased. Employee habit change and value proposition make it important to focus on the emotional dimension of technology's interaction with people.

Relationship affects performance

Wars have played a role in increasing investments in technology. World War II and its aftermath provided a wealth of data that helped us unravel the relationship between people and business outcomes. During the Cold War, the United States and the Soviet Union conducted decades of research. Engineers and behavioural scientists mainly conducted the research. In this period, the human factor was at the center as the most fundamental issue.

Allen, an MIT researcher, was asked to identify and benchmark the performance of teams carrying out the complex task of deploying and guiding intercontinental ballistic missiles and communicating with satellites. So the so-called "twin projects" were launched. The working conditions of the teams, the quality and measurement of the solutions and the success criteria of the projects were investigated.

In the teams' work practices, we found a pattern that repeats itself based on distance and relationship in the placement in space, which we discussed in the book The Language of the Body. Allen called the people involved in successful projects the "good communicators group". They were able to overcome complex problems with astonishing speed.

When he began to examine this intriguing situation in detail, he first looked at intelligence, age, school or graduate school majors and degrees. They also compared differences in experience and competence and found no differential factor. However, the placement in the study and social field was intriguing, and the findings were surprising. The fact that employees see each other, watch each other and have visual contact with each other, whether there are problems within them and in their work, who to ask for what and when, and several other influences were activated. They wanted to dig deeper and understand how often people communicate and how they are positioned in relation to each other. The result is a curve showing the distance and frequency of interaction. This curve, known as the Allen Curve, revealed that the relationship distance intercept spikes at the 8-meter limit.

People have been living collectively since the beginning of time, and the function of distance has a binding characteristic that brings people closer together. It brings intimacy, and belonging and is a safe harbour that allows for secure attachment. Research has also shown that digital communication still fits the Allen curve. People who are physically close are more likely to text, email, and communicate virtually. It is reported that employees who share the same space send four times more emails and complete their projects 32% faster than those who do not. They also find each other in other places, even when with other people.

The new world we live in today seeks the conditions of this physical environment, which is one of the important grounds for secure attachment.

Technological communication and emotion management

Staniec et al.[2] explored the emotional experiences and impacts of working from home in the first three months of the pandemic. Two groups participated in the study: "digital natives" who had remote working experience before the pandemic and "digital immigrants" who started remote working during the pandemic. The results revealed that emotional experiences while working from home

did not differ by occupation, age, gender, length of experience and past experience of telecommuting. This showed that digital natives experience similar feelings as digital migrants, and both have to cope. Our deep codes could not be expected to change in such a time. Working in conditions that are difficult for everyone forces employees to collaborate across organizational boundaries. In such cases, there is a need for the management to diversify the relationship management channels and to show closeness to the employees by getting emotionally involved in the process and connecting with the new discourse.

However, Dr Helen Riess from Harvard Medical School points out that when a person chooses to communicate via text message, email or social media instead of face-to-face, the neurological foundations of empathy are eroded and diminished. The emotional experiences of others are actually mapped to our own brains as an observer. That's why we feel sad around someone grieving or experience positive emotions like excitement with them. Neurologically, the fact that most emotions are contagious is related to brain biochemistry and is experienced more strongly when mirror neurons are activated in the mutual relationship.

Texting, email and phone conversations, on the other hand, do not allow us to recognize the implicit clues of emotion and thought in body language and to build a deeper understanding.

The findings of the University of Salzburg confirm this observation. Anneli Eddy,[4] investigated how interpersonal communication differs in virtual and face-to-face environments through 10 dimensions. The survey findings showed that face-to-face communication was rated significantly better in 5 out of 10 dimensions than virtual communication. These were empathy, immediacy, interaction management, self-disclosure and expression. In a culture of inclusion, self-disclosure and expression are factors that facilitate understanding and acceptance of psychological dynamics.

On the other hand, various programs are being created to understand and improve mood changes. These programs aim to deepen understanding, starting with an assessment of oneself. One of the first examples of this was the "Mood Meter", designed by the Yale Center for Emotional Intelligence. According to the researchers, Mood Meter enables to identify the emotion and its cause, choose an emotion regulation strategy, track the distribution of emotions over time, maintain it in the desired order and share it on social platforms if desired. In this way, it helps individuals develop the skills of Recognition, Understanding, Labeling, Expressing and Regulating emotions, which they call RULERs.[5]

One of the pioneering examples of emotion-sensing technology is EQ-Radio, a device created at the Massachusetts Institute of Technology (MIT). By measuring heartbeat and breathing through wireless signals, it detected with 87% accuracy whether a person was excited, happy, angry or sad.[6]

As EQ-Radio is an indoor device, it is not designed to measure on the move. However, other solutions that combine with smartwatch technology are being worked on. For example, a study conducted jointly by researchers in the USA, Australia, England and Malaysia thinks it will be possible to activate a smartwatch or mobile phone application that can monitor emotions from motion sensor data. The new app emphasizes the importance of utilizing direction, motion sensing, and heart rate data.[7]

Researchers believe this kind of technology will be a solution to managing workers' time, facilitate appropriate decision-making, and increase emotional well-being. One example is the time allocated for responding to annual employee engagement surveys. It is emphasized that while the traditional practice requires the employee to devote 60 minutes on average to data collection with new technologies will not take longer than 60 seconds and will provide continuous and consistent information without tiring the employee. In this sense, technology offers a unique opportunity to get to know the employee and facilitate targeted behavior change.

Image 1. FeelScan that registers texture on different surfaces.
Source: https://www.youtube.com/watch?v=lctQa9IuUGg&ab_channel=Balta%C5%9F-Grubu (the part between 19:10 and 20:10 mins of the video)

We know that all these technologies extract meaningful patterns from different sensory data collected from humans. On the other hand, while transferring sensory information to digital, we see that it is possible to strengthen digital experiences in terms of emotion as the power of representing the real world increases. Different interaction methods are being studied in depth in the field of surface haptics using haptic technology. The aim of the studies carried out under the direction of Yasemin Vardar at Delft University Cognitive Robotics Research Laboratory is to bring a different dimension to screen meetings. With pens that will be used as an extension of the hand, it will be possible to experience the feeling of touching and touching the images on the screen. For now, work is underway to digitize and feel the indentation, softness or hardness of various surfaces such as fabric (Figure 1). But in the not-too-distant future, adding the human touch to digital experiences will no longer be a dream. If you are far away from the birth of a new baby in the family, don't worry, you will be able to love him/her by touching his/her image on the screen.

Digital nudges

The nudge theory, which came into our lives with the work of behavioural scientists Richard Thaler and Cass Sunstein, especially in the field of behavioural economics, includes intervention methods that aim to change the behaviour of individuals in a predictable way without restricting their freedom of choice. Digital nudges using technological tools open the door to flexible solutions to guide employees towards appropriate behaviour. Mobile devices, corporate social networks and other workplace applications facilitate using digital nudges to encourage behaviours that benefit employees and the organization.

Among the different uses of digital nudges, they are known to be effective in improving time management. For example, JDS Security's use of shift scheduling software to nudge mall security guards for their upcoming shifts reduced overall tardiness by 21% and absenteeism by 16%.[10] The software allowed employees to see their upcoming shifts, change their current shifts, and receive

reminders a few hours before shift start time. If the employee missed a shift, the system would send a message to their coworkers asking them to pick up the shift.

In another application, artificial intelligence coaching was used to improve the performance of field service technicians. The company created a personalised nudge recommendation engine based on the employee's past performance on key metrics such as time per job or rework rate. These nudges included requests to complete specific steps or actions, and best practice summaries for specific jobs with links to training content such as videos. Initial nudges were followed up with reminders, and technicians who improved their performance with these nudges were sent nudges confirming their progress. The content and overall tone of the messages were tailored based on the technicians' combined reactions to the personalized nudges sent to them.

The system's effectiveness was measured by comparing the field service workforce test groups with similar groups in the company's traditional coaching and performance management techniques. The efficiency of the test groups increased by 8 to 10 per cent compared to the control group, while the need for rework was reduced by 20 to 30 per cent. These productivity and quality improvements helped achieve a 5 to 10 per cent cost reduction. Moreover, the system was highly appreciated by both field technicians and managers.

It is known that well-being-first practices affect performance and play a role in its improvement. There are many examples, such as automated systems that alert the manager when he or she wants to send an email to an employee outside of working hours or alerts that encourage the employee to set aside time in their agenda to focus on themselves. A study published in the International Journal of Environmental Research and Public Health focused on different dimensions of well-being. The effectiveness of an app called Welbot was measured. The study, which prioritized reducing sedentary life, also considered the consequences for mental well-being, procrastination, depression, anxiety, stress and work engagement.

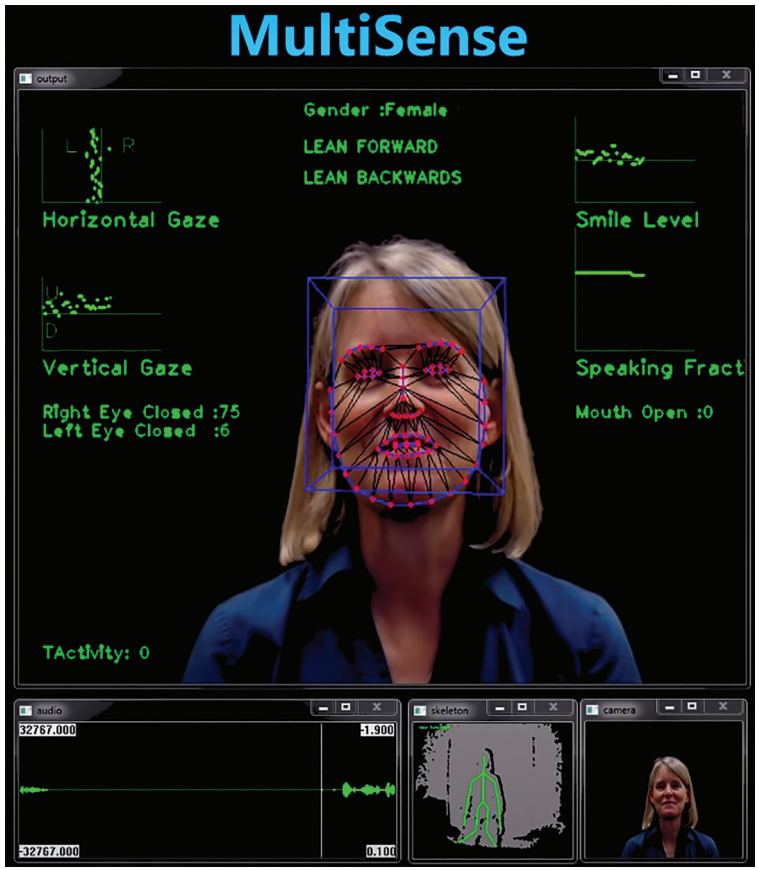

Image 2. MultiSense, which analyzes people's body language in real time.

Source: https://www.youtube.com/watch?v=ejczMs6b1Q4&t=95s&ab_channel=USCICT (the part between 2:00 and 3:33 mins of the video)

Participants' self-reported sitting time decreased significantly while standing time increased. It was also noted that they took more steps. There were significant improvements in depression, anxiety and stress. The participants' perception was that they experienced a positive behavioural change and that their awareness of unhealthy workplace behaviours increased.

In the near future, robots will support clinical psychologists and psychiatrists by diagnosing clients. They will present the data obtained from the analysis of important elements of body language to experts. MultiSense13, an Institute for Creative Technologies project at the University of Southern California, automatically tracks and analyzes real-time facial expressions, body posture, acoustic features and linguistic patterns (Figure 2). By inferring psychological indicators from these signals and behaviours, the virtual human directly informs SimSensei. SinSensei is a multi-modal virtual human platform and healthcare support. The platform automatically reacts to the detected user, ensuring an engaging interaction. This work on algorithms that allow multi-sensory readings has become quite widespread. For now, diagnoses seem to be limited to anxiety, depression and post-traumatic stress.

Conclusion

As a result, digital techniques to help management and HR recognize and connect with employees are rapidly evolving. This change is expanding the information network of employees and management based on personal data. While workflows can be easily sustained, the search for how to build the human side of the face-to-face and collaborative business model continues. On the other hand, digital nudge designs allow for faster and more effective decision-making due to their low cost and the ability to deploy multiple nudges.

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CHILDREN OF CREATIVITY CHANGING THE WORLD: ART AND TECHNOLOGY

ZUHAL ÜRETEN

İş Sanat
General Manager

You may have missed the news that scientists from China's Guangzhou University have found the oldest known artwork ever. Research on handprints discovered in 2018 on the Quesang rocks on the Tibetan Plateau suggested that they were 226,000 years old and were made by the children of the Denisova people with a "creative approach". Thought to be the oldest artworks ever discovered, the handprints in Quesang are estimated to be tens of thousands of years older than the famous cave paintings in France, Indonesia and Spain.

Inspired by this news and looking at it with today's knowledge, it seems possible to think that even in the ages we know very little about, people who demonstrated their creativity by removing hand and footprints, drawing shapes, carving bones or stones in unique ways in order to leave their mark, express themselves, create an impact, and give a message, also created the technology of their age with this creativity, developed the artworks of their age with their technology, and thus changed the world. The fact that the term "technology", which we use to describe all methods ranging from the simplest tools made of stone to spacecraft, from tools made of animal bones to artificial intelligence, is a combination of the Greek words "techne", meaning art and craft, and "logos", meaning word, discourse, narrative, science, feeds this idea.

In the tens of thousands of years of humanity's history, art, like technology, has reached today by increasing the acceptance of its importance and indispensability, even though it has been shaped and changed by the conditions of its time. Although the technological developments that accelerated after the Industrial Revolution changed the performance of art, its material, its subject, its meeting with the audience, the artist and even what we call art, the importance of the existence of art and technology can be seen

as one of the most important common acceptances of the 21st century generations.

The endless possibilities provided by technology not only change today's art but also enable the care and protection of artworks whose lifespans span centuries, unravelling their secrets and uncovering their surprises. For example, a painting by Van Gogh, which he had covered over with another painting, was recreated more than 135 years later using artificial intelligence. The obscured painting of two wrestlers was detected by x-ray technology 10 years ago behind Van Gogh's 1886 painting "Roses and Meadow Flowers" at the Kröller-Müller Museum in the Netherlands.

Technological developments, the virtualization of museums and exhibitions, and the ability of people to easily visit artworks from wherever they are and even to be involved in the production of art are enabling new and rich forms of an exhibition such as audio, visual and augmented reality. As we count the days until the opening of our Museum in Beyoğlu, one of the most important and comprehensive painting collections in Turkey, we were excited to welcome the İşbank painting collection to its permanent home. With the first NFT exhibition at Metaverse, "A Stroll on the Bosphorus with Paintings", NFT presented selected paintings from the works of master painters such as Hikmet Onat, Şeref Akdik, Zeki Faik İzer, Feyhaman Duran, İbrahim Safi, İbrahim Çallı, Cevat Erkul, Hulusi Mercan, Bedri Rahmi Eyüboğlu and Halil Paşa in the İşbank painting collection. The exhibition, presenting with the selection of Prof. Dr. Gül İrepoğlu, Founding Curator of İşbank Museum, met with its audience on the Decentraland platform, which uses blockchain infrastructure and is established in a decentralised structure. The augmented reality applications used in the exhibition enabled the NFT artworks to be viewed by combining physical and digital experience. Although the interest and the awards won by our exhibition, the technological design prepared by İşbank's technology teams, and Softtech's innovation centres in Turkey and China encourage us to take new steps in this area in the future, it isn't easy to predict what will happen next.

While technology is opening many doors in art today, it is also creating new debates. Remember, an artificial intelligence painting was sold at Christie's auction house for 432,000 dollars in 2018. The painting titled "Portrait of Edmond Belamy", which bears the signature of the artificial intelligence program developed by the Paris-based art collective Obvious was priced between 7-10 thousand dollars before the auction. The spectacular start of this artificial intelligence algorithm, which has a database containing 15 thousand of portraits made between the 14th and 20th centuries, has not been able to prevent today's discussions. Game designer Jason M. Allen won the Fine Arts Competition held as part of the 2022 Colorado State Fair in the USA with a work he designed with the help of artificial intelligence in the digital arts / digitally played photography category. The fair, which has a 150-year history and is held in Puebla, Colorado, every summer, defines digital art as "the artistic practice that uses digital technology in the creative or presentation process". Allen's success therefore does not break any

rules. Nevertheless, many people reacted to the news of the award. On social media, comments were made: “This is why we don't allow robots to participate in the Olympics”, “We are watching the artist die before our eyes”, “I can see how artificial intelligence can be useful, but I definitely cannot say that you are an artist”. On the other hand, Allen said, “I created hundreds of images, and after weeks of fine-tuning, I chose the first three and printed them on canvas. It was the first time I participated in a competition and I won. I think it really shows the power of AI, and unfortunately, a lot of people were offended by it," he had to defend himself and AI. Of course, these discussions are not limited to the questions of what is art and who is the artist, as well as commercial and ethical problems, such as who owns the copyright of the work and whose responsibility it is.

The indirect dimensions of the relationship between technology and art are now among the hot items on our agenda. Global climate change problems, in which technology is among the causes as well as the seeker of solutions, occupy the top of the agenda of art. While many artworks are produced that draw attention to the problems of global climate change, sustainability approaches and climate problems take first place among the most popular themes of biennials and art festivals. Climate activists have carried their protests to museums. In the autumn of 2022, first, tomato soup was spilt on Van Gogh's Sunflowers painting at the National Gallery in London; a few days later, mashed potatoes were thrown at a piece from Monet's Haystacks series at the Barberini Museum in Potsdam, followed by the Mauritshuis Museum in The Hague. Vermeer's Girl with a Pearl Earring was targeted. Although these climate actions did not damage the works due to the glass on them, they managed to terrify art lovers from different angles.

Art and technology, two unpredictable children of creativity that pave the way for each other, influence each other directly or indirectly, feed on inspiration and imagination, and whose futures are unpredictable, continue to change our lives as they change each other.

AVATAR LAW IN METAVERSE

BURCU TÜMER

TBL Legal
Lawyer, Co-Founder

Law Between Revolutions and Evolutions

Since the early 1990s, the so-called Web 1.0 era, we have witnessed many technological developments. While these developments sometimes appear as new products and/or services, sometimes they are more revolutionary than an evolution. During these technological transitions between evolutions and revolutions, the tradition of writing laws and jurisprudence, which first began with the Sumerians in Mesopotamia, has also undergone change and transformation over time to meet these needs. Although the law has often failed to catch the winds of "technological transformation", it has at least managed to keep pace with this transformation with minimal damage thanks to the correct creation of "protective legal rules".

As many jurists would agree, the law is "the set of norms regulating human behaviour". Based on this definition, if we consider that human behaviour will play a major role in the implementation of Web 3.0 technologies, which are nowadays being debated with great momentum, then we can state that it is important to evaluate these technologies from a legal point of view, perhaps sometimes to recreate them.

META-VERSE; LAW AND BEYOND

The concept of the metaverse, first defined by Neal Stephenson in 1992 in his book "Snow Crash", is no longer a science fiction concept but a technology that will be used in the near future. It is stated that this concept, which consists of the combination of the words "universe" and "meta", that is, "beyond the universe", will cause a

digital transformation in which virtual reality and other technologies will be used together in all areas of our lives. It is defined as a platform that can be accessed from anywhere in the world with virtual reality (VR) and augmented reality (AR) devices, where physical and virtual worlds will be connected to each other, where users can socialise professionally and engage in commercial activities through the "avatars" they will create.

From a legal point of view, if we are talking about a digital universe where everything is composed of 0s and 1s, i.e. a binary system, it would not be reasonable to expect that the rules of law currently in force in this new "universe" will be in line with this new concept or that they will answer all questions. As a matter of fact, although at the contractual level, traditional contracts are now being replaced by "smart contracts" through "if..." Although we are working on the regulation of the relations between the parties by establishing cause and effect relations with the coding of "then...", when it comes to the law, "grey" areas are also on our agenda due to the existence of "open to interpretation" issues, and new areas of work arise for us lawyers who like to negotiate. Therefore, in this new concept defined as "the universe and beyond", it is necessary to examine what kind of reflections the basic legal needs in the ordinary world may have beyond the universe.

Before addressing possible legal problems, we should not forget that legal discussions have been held under different topics in recent years for many technologies that have actually become a part of our daily lives today. Although there are still grey areas in this new technology world, the issues that are the subject of discussions could not prevent this development and the law actually followed the technology. Therefore, without taking a pessimistic approach, emphasizing the importance of how to provide the right infrastructure legally, which stakeholders should act together, and identifying possible risks in situations that cannot be resolved will shed light on these new world « players ».

What legal issues/questions arise?

In the new concept to be created in the meta-universe, as in our daily lives, issues such as personal data transfers, labour relations due to new employment opportunities, land purchases/sales, leases,

Ownership of works, hence intellectual property, international law rules since a supranational system will be created;

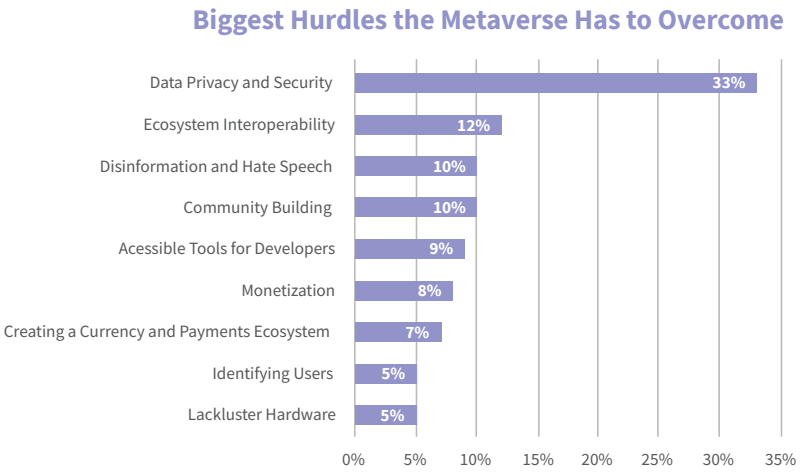
It is important to make legal evaluations in areas such as intellectual property law, labour law, personal data protection law, inheritance law

within the scope of private law; human rights law, real estate law, tax law, international law and criminal law within the scope of public law. In this article, I would like to state that since the legal problems that may arise due to the avatars to be created in the meta-universe will be discussed, the evaluations made will be limited to this scope.

How will personal data be protected?

While data privacy issues persist in our current system, these issues are likely to become more complex in this new virtual world with augmented reality. As a matter of fact, since the digital footprints of the avatars that users will create will be recorded in a data infrastructure, measures should be taken to protect data such as credit card numbers, medical records, and location information

of individuals. The survey studies also show that data privacy and security are the most important problems to be encountered in the metaverse universe, with a rate of 33%; [2]



At this point, it is stated that the "privacy by design" application regulated in the GDPR is one of the important solutions for protecting personal data in the metaverse world. Thus, by redesigning all the tools that process data, it will be effective in taking the necessary measures to protect personal data at the very beginning of the process.

Another concept that should be evaluated in terms of personal data protection is data transfer mechanisms and data localisation. Since technology giants such as IBM, Microsoft, Apple, Meta Inc. are working to realise multiple metaverse platforms with different themes, it should be noted that there will be a transition between these virtual universes. For this reason, it is important to establish data transfer mechanisms in order to ensure secure data transfers when users move between different platforms. To be evaluated within the scope of the existing rules, in order to establish the said data transfer mechanisms, it will first be necessary to determine whether there is a data controller and a transaction that can be described as data transfer. On the other hand, it is also important to determine how the said transfer will be carried out and what approach will be adopted for data transfers both between countries and between platforms due to the increasingly widespread "data localization" restrictions of countries.

Since there is currently no uniform data privacy law or set of rules applicable to all countries in the world, which legal rules will be applied in terms of the protection of personal data in this new meta-concept, which will host different platforms, is another matter of discussion. Although there are assumptions in the market that a different set of international and universal rules for the metaverse could be established, how this would be implemented, how the interests of all stakeholders could be equally respected, and even whether all countries and/or platforms could reach a consensus on the rules to be applied is a matter of debate.

What if a cyber attack happens in the meta-universe?

Meta-universe platforms may be subject to cyber-attacks in the "traditional" sense, as well as cybersecurity threats due to the ownership and transactions of digital assets, e.g. if end-users' digital wallets are not adequately protected. In such cases, it may cause situations such as identity theft of the end user in the digital world or imitation of the created avatar by someone else.

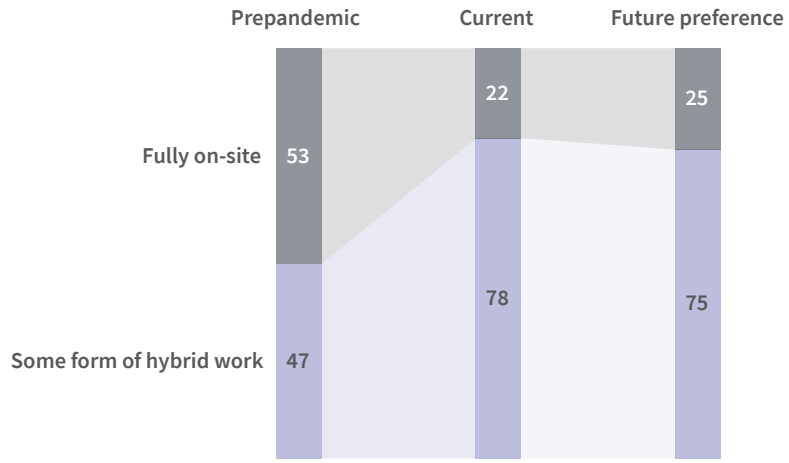
In order to eliminate the mentioned risks, it is stated that it will be important for metaverse platforms to take the necessary administrative and technical measures within the scope of personal data protection legislation. As a matter of fact, The European Parliamentary Research Service states that identification activities on the blockchain will be beneficial in terms of eliminating these risks and that it will be important to establish cyber security protocols between platforms.

When we evaluate the cyber security risks mentioned in terms of criminal law, the decision made by the 13th Penal Chamber of the Supreme Court in 2020 catches our attention. In the relevant decision, the unauthorised sale of the plaintiff's avatar to a third party occurred due to unauthorised access to the plaintiff's e-mail address and access to account information. **As a result of the examination, the Court of Cassation ruled that the defendant obtained unfair advantage on the grounds that the avatars had a material value.**

New Employment Opportunities in Metaverse!

New technologies have led to changes not only in companies' operating and investment strategies but also in their employment policies. In this context, "freelance" working models, which emerged through the establishment of consultancy contracts, and remote working and hybrid models, which companies switched to compulsorily during the pandemic period, came to the agenda. Especially due to the increase in hybrid working models, new regulations have been introduced within the scope of labour law, and companies have made changes in their employment policies in this context.

Share of respondents by work model, %



In teleworking models, it is important to determine the applicable law, especially since foreign companies or the element of foreignness are involved in business relations. Since the employment relations to be established in the metaverse world are actually mentioned on a transnational level, questions such as which legal rules will be applied to the business relationship in question, how the employees will be paid or how the nature of work accidents will be determined.

When we evaluate it in terms of the applicable law, in our law, in accordance with the International Private and Procedural Law No. 5718, the parties can determine the law to which the contract will be governed in consultancy contracts containing foreign elements.

If not, the law to be applied to the contract will be determined in accordance with article 24/4 of International Private and Procedural Law. The regulation in the relevant article is as follows; “In the event

that the parties have not made a choice of law, the law most closely related to the contract shall apply to the contractual relationship. This law shall be the law of the habitual residence of the obligor of the characteristic performance at the time of the conclusion of the contract, the law of the place of business of the obligor of the characteristic performance in contracts concluded pursuant to commercial or professional activities, or if the obligor of the characteristic performance has more than one place of business, the law of the place of business that is most closely related to the contract in question. However, if there is a law more closely related to the contract according to all the circumstances of the case, the contract shall be governed by this law."

In this context, there are different opinions and concerns as to whether the law of the country where the relevant platform is established or the law of the country where the employee resides will apply in the metaverse world, which is referred to as a decentralised working environment. Although it is accepted that the parties may choose the law applicable to their employment contracts, it is stated that the minimum protection rules provided to the employee constitute an exception to the choice of law, by stating that "Employment contracts shall be governed by the law chosen by the parties, without prejudice to the minimum protection that the employee shall have pursuant to the mandatory provisions of the law of his habitual place of work" in Article 27/1 of the International Private and Procedural Law. Therefore, the choice of law to be applied in such labour relations is limited in favour of the employee in accordance with the principle of protection of the employee, who is considered to be the weaker party.

In this context, the determination of which legal rules provide more protection in favour of the worker will be made in accordance with the « principle of expediency », and the provisions that provide the minimum protection that the worker has in accordance with the mandatory provisions of the law of the place where he or she habitually works will be applied.

Regarding how employees will be paid, the question of "whether employers can pay their employees with cryptocurrency", which is currently a subject of discussion/curiosity on the agenda, comes up. Under Turkish law, Article 32 of the Labour Law No. 4857 ("Labour Law") defines wages as "the amount provided by the employer or third parties in return for work and paid in money" and states that wages cannot be paid in any form or by a bill representing money. When evaluated in this context, we can conclude that if Turkish law is to be applied in the labour relations established on the metaverse platform, employees cannot be paid with cryptocurrencies unless cryptocurrencies are accepted as "currency" in our legislation.

Apart from the above-mentioned, questions such as whether an accident experienced by a person hired on the metaverse platform while performing his/her job will be considered an occupational accident, what the scope and implementation of the employer's supervision and inspection obligation will be, what the limits of the creation of appropriate working conditions by the employer will be, are among the topics that should be evaluated within the scope of labour law.

What about human rights?

It is of legal importance to examine the criminal behaviour of avatars in the Metaverse universe. Crimes such as insult, threat, sexual harassment, qualified fraud, which we encounter in "real" life,are actually occurring between avatars directed by real human hands

through avatars created. Indeed, in 2022, the media reported that other avatars were harassing a British user's avatar.

In such cases, the principle of "individuality of punishments" and whether the absolute rights of individuals from birth will also apply to their avatars should be evaluated from a legal point of view.

In terms of intellectual property;

In the context of the new concept of "life" in the metaverse, intellectual property issues have also come to the fore. As a matter of fact, it is observed that trademark owners in many countries around the world have started to file trademark applications for virtual goods and services in order to eliminate the risk that their existing trademarks do not provide protection in metaverse platforms. In the statement made by the World Intellectual Property Organization (WIPO), it was stated that the applications were filed under different classes and that the standardisation of the approaches of the examining trademark offices would be decisive in terms of future processes.

In the information letter published by the European Union Intellectual Property Office on 23 June 2022, it was stated that a guideline on the subject would be published in 2023.

So, what happens next?

Nowadays, when we see that some governments are even making agreements to open embassies in the metaverse universe, additional questions such as how citizenship law will be applied, which legal rules will be applied in case of conflict between the laws of two or more countries, whether a brand new legal plane will be created for the metaverse or whether concrete legal rules will be applied by analogy for the virtual world, what the taxation system will be like, how issues such as inheritance law and property rights will be handled are also on the agenda.

Since data and data-based ecosystems are becoming more and more important today, how the data to be stored in the meta world will be processed, what kind of an economic model it will reveal, and how the stakeholders' approaches will be, Although questions and problems such as how it will be reflected on the end-user and how "human rights" will be protected are among the topics of curiosity, as I stated at the beginning of my article since the law today follows the technology, I think that new legal rules will come to the agenda with the development and widespread use of technology and a new "legal order" will emerge. In this context, the approaches of the relevant institutions and organisations, countries and metaverse platforms to the above-mentioned legal issues and the conditions under which a common ground can be reached will be important.

[1] ***Metaverse | European Data Protection Supervisor (europa.eu)***

[2] ***Report: 33% of devs say data privacy is a big obstacle for the metaverse | VentureBeat / Agora***

[3] ***Metaverse (europa.eu)***

[4] ***argıtay 13. CD, E. 2019/9265, K. 2020/258, T.2020***

[5] ***Hybrid work: Making it fit with your diversity, equity, and inclusion strategy | McKinsey***

[6] ***1.5.5718.pdf (mevzuat.gov.tr)***

[7] ***Trademarks in the metaverse (wipo.int)***

[8] ***EUIPO - Virtual goods, non-fungible tokens and the meta (europa.eu)***

SMART CITY = SYSTEM THINKING + TECHNOLOGY

SİBEL BÜLAY

EKOIQ
Local Governments Editor

Livable Cities
Columnist

According to Peter Senge, "Today's problems arise from yesterday's solutions. In this case, it is clear that we cannot solve today's problems by thinking as we did yesterday (technology alone does not change the way we think).

SMART CITY

The concept of "smart city" does not yet have a common definition. Different definitions are put forward by researchers from time to time. The existing ones are also changing over time. When asked what a smart city is, smart projects and smart applications are described. We see that smart city projects mainly focus on technological innovation, improving services and infrastructure, and reducing environmental impact.

We had a chat with Nathan Pierce, Head of London's Smart City Team, about London's journey to becoming a smart city. He explained that the concept of "smart" has changed in the last 10 years and that technology was at the centre of the smart city vision when they first started. Quality of life and socioeconomic issues were ignored or not emphasized. The smart city roadmap developed under Sadiq Khan in 2018 was citizen-oriented and published as "Smarter London Together".

The roadmap includes Chief Digital Officer Theo Blackwell's definition of a smart city: "A smart city is a collaborative, responsive city with strong connections. It integrates digital technologies and uses city-wide data to respond to the needs of our citizens.

London Mayor Sadiq Khan emphasizes the importance of increased collaboration between Londoners and municipal departments to

improve municipal services. Several tools have been developed to promote citizen engagement, including data platforms and urban living labs that aim to engage the public in urban governance processes through digital technologies.

(Although beyond the scope of this article, I must emphasize that the digital divide is a critical barrier to citizen participation in governance and must be addressed. Otherwise we cannot talk about participatory democracy and inclusiveness).

The Mayor is, no doubt, acting in good faith. But there is an overlooked fact here: Current problems are being tackled instead of long-term solutions. The problems are so complex that the causes are not properly addressed. Collecting data, developing models allows us to understand where we are today. And this is of course important. But suppose the goal is to ensure that cities develop sustainably, healthier, happier and with a better quality of life. In that case, it isn't easy to achieve this by simply collecting data, building platforms and engaging the public.

If we tackle the complex social, economic, environmental and cultural problems of sustainable urban development with today's reductionist thinking, even with the support of technology. In that case, we will produce simple, superficial solutions to these deep problems. We need a different approach in shaping the future of our cities. So, we need system thinking.

Smarter London Together

SYSTEM THINKING

Michael Goodman's definition of systems thinking is "a sensitivity to the cyclical nature of the world we live in; an awareness of the role of structure in creating the conditions we face; an acknowledgement that there are powerful laws of working systems that we do not know about, an awareness that our actions have consequences we are not aware of.''

According to Peter Senge, systems thinking is "the discipline of seeing wholes. It is a framework for seeing interrelationships rather thanobjects, for seeing patterns of change rather than static snapshots".

Donella Meadows describes systems thinking as follows: "The first thing a systems thinker does when faced with a problem is to look for data, time graphs, the history of the system. This is because long-term behavior provides clues to the underlying system structure. And the structure is the key to understanding why not just what happened." Through technology, we are collecting data at a local scale, and creating time graphs and models. Thanks to technology, we can more easily obtain information that allows us to understand the system. In other words, when technology is taken together with system thinking, we become much smarter.

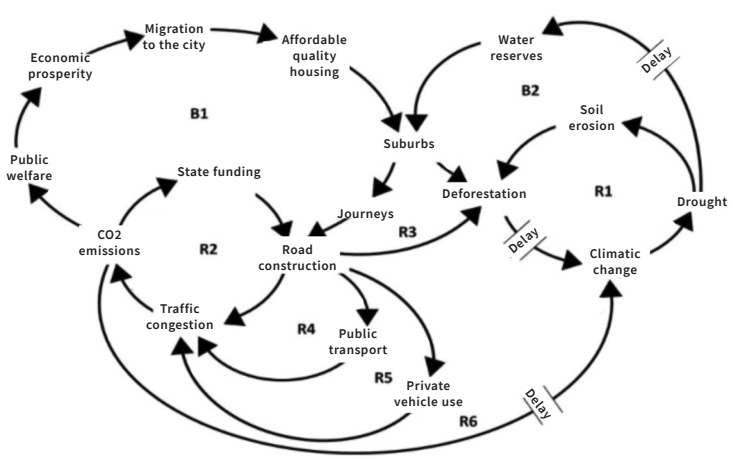
COMPLEX SYSTEMS: CITIES

"The biggest obstacle to developing good cities is not understanding the city as a complex system."

The city is a complex system of both man-made and natural elements. It is even a system of systems. Infrastructure, legal system, culture, politics, economy, social structure, food system, waste system, technology, health, education, and and even citizens are just some man-made systems. We also have natural systems such as air, water, soil, forests, animals, plants, climate, and energy. And all these systems are somehow interconnected and need to work together to support life in cities.

(I described London's experience above. If systems thinking had been used when establishing the smart city unit in London, it would have been understood that the citizen is one of the elements of the city, and the citizen would have been included in smart city activities from the beginning).

We find it difficult to understand such a complex system because we humans like to think about singular causes producing singular effects. As Donella Meadows says, "In our heads we can only track a few variables at a time... our mental models do not take into account the complications of the real world... With a reductionist approach, we break wholes into parts and examine parts separately from the system. We think this approach is more understandable. This is how we plan our cities, addressing urban problems in isolation from the complex systems in which they exist. And so we treat the symptoms instead of solving the underlying problems. This approach can also lead to unpredictable outcomes that create more problems.



A small cross-section of the effects of urban migration on the city system

When this reductionist approach was combined with technology, the concept of the smart city emerged. Making decisions based on data thanks to technology, ensuring public participation in

governance thanks to technology, improving city services thanks to big data... these and similar studies are all valuable developments. City management is more efficient thanks to technology. But within this complex system, as I mentioned above, we are failing to produce fundamental solutions. Therefore, in order to ensure the sustainability of our cities and improve their quality of life, we need to adopt system thinking in shaping tomorrow.

CONCLUSION

As a proponent of systems thinking, Peter Senge suggests that city managers should shift from seeing parts to the whole, see citizens as active participants in city governance, and focus on shaping the future rather than the present.

When we bring our smart cities together with system thinking, we can build sustainable cities with high quality of life.

NOTE: I would like to recommend two books on systems thinking:

¬ Donella Meadows: Thinking in Systems - A Primer

¬ Peter Senge: The Fifth Discipline

Resources

https://www.london.gov.uk/programmes-strategies/business-and-economy/supporting-londons-sectors/smart-london/priorities-and-programmes-2021-and-beyond

EMPLOYEE ENGAGEMENT IN TIMES OF CRISIS

ASLI ABACI

Softtech
Human Resources Director

Speaking of commitment...

"Employee engagement" is not a new concept. However, it is a subject importance of which is increasing day by day in line with the conditions of the day and our perspective should constantly change depending on current developments.

As someone who has worked for many years under a group with a deep-rooted history and historical mission, I have always believed that the most fundamental thing that lies at the core of my loyalty is "trust in your colleagues and the company you work for". Putting aside financial means, whether you are in a managerial position or a team member, if your communication with your team is strong and you have been able to build a sense of mutual trust, loyalty comes with it. Even in times of crisis, this situation becomes an opportunity and creates new opportunities and areas for development.

When it comes to employee engagement, the first thing that comes to mind for many people is probably "employee happiness". However, what it emphasises at its core is not only happiness but a wide range from the satisfaction that individuals feel for the roles they are responsible for establishing healthy relationships with their managers and colleagues, to believe that they are supported and valued in their working processes, to feeling secure by serving the same purpose as the company they work for, to the financial opportunities provided. In fact, saying “the feet do not go backwards on the way to work” can be taken as a short summary.

The Covid-19 pandemic we have experienced worldwide has also made a significant difference in this sense. Although the course of the pandemic has diminished, traces of it have not disappeared. While unemployment was fought during the pandemic, decentralized employment has become the day's topic.

Aside from the stress caused by mass layoffs, economic downturn and uncertainty about the future, with the "remote" and "hybrid" working styles that the pandemic has rapidly adapted to our lives, ensuring employee engagement has become a common concern of all managers.

Although it may seem like a long time ago, "the freedom to work from wherever we want without having to go to the office every day", which was a common dream of all of us just a few years ago, has changed the approach of companies to this issue with the pandemic and accelerated the transition process. Many companies were forced to adapt their technological infrastructure and equipment in a short period of time in order to survive. Apps like Zoom, Teams, and WhatsApp have become an integral and undeniable part of our lives.

While this may seem like a strong motivator and a source of comfort for employees at first, as time passed, it became clearer and more apparent that there are actually different challenges and complications for both companies and employees. With the realization that being together for hours on Zoom is no substitute for 10 minutes of face-to-face contact, photo posts with the theme of happiness of coming together on days when going to the office have started to appear more and more on social media.

The biggest threat that fully remote working poses to many industry sectors is the ability to compete with global job opportunities that are difficult to compete with in terms of compensation packages and stable living standards, and to maintain employee engagement without physical contact.

What can be done?

In the face of all these threats, the most important thing to realize in order to sustain and increase engagement is that providing

satisfactory wages and benefits alone will not be enough to create sustainable and long-lasting engagement.

The first important step is to ensure that employees' personal goals and expectations are aligned with the company's vision and goals. It is important to follow the evolving trends of the day and refocus on employee experience practices by continuing to support each individual in their specific area, even in times of crisis.

Research Says...

According to the Microsoft Work Trend Index (2022), 53% of employees prioritise health and well-being at work more than before the pandemic. Mercer's Global Talent Trends (2021) report provides similar data, stating that 49% of employees change jobs with the expectation that their welfare and well-being will improve.

Offering special wellness packages to employees, providing continuous learning and development opportunities, being able to appreciate their performances, providing personalised working models and ergonomic working environments, offering satisfying job opportunities, trying to hear the voice of employees by conducting surveys in certain periods, revising the existing processes in line with the feedback received by trying to empathise are listed as the most basic other factors necessary to increase loyalty. Again in the Microsoft Work Trend Index (2022) research, it is predicted that young people who have just entered and will enter business life will be able to do some of their work in the Metaverse in the next two years. It is emphasised that managers should increase their cooperation with developing technologies such as Metaverse and AI, and it is recommended to consider solutions to facilitate creativity.

ManpowerGroup's What Makes Workers Thrive Survey (December 2021) and The Great Realisation Report: Accelerating Trends, Renewed Urgency (2022) reports include the following titles as the top 10 trends for current and future expectations of employees.

Trend #1. The 3 most important flexibility factors for employees:

- **Determining their own start and end times (45%)**
- **More vacation days (36%)**
- **Completely flexible workplace options (35%)**

Trend #2. With the increasing emphasis on mental health, it is stated that 3 out of 10 employees want to have more time to focus on their mental health to overcome the feeling of burnout.

Trend #3. It is stated that 4 out of 10 employees want to determine which days of the week they will work on their own initiative, with the desire of employees to reshape their workplace and maintain a home/work balance with hybrid work.

Trend #4. Emphasizing the importance of creating a strong EVP to ensure the loyalty of remote teams by creating an environment of trust for employees, it is stated that 3 out of 4 employees want to be motivated and passionate about their work, 7 out of 10 employees believe that their work is important and want their contributions to be seen by the management.

Trend #5. With the increase in employees' desire to be heard en masse, 64% of employees want to serve for the betterment of society in their daily work, and 2 out of every 3 employees want to work for companies with a culture similar to their own values.

Trend#6. With the necessity of gaining new skills for the employees in line with the new talent needs brought by the conditions of the day, It is stated that more than 30% of companies plan to increase wages in order to gain and retain employees, and 1 out of every 5 employers plan to offer fringe benefits such as additional vacations.

Trend #7. It is stated that generation distinctions such as X, Y, Z are coming to an end, everyone wants to see more personalised services, and 75% of the workforce will consist of young people under the age of 35 by 2030.

Trend #8. The pace of closing the gender gap has begun to stagnate as women leave the workforce at alarming rates; the overall rate of women leaving the workforce is alarming, 51% of women are less optimistic about their career prospects after the pandemic, 57% have left their current jobs within 2 years He is said to be planning to leave.

Trend #9. Based on the fact that companies will increase their work on social benefit issues, more transparency will be expected by all parties, and actions on diversity, equality and inclusion will have to be taken in order to benefit from economic opportunities, it is stated that more than 30% of companies have already started to implement diversity and inclusion programmes.

Trend #10. When thinking about the future of work, it is important to think about families and the care of family members alongside technology.

Conclusion

Focusing on measures for the fitness, welfare and comfort of our employees, following developments closely, not neglecting always to keep people in focus while maximising cooperation with technology, and continuing to support them throughout their entire working journey, starting from the moment we first contact them as employee candidates, receiving their feedback through surveys and open communication, and trying to develop new approaches where changes are needed will always be our most fundamental tasks in this process.

THE PLACE OF DIGITAL LEARNING PLATFORMS IN THE WORLD OF YOUTH

MERVE DEMİREL

Softtech
Human Resources Team Manager

With the developing technology and changing conditions, speed, adaptation and innovation are on our agenda more than ever. Education is one of the disciplines most affected by digitalization, which has accelerated with the pandemic.

In this period, when education is being redesigned from schools to universities and corporate life, what is actually happening is a change in learning processes. Learning no longer takes place only in classrooms and in a period of our lives, but in every moment of our lives and in a continuous way. This situation, together with digitalization, has firmly placed the concept of e-learning in our lives.

E-learning is a learning model that uses technological infrastructure to realize the learning activity. E-learning is an umbrella concept that includes concepts such as computer-based learning, internet-based learning and mobile learning.

This article will focus more on digital learning platforms where different learning tools are brought together. These platforms are also referred to by different terms depending on the experiences they offer.

The first work in this field is MOOC (Massive Open Online Course) platforms that offer massive open online courses. MOOCs emerged with the idea of providing quality and free education. Subsequently, with the emerging sector needs, enrichment of content and infrastructure requirements, it has become a growing market with paid versions.

In 2020, digitalization accelerated with the emerging pandemic. While interest in online education has increased during the pandemic, the global e-learning market size, which exceeded 200 billion dollars in 2019, is expected to nearly double by 2026. According to research

conducted in Turkey, the e-learning market size recorded double-digit growth between 2013-2018, while the market size is expected to reach 200 million dollars by the end of 2023.

So why have digital platforms become the center of attention? At the beginning of the pandemic, when we couldn't leave the house, we were all curious about something new and wanted to make the most of our time, so we signed up for something and had an experience.

From this point of view, what we hear and know most is that it offers an experience in its own time, space, and learning pace. Generation Z is most interested in this feature. Generation Z, as defined by researcher and author Evrim Kuran, is a generation specialising in one field while working in another and looking at life from many windows, not just one. It's also a term for the new generation of multi-careerists who don't just follow one career path, who can be a journalist on the one hand and an interior designer on the other.

For this young audience, renewal and the ability to adapt their competencies to changing conditions are indispensable for success.

What do these platforms offer to young people?

Freedom in Space and Time

They allow to set their own learning pace and have the flexibility to set a program flow that fits their agenda. Wherever there is internet infrastructure, they can access the information they want, whether in a café, bus or park. The platform is there for them whenever they need it.

Ease of Access

Access from a computer, tablet or mobile phone from anywhere the internet is available. Access to open, free resources, sometimes with a fee, but mostly for free.

Subject Diversity

The opportunity to specialise by acquiring new knowledge and skills in many areas from the language learning to hobbies, from software to social skills.

As examples of such platforms that are in the centre of attention of young people; patika.dev, Geleceği Yazanlar, Yazılım Köyü, etc. could be mentioned. Some of these platforms focus on development in a specific area, while others focus on multiple topics. These platforms have some differences from the MOOC platforms we are used to; the possibility of interaction, learning from each other through the community, offering career opportunities such as selection and placement in some of them, and organising competitions such as hackathons and ideathons.

What should these platforms, currently supported by information-intensive, mini-quizzes and competitions, evolve into in the future, and what do young people expect at this point?

Another important issue shared by Evrim Kuran as a result of his research on youth is to break the cycle of lack of experience in new graduates. This issue, frequently voiced by young people, brings up the need for "experience" and "learning from the expert".

To transform knowledge into experience, young people expect platforms where they can conduct tests in laboratory environments, try different areas of expertise with role play in simulations, and receive and give feedback; in short, where theory and practice will be presented together to become widespread. At the same time, they want this experience to be personalised, with the tools that best suit their learning style. After they have achieved these outcomes, another expectation they have is internship opportunities so that they can apply for them and weigh whether they are suitable for them or not.

Thanks to developing technologies, many of these features are now more reachable possibilities. Technologies such as artificial intelligence and augmented reality, which will take place more in our daily lives with Web 3.0, will play an active role in developing the issues mentioned above. Artificial intelligence can offer similar content suggestions based on the content that it has watched and read before. With augmented reality, what happens in a business environment, and what kind of environment one works in can be demonstrated and even experienced.

These platforms, which entered our lives with digitalization, also become a part of social responsibility in creating equal opportunities for young people. Digitization will continue to be a very important resource that strengthens our hand not only in terms of technology but also in terms of creating inclusiveness, accessibility and equal opportunity.

Considering the quality of education and reducing inequalities targets included in the Global Goals for Sustainable Development until 2030, every investment made/to be made in this field for young people will have a positive impact.

Resources

5 Reasons Why Online Learning is the Future of Education in 2022 (educations.com)

The digital evolution of learning - Digital Age

The global market for digital learning has reached $80 billion - Bloomberg HT

Online Education Market Gears Up " Marketing Türkiye (marketingturkiye.com.tr)

https://www.kureselamaclar.org/

https://dergipark.org.tr/en/download/article-file/1708606

INTANGIBLES, TECH COMPANIES, SUSTAINABILITY AND LEADERS OF FUTURE

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Market participants are questioning the validity of some traditional investment instruments these days. Especially for sectors such as technology, software, healthcare and pharmaceuticals, the traditional investment value of "book value" may no longer accurately capture a company's intangible assets, such as the strength of its brand or the value of its intellectual property and social capital.

So what are these intangibles, and how should technology companies, in particular, think about them if they are indeed driving market capitalization?

Assets are basically everything that a company owns. Tangible assets are physical. Intangible assets do not physically exist. These may include intangible assets such as patents, customer satisfaction, resources, and networks created by talented employees, some of which are more easily measurable while others are more difficult to measure. Assets that money cannot buy and require time to build and a suitable culture and environment can actually be very important to company value, especially in innovative technology companies. This is one of the main reasons why many mergers and acquisitions fail to create the expected post-deal value. The post-merger integration of these intangible assets is the cause of many mergers and acquisitions failures due to the cultural mismatch between the acquirer and the acquiree.

What we understand by intangible, fixed assets has changed rapidly in the last two decades. Historically, intangible assets consisted primarily of value revealed by purchase accounting rules. Today, however, intangibles are much more diverse and complex. This makes valuation difficult and requires company-by-company analysis.

Human capital is one of the most important elements that play a key role in creating intangible value. Generally speaking, human capital has two main components, internal and external. Internal consists of your employees; their ability to create new products, resources or customer relationships can often be the most important factor in determining the success or failure of a business. External capital consists of your customers and business partners such as suppliers and dealers; they not only provide a monetizable asset but also give a company both a positive reputation and a strong brand. As some social media platforms have discovered, if the trust in the institution is shaken, the reputation and brand may face a serious loss of value.

Many technology and software companies in human capital-dependent industries, such as Google and Facebook, provide employee benefits such as flexible working, canteens, sports facilities, on-site laundries, "dogs welcome" policy, shuttle buses, free on-site haircuts, discounts for events, 7-week paternity leave, massage therapists and on-site health services to remain competitive in accessing the best employees. Failing to invest sufficiently in human capital in customer acquisition means failing to manage risks to the brand and reputation correctly and failing to create intellectual property.

Indeed, intangible assets now account for 90% of the total assets of stock market indices. This is not only a historically high rate but also an indicator of how pervasive value-creating technology has become in our lives. Nasdaq is even further ahead of the asset evolution curve, with only 5% of the value attributed to net tangible assets.

In an environment where sustainability is becoming increasingly important, companies increasingly face similar challenges to those

seen in the struggle to accurately value intangible assets. In order to create long-term value, companies must pay as much attention to environmental and social issues as they do to economic issues, and the quality of governance of the organization forms the basis of trust in the organization. It is recognized that a long-term commitment to companies' sustainability approaches is essential and that many investors care passionately about this issue. But how can a company capture the value of its sustainability efforts on its balance sheet? Existing traditional accounting regulations need a better template for reporting on their activities in this regard. Investors find it difficult to find the information needed to assess a company's sustainability efforts in reports and accounts. Two key elements to fix this are missing. First, a universal consensus on what constitutes sustainability investments, which have many dimensions; and second, standardised reporting to help both measurability and comparability.

These are not straightforward issues to resolve, and the challenges are real. In addition to consistency of leadership at the management and board levels, holistic thinking and an integrated reporting framework can provide some answers. New developments in management, including the new EFQM Model 2020 and Integrated Reporting, are trying to address these issues. In particular, the sustainability reporting standards adopted by the International Sustainability Standards Board (ISSB), which was established under IFRS this year, will be an important milestone in this regard.

The logic of the new EFQM 2020 model (Why-Direction, How-Execution, What-Results) is fundamental as it addresses how to be excellent and, more importantly, how to be radically different by understanding and reacting to all relevant megatrends and influences in the environment. The model also helps organisations better manage what they measure by focusing on measuring inputs, outputs and outcomes from different perspectives.

Integrated thinking is a decision-making and analysis process in which all corporate stakeholders participate, as all stakeholders are affected by a company's decisions. These interconnected causes and effects should be assessed and reported as an integrated whole.

Integrated Reporting aims to communicate to stakeholders the value creation model of a business, its performance and the responsible use of any resources (Capital). An Integrated Report shows why an organization exists (Purpose), how it achieves its purpose (Strategy, Business Model) and what the results of its activities are, including outputs (directly visible results such as products, employment, profits, emissions, etc.) and outcomes (indirect material impacts created by activities and visible over time). Therefore, an Integrated Report provides information not only on last year's financial results and the organisation's financial position but also on the opportunities and risks for the long-term existence of the organization, its stakeholders and the environment.

Organizations should be able to communicate their value proposition not only to the market and shareholders but also to other stakeholders such as employees, customers, suppliers and society at large.

The role of measurement and reporting is becoming more important as it becomes clear that a significant proportion of value creation comes from hard-to-quantify intangible assets or ethical approaches and behaviours related to sustainability. Tomorrow's leaders will be managers who are able to go beyond today's financial figures and communicate the value proposition of their activities to all their stakeholders, not only holding themselves accountable but also being comfortable explaining to their stakeholders the positive results of their actions. This would merit a long-term, higher market valuation. The ISSB's adoption of integrated reporting will contribute to this direction. However, it will also be the basis for long-term value creation, especially for companies to evaluate not only their own income and expense statements and balance sheets, but also the impacts they create for their stakeholders within materiality assessments.

INNOVATION AND ENTREPRENEURSHIP

DISRUPTIVE INNOVATION, LEADERSHIP AND ORGANIZATIONAL STRUCTURE

SEZGİN LÜLE

İşbank

Deputy Chief Executive Officer

What is the lifespan of companies? Today, we see that we are among companies whose roots go back almost to the industrial revolution and which have continued their activities for many years. On the other hand, many of the new generation companies that have recently appeared on the stage of history, thanks to the products and services they offer to their customers, are taken for granted in our daily lives as if they have been operating for many years. Both century-old and recently established new companies have in common that, contrary to the biological limitations of human life, they are not ephemeral, and especially those with advanced adaptation skills have the chance to exist in the future. However, companies that miss the transformation currents are bound to be very short-lived.

When rapidly developing technological competencies, capital that easily circulates between countries and industries, and human resource competencies that have recently become accessible regardless of location come together, we observe that organisational structures with high adaptability that can respond quickly to transformation are beginning to form. And this is not necessarily the case with newly established initiatives. We observe that traditional companies that have distinguished themselves in their activities and have sufficient capital can easily establish structures that capture new customer expectations and innovative trends thanks to the right leadership and the right transformation strategies and overcome the "Innovator's Dilemma" problem posed by the famous Harvard Professor Clay Christensen.

Although Clay Christensen recommended that companies can overcome the inevitable Disruptive Innovation trends by establishing new organisational structures outside the company, today, many traditional companies can overcome this process with an effective Explore-Exploit mechanism.

Ambidexterity is a critical characteristic that every company or enterprise that does not want to be limited to mortality like human beings today must have; this characteristic can be revealed through the virtues of successful leaders. In fact, we can count many successful leaders in business life today; however, it is obvious that those who succeeded in turning the cycle of discovery and exploitation we mentioned into a corporate culture can easily differentiate from their peers, and when we look back, it is obvious that the leaders who we remember the endless transformation in question and the resulting balance sheets enriched in terms of content and diversity, rather than the balance sheet results in terms of sustainability, will take a place in the memories.

I believe that in the past when the transformation took place at a relatively reasonable pace, it was easy for companies to compensate for the transformation even if they did not take a quick initiative; it was always possible for them to proceed with a transformation programme that had a clear start and end dates and guaranteed certain outputs. However, in the face of today's initiatives with the right combination of technology, data and competence, we need to recognise that no environment will tolerate this wait-and-see policy. It would probably not be wrong to say that we are in a Perpetual Transformation (Perpetual Transformation, McKinsey). Those who survive in this transformation, on the one hand, must continue to improve what they know best or Exploit to the best degree with incremental innovations, while on the other hand, they must be in a strong Exploration process (Explore) for different market and customer expectations with radical or disruptive innovations. It has become a necessity for companies to have both Discovery and Exploitation initiatives within their transformation portfolios.

The versatility of the company depends on a strong organisational alignment. Leadership is as important as the ability to execute a multi-skilled business strategy. Although the desired direction to be taken and the goals to be achieved in order to be successful are clearly defined, it is very important that the organizational structure, employee competencies and internal culture support this journey.

For this reason, the following topics that will support the transformation in question should be addressed accurately and strongly:

- **Do employees clearly understand what we want to achieve? Are they motivated enough?**
- **Is there an organizational structure that will enable the employees who will need the right information and resources to operate processes quickly and effectively? The recent popularity of agile structuring programs actually addresses this need.**
- **Do achievement and reward mechanisms support this?**
- **Are control and surveillance systems working effectively?**
- **To what extent do the values displayed by the employees support the success criteria of the whole or company culture on the way to achieving the goal?**

How we answer these questions will directly affect the success of the transformation journey. Just as it is possible for a traditional company that has achieved the transformation to turn into a fast and flexible company that has caught the spirit of the time, it is also possible for a new generation enterprise that cannot maintain this to take on a traditional structure over time.

TURKEY'S ENTREPRENEURSHIP ECOSYSTEM

AYLİN ÖZTÜRK

Softtech
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Between 2000 and 2010, the Turkish Entrepreneurship Ecosystem experienced a period of bootstrapping (self-funding by an entrepreneur). Due to the lack of investors, the most successful startups emerged from the bootstrapping model. Between 2010-2018, we saw a large influx of supportive actors into the ecosystem, leading to an increase in startups that managed to grow through external investment. These actors included angel investors, VCs, CVCs and accelerator programmes, and during this period, these actors gained experience and made their first investments. As of 2019, we have entered a period of acceleration. We witnessed Turkey's first unicorn. The first IPO took place, and the first steps towards global expansion were taken.

By 2022, the number of ecosystem actors shows that the Turkish entrepreneurship ecosystem has a network that cannot be underestimated:

- 8000+ startups
- 33 VCs
- 41 CVCs
- 16 Angel Investor Networks
- 715 Accredited Angel Investors
- 5 Active Crowdfunding Platforms
- 101 Incubators / Accelerators
- 73 Technoparks
- 129 Technology Transfer Offices
- 41 Co-working Space

Source: startupcentrum

In the 2022 Technology Report, while discussing the Turkish Entrepreneurship Ecosystem, we discussed the pandemic's effects. This year, it is necessary to evaluate entrepreneurship ecosystems with the diminishing effect of the pandemic after almost three years but with the negativities that the whole world is trying to cope with. The pandemic's most significant impact is on countries' economies. With rising inflation rates, rising interest rates, the energy crisis, declining growth trends and deflationary economies, it is inconceivable that entrepreneurship ecosystems would not be affected by these parameters. However, this also has positive consequences for startup investments; the most important advantage is that investors invest smaller amounts, making it easier to find investments. Nevertheless, the downturn in global venture financing is likely to be felt in Turkey as well, as global venture financing reached $74.5 billion in Q3 2022, the lowest level in the last 9 quarters. This means a 34% decrease compared to Q2.

In 2021, investment and fund establishment records were realized worldwide. Turkey's startup ecosystem broke all-time records in 2021, with 1 billion 552 million dollars invested in 294 investment rounds in Turkey. Turkey was one of the top 10 most invested European countries.

Looking at the first 9 months of 2022, the number of deals in 2022 is expected to lag behind 2021. However, despite all these negativities in the economies in 2022, venture investments continue to increase both in Turkey and globally. According to the Turkey Startups Ecosystem 2022 Q3 Report prepared by Startups.watch; In the first nine months of 2022, 1 billion 495 million dollars was invested in 208 deals. In terms of the number of deals, Fintech, SaaS, Gaming, AI and Marketplace are the leading investment areas for the first nine months of 2022.

Turkey ranked above the Netherlands, Estonia and Austria in the European Super League, while the MENA Super League ranked just above the UAE in angel and VC deals. In the first half of 2022, Istanbul ranked fourth among European cities for angel and VC deals, behind London, Paris and Berlin (source: invest.gov.tr).

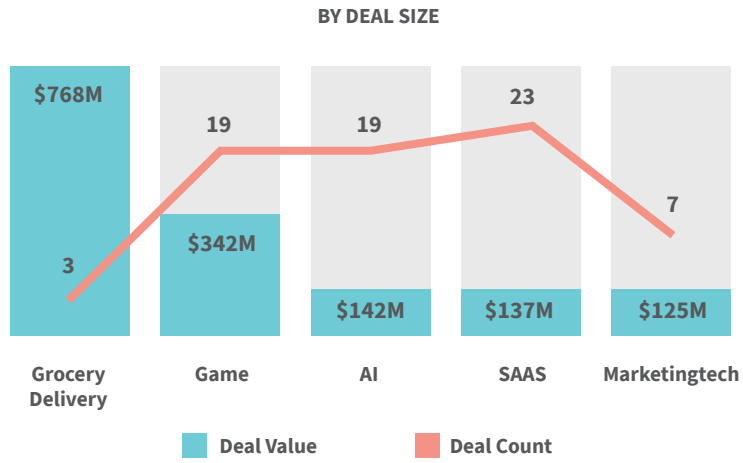
The verticals most preferred by startups in Turkey are shown in the graph below on a yearly basis. According to this data, we see that the gaming sector has maintained its first place in the last four years. Also noteworthy are NFT and blockchain startups, which entered the list for the first time in 2022.

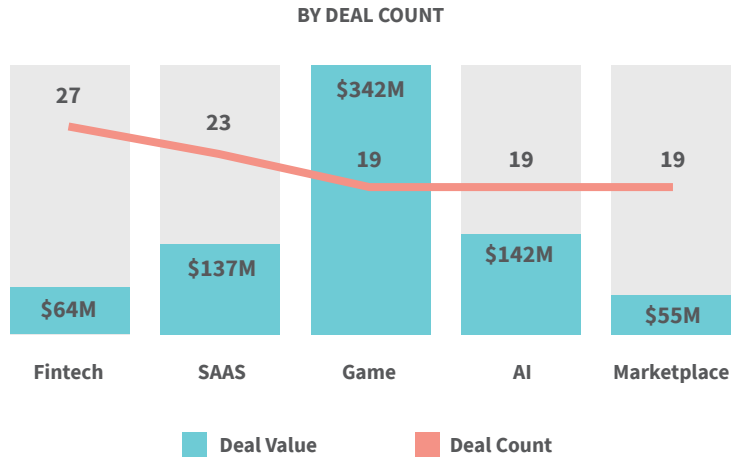
TOP 5	2017	2018	2019	2020	2021	2022
1	FINTECH	FINTECH	GAMING	GAMING	GAMING	GAMING
2	SAAS	SAAS	AI	AI	FINTECH	FINTECH
3	DEEPTECH	AI	SAAS	HEALTHTECH	AI	AI
4	HEALTHTECH	DEEPTECH	FINTECH	FINTECH	HEALTHTECH	NFT
5	GAMING	HEALTHTECH	HEALTHTECH	SAAS	SAAS	BLOCKCHAIN

Source: startups.watch

The investment process is undoubtedly one of the most critical areas of the entrepreneurship ecosystem. Investments play a critical role in accelerating the growth of startups, reaching their goals more easily, allocating resources to different endeavours, growing their teams and increasing their power. As entrepreneurship and the number of entrepreneurs worldwide grow, and dozens of new startup ideas are launched daily, the amount of investment in startups is also increasing. Some of the success stories in last year's Turkey Entrepreneurship Ecosystem article illustrate the importance of the investment process: Trendyol became the first Turkey-based decacorn company with a valuation of USD 10 billion or more, Hepsiburada went public on NASDAQ with a valuation of billions, Getir raised approximately USD 1 billion in funding through various investment rounds.

When we look at the distribution of the deal size and number of investments made in the first nine months of 2022 based on sector, we see that the vertical that received the most investment is grocery delivery. In terms of the number of deals, the fintech vertical remains in the first place.





Source: startrups.watch

Investments of USD 1 million or more in Turkish startups in the first 9 months of 2022, ranked from highest to lowest, are as follows:

Startup	Vertical	Venture Capital	Quantity
Dream Games	Game		$255,000,000
Spyke Games	Game		$50,000,000
n11.com	Marketplace	Yes	$50,000,000
Param	Fintech		$23,884,345
Rubibrands	Ecommerce enabler	Yes	$23,000,000
modanisa	Conservative fashion, Flash sales		$20,000,000
TURK Finance	Fintech		$11,093,991
Midas	Fintech		$11,000,000
EasyCep	Marketplace	Yes	$11,000,000
Figopara	Fintech	Yes	$11,000,000
OPLOG	Logistics	Yes	$10,741,445
Procenne	Cybersecurity	Yes	$8,588,739
Agave Games	Game		$6,903,000
Fomo Games	Game		$5,000,000
Layer	Artificial intelligence		$5,000,000
Joygame	Game		$4,832,000
Revel Games	Game	Yes	$4,500,000
Züber	Ecommerce, Foodtech		$3,750,000
Ödeal	Restaurant, Retailtech, Fintech	Yes	$3,700,000
Dreamplace	Baby toddler		$3,700,000
ikas	Retailtech, SaaS	Yes	$3,500,000
Vispera	Retailtech, Deeptech, Image process, Artificial intelligence		$3,176,496
Fuudy	Meal delivery	Yes	$3,000,000
GT CARBON	Sustainability, Energy		$2,872,151
Kidly	Baby toddler		$2,739,800
BiLira	Cryptocurrency, Fintech	Yes	$2,500,000
The Unfettered	NFT, Metaverse, Game		$2,500,000
Wellbees	Hrtech		$2,200,000
Musixen	Media, Music, Marketplace		$2,000,000
Saykal Electronics	Military, Deeptech, Electronics, Agency, Energy	Yes	$2,000,000
Craftgate	Fintech, SaaS	Yes	$2,000,000
Fimple	Fintech	Yes	$2,000,000
Kolay IK	Hrtech, Cloud, SaaS	Yes	$1,900,000
Metavest	Cryptocurrency, Fintech		$1,600,000
Getmobil	Marketplace		$1,550,000
ELYT	Blockchain, Marketingtech, NFT		$1,500,000
PackUpp	Logistics	Yes	$1,400,000
Bilet.com	Travel	Yes	$1,200,000
KolayBi	Fintech, SaaS	Yes	$1,128,075
fundfinder	Crowdfunding, Fintech		$1,100,000
LIVZYM Biotechnologies	Biotech		$1,000,589
Abracadabra Games	Game, Agency	Yes	$1,000,000
Taxpayer	Business intelligence, Fintech	Yes	$1,000,000
Albert Health	Artificial intelligence, Healthtech	Yes	$1,000,000
Ontrail Store	Ecommerce		$1,000,000
Yin Yang Games	NFT, Game	Yes	$1,000,000
Thread In Motion	Internet of things, Wearable, Industry40		$1,000,000
ARTIOX	Blockchain		$1,000,000
Hiwell	Healthtech	Yes	$1,000,000

Obtained from startups.watch data.

After the pandemic, we see that the increasing interest in digital platforms continues, and the technology sector stands out in particular. Dream Games raised $225 million in funding in January 2022 and continues on its path with a valuation of $2.75 billion. In the table above, 327 million dollars of the total 573 million dollar investments belong to the gaming sector. The fintech and marketplace verticals are in second place, with 62 million dollars each. We see that NFT and metaverse investments remain very low despite the boom in this area in 2022.

As Turkey's entrepreneurship ecosystem grows, developments in the field of investment, one of the most important supporters of this ecosystem, follow an upward trend. Large-scale investments in companies have increased Turkey's strength in this field, boosted the number of local investors and attracted foreign investors to Turkish startups. The increasing number and volume of transactions indicate how healthy the Turkish entrepreneurship ecosystem is growing and will achieve even greater success in the coming years.

Turkey's geographical location and proximity to Europe are the main factors in attracting investment for Turkish startups. There is also a considerable entrepreneurial network, especially in Istanbul, which means many opportunities exist.

Despite all these positive factors, although Turkey's entrepreneurship ecosystem has a very high potential and is developing rapidly in the region, we can say that it is still in its early stages. Turkey is a dynamic and innovative country. Using the latest technologies provides a favourable environment for entrepreneurship as we are a country with a young population, but there is still much to be done to develop the ecosystem. In particular, entrepreneurship finance and access to finance are very important; state policies to support this should be permanent and continuous, and entrepreneurship education should start in schools so that the right entrepreneurship culture can be established.

Although I talk a lot about the importance of investment, investment can improve the ecosystem up to a point. The development of the ecosystem can be made permanent by increasing the number of incubation centres and acceleration programs to support start-ups, implementing world-class programs for productive teams and encouraging intrapreneurship. On the other hand, increasing the number of startups that can scale with late-stage investments and ensuring the return of these scales to the ecosystem also makes the ecosystem healthy. The importance of the development and continuation of entrepreneurship should not be forgotten because of its results, such as creating employment, providing economic growth, creating competitive advantage and transforming R&D results into commercial products.

TARGET RADICAL INNOVATIONS IN TIMES OF CRISIS

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Dünya Newspaper
Columnist

Radical is not a word we like very much in a socio-cultural sense. It makes us feel a bit scared and uneasy. However, real changes in a positive direction are usually brought about by radical leaps or even major ruptures (basic laws of dialectics). The world is going through a major rupture and transformation. While a long list of issues such as the Russian-Ukrainian war, climate change, energy crisis, high inflation, disruptive startups, digitalization, new technologies and changing customer behavior have already created serious uncertainty for businesses, the problems caused by the COVID-19 pandemic on top of these have deepened the uncertainties. According to many economists, we are facing the biggest crisis since the Second World War.

Under normal circumstances, most companies focus on cost improvements. This is understandable because the main competitive factor in many sectors continues to be "price". Cost is a key focus, especially in low-value-added products and traditional industries. Our companies have come a long way in establishing a quality culture and the influence of Japanese management techniques. Dozens of performance indicators were identified in domains such as efficiency, waste, unit cost, capacity utilization and process improvement. Performance management systems were established. High-performing employees who contributed to cost reductions were rewarded and quickly moved up the career ladder. However, we are living in extraordinary times, not ordinary times. In such periods, cost-cutting in an already rapidly shrinking core business offers a limited solution. Performance and cost improvements are meaningful in markets where there is no contraction in demand and growth is slow. In turbulent times like these, when demand is sharply depressed, consumers are postponing all, but essential spending and all traditional markets are shrinking, the most

effective weapon is the radical innovation that creates new markets. According to Deloitte's 2020 Global Technology Leadership survey, 66% of the top executives of leading technology companies prioritize innovation, while only 20% focus on costs[1]. In times of uncertainty, small improvements can make only limited contributions. The focus should be on radical solutions to create new waves of growth.

The silver lining of the current crisis is that high-impact innovations that would take years in normal times can be realized much sooner with agile collaborations in extraordinary times. During such periods, partnerships can be developed even with competitors (coopetition).

The scale and pace of R&D against Covid-19 is unparalleled by any other case in human history. Although not easy, many radical innovations have been achieved during global crises or during companies' own downturns. Many brands, such as Heinz, Microsoft, Burger King and FedEx were born in times of crisis. The risk that Nokia did not dare to take, but Apple took with a bold decision at the lowest point in its history, brought great success. In fact, the cell phone market leader at the time was one of the most admired brands with high sales figures. However, it failed to anticipate the coming trough and new consumer trends. Motorola and Blackberry shared the same fate. Blockbuster became history because it could not go beyond opening new physical stores and e-mail marketing and failed to make radical innovation decisions. The automotive industry, airlines, hotels, traditional media, and many of the once most successful, established companies, such as Volkswagen, are approaching a similar fate. Even in times of crisis, brands such as Adobe, Amazon, Google, LEGO and others are constantly reinventing themselves, making more than small improvements and, when necessary, stepping outside their core business. It seems that brands that can make radical transformations based on changing customer needs and behaviors will remain in the future.

8 Steps for Radical Innovations

Radical innovations undoubtedly involve risk. It requires fast and effective decision-making. We need an agile organization, but also strong collaborations. But as Canon, Tesla, Apple, and many other successful examples show, it offers much more effective gains in the medium and long term. By turning periods of uncertainty into opportunities, we can build radical innovations step by step:

1-Create Space for Radical Leaders

Leaders who pioneer radical innovations are characterized by extraordinary circumstances. Risk thresholds are high. They take quick and bold decisions. They set ambitious goals. They inspire their teams and are personally involved in every step of the innovation process. In his book 'First Class Madness', Nassir Ghaemi offers striking insights into the profiles of people like Kennedy, Lincoln, Hitler, Martin Luther King and others who led in extraordinary times.

2-Build a Guerrilla Team

The competency set of the team that will realize radical innovations is quite different from that of other employees. Let your team have 'maroon collars' who do not fall into insecurity about themselves and their teammates in difficult times, do not give up, can work under stress, act flexibly and quickly, have a system approach, think analytically and holistically, manage processes iteratively and have strong communication. Establish a gifted team with internal and, if necessary, external reinforcement.

3-Establish Your Headquarters Outside Company Borders

The team focusing on radical innovations should not be burdened with lengthy processes and company bureaucracy. We see that autonomous structures deployed at a point far from the existing corporate culture are more successful. The guerrilla team should be kept out of the main business and close to the ecosystem's arteries.

4-Tear Down Your Business Model and Design a Radical One

Probably radical innovations will need to be built outside your core business model. Identify the new customer base and the new value proposition to offer them. Design which partnerships, critical stakeholders, channels and tools will deliver the value proposition to customers. Clarify revenue items and cost structure. You should formulate marketing, pricing and communication strategies that align with the target audience. Remember that the business model is as important as the products and services for radical innovations.

5-Combine Your Ambitions with Strategic Wisdom

You need an effective answer to the question "Why radical innovation?". Support your intuition and passion with data. Identify the innovation opportunities promised by extraordinary times through data-driven analysis. Then decide which opportunity your business should focus on that aligns with its purpose, passions and values. Define the problem. Identify which part of the problem, what and how you will solve it. Strategize this whole process and make an exercise plan.

6-Change Performance Indicators

It is a big mistake to compare the sales figures of radical innovations with the core business. Because unit profitability, not scale, is a much more meaningful criterion in these cases. Performance indicators should no longer be purely financial. We are leaving behind the era when the most limited resource was only capital. At a time when central banks and governments are offering billions of dollars in quantitative easing, our scarcest resources are adaptability, teamwork, creativity, communication, flexibility, speed

and collective production capacity. Social contribution, the number of new stakeholders rather than the number of new customers, patents, and technologies developed and offered to humanity, the number of new solutions, the level of competence and happiness of employees, the size of the ecosystem rather than the size of individual companies, the meaning added to life and the number of happy people should be the new success factors.

7-Evolve into a Tech Firm to Survive

Every company now has to position itself as a technology and content producer. Brands that cannot deliver their value proposition to their stakeholders with superior data-driven technologies and business models have no chance of survival. Decide not what company you are now, but what kind of company you want to evolve into in the near future. Should you be structured as just a newspaper, a media company, or a technology company that produces and distributes content? Are you positioned as an automobile manufacturer or a technology company that offers future mobility solutions to humanity? Are you an airline or a fast and comfortable transportation provider? Are you a hospitality company or a brand that offers local and unique experiences?

8 - Take People-Oriented Action

While there is an inverse correlation between cost-cutting efforts and employment, there is a direct correlation with radical innovations. Instead of short-term profit and loss statements, focus on the sympathy you receive from the public and the brand love factor in the medium and long term. Undoubtedly, in such times of crisis, the public watches brands more closely. In this crisis we are going through, companies that are unknown at the moment, but have won society's appreciation by taking radical decisions, will be important players ten years from now. Many big brands of today will not be remembered in ten years. Just as becoming a social movement is the pinnacle for social enterprises, gaining social affection and mobilizing society is a similar parameter for companies. Brands that take action in such extraordinary times prioritize society and fight for the future, sacrificing financial statements for a while, if necessary, will be remembered.

Radical decisions and radical innovations are, of course, not easy, but they are the most important starting point in these times. **We need radical leaders, unflinching teams, passionate people, extraordinary models and action to take us into a new era of a new order. As Jean-Paul Sartre said, "There is no reality except in action".**

Resources

[1] ***https://www2.deloitte.com/us/en/insights/topics/leadership/global-technology-leadership-study.html***

IS YOUR PRODUCT STRATEGY READY FOR CHANGING ECONOMIC CONDITIONS?

HALUK ALTUNEL

Odeon Software and Technology
Deputy Chief Executive Officer

As we approach 2023, economic conditions are changing all over the world. Institutions such as the IMF and the World Bank predict a slowdown in growth trends and even contractions in some countries. Changing economic conditions will affect customers, markets, competitors and, therefore products. You've invested in your product for years, and you've strategized, but now is the time to revisit it and adapt it to new circumstances. Let's take a look at how you can do this.

Changes in Customer Behaviors

When approaching products to meet their needs, customers' key questions are:

- **Does this product meet my needs?**
- **Is my budget suitable for this product?**
- **How does the product compare with its competitors?**

As economic conditions change and become more complex, customers inevitably tend to save money, and the following questions are added at the beginning:

- **Do I have to meet this need now?**
- **How else can I meet my needs without buying a product?**

All alternatives that can replace the product are screened, and those that are not really urgent needs are left for later. Existing customers of the product also tend to prioritize more basic features in order to reduce costs.

The sum of all this is to revisit the Business Model Canvas, revisit the product's value proposition, and start refreshing the strategy work.

The product's value proposition must be redefined by uncovering changing customer expectations and segments. For this purpose, a Value Proposition Canvas should be drawn up, and the benefits and pain relievers to be offered to the customer should be clearly identified.

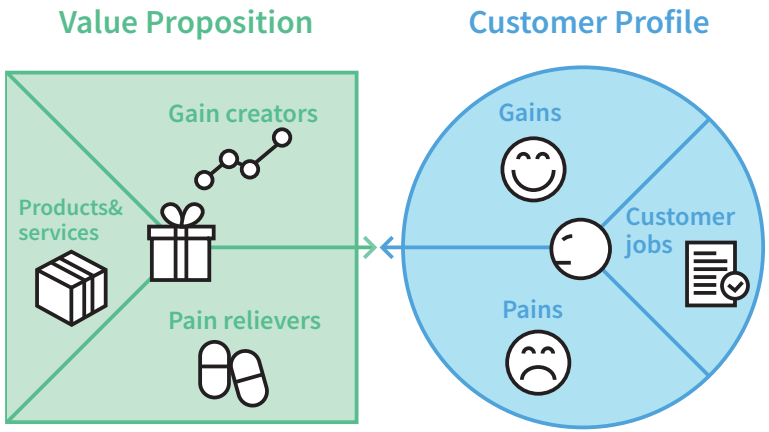

Figure 1. Value Proposition Canvas

In times of economic hardship, people reflexively gravitate towards products they know and are familiar with, so you should definitely include steps to retain your existing customers. If you have added new customer segments as targets, they will need to be convinced to try your product. If they are using a competitor's product, you should be able to explain how you are different from the competitor. If they are not using a product, you need to understand how they meet their needs and the gap this creates. Buying your product is an investment for them; it would be good to clarify how you will convince them that it is a profitable investment.

As part of the product strategy, it is also appropriate to restructure the product roadmap according to changing customer expectations and to review the priorities. Especially in the short term, which is usually a one-year term, it would be right to prioritize titles with a high economic return to the customer.

Change in Revenues and Costs

Economic difficulties may reduce sales volumes and therefore revenues. On the other hand, it will also be necessary to continue investing in the viability of the product. In such times, the importance of maintaining the product's profitability will increase even more. While costs may not be so important during periods of rapid growth when economic conditions become more difficult, costs must be managed effectively, and available financing needs to be channelled into the right investments. These investments should be those that have a quick return and effectively meet customer expectations. It would be appropriate to conduct cost-benefit analyses when addressing the headings in the product roadmap, and to prefer the headings that can be put in front of the customer in a shorter period of time. It would be appropriate to closely monitor costs, monitor budgeting and realization data and take actions in case of possible deviations. In addition, managing expenses by monitoring the trend of income, limiting expenses if there is a loss of income, and slowing down investment will also eliminate potential cash flow risk. Cash flow is an important issue in the management of products, just as it is in the management of companies, and it becomes even more vital in times of economic hardship.

Changes in Market and Competition

Depending on the economic development, it is also possible that the market's growth momentum will slow down or shrink. In such an environment, competition will intensify. Competitors will also do more to maintain or increase their market share. This results in the product being exposed to stiffer competition. In this environment, which means the increasing redness of the ocean, it will become increasingly difficult to survive. In this environment, preparing the product for different usage scenarios, taking steps to meet new customer segments, and differentiating the product through innovation will help to reach the blue ocean.

During market analysis, it is necessary to make use of data and create data on Total Addressable Market, Serviceable Available Market, and Serviceable Obtainable Market. With the changing strategy, especially the change in the Achievable Market Size should be addressed, and the blue ocean opportunities should be carefully reviewed. Positioning the product in different countries and diversifying its revenue will make it more financially resilient. A contraction in one country's market can be offset by growth in another country's market.

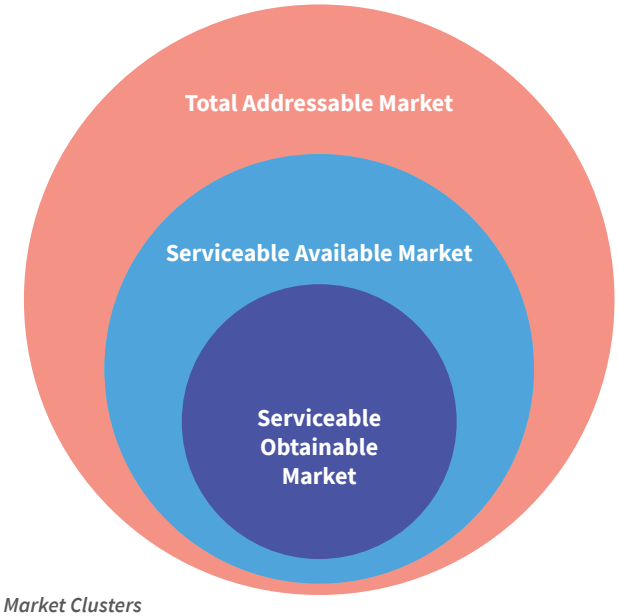

Figure 2. Market Clusters

Change in Opportunities

Tough economic conditions bring new needs. New ideas and products based on innovation to meet these needs increase during such periods. This is because there is an environment where the existing order is changing and these needs, which existing products cannot fully respond to, need to be met in another way. Such a need is a new opportunity, the blue ocean. With this realization, it is possible to shape the strategy of the product by taking the following steps:

- **Assess what you have and where you are. If you have a product, discuss its ability to meet the new opportunity, its strengths and weaknesses.**
- **Set the product vision. Describe what kind of product you envision.**
- **Identify target customers and their needs.**

- Conduct competitor analysis. Clarify the features that will differentiate you from competitors.
- Analyze market trends.
- Set SMART goals for the product.
- Create a product roadmap that will enable you to achieve your goals.
- Prioritize what you will do in the short term.
- Set milestones to monitor and review your product strategy.

As you go through all these steps, clarify your positioning in the market in particular by choosing one of the following four main types:

- Leader: To be positioned as the market leader.
- Quality: Positioning as the best quality in the market.
- Niche: Standing out in a specific area of the market positioning.
- Affordable: Positioning in the market as affordable.

Conclusion

In changing economic conditions, customer expectations and behaviors change; they become much more price sensitive. The change in customers is reflected in the market and competition. In order to stand out from the fierce competition, it is necessary to analyze the change in the customer well and renew the strategy and roadmap of the product, especially with touches that will make the customer's investment more meaningful. By closely monitoring new opportunities, it will be possible to position the product differently and reach new customer segments. It is important to remember that economic challenges bring different opportunities.

Resources

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COULD UPCYCLING FOODS SAVE OUR WORLD?

MERVE YETİŞ

Malty
Co- Founder

The food system is diverse, complex and under greater pressure and change than ever before. Demand for food is growing rapidly along with the population. It's not just new consumer trends that the industry needs to keep up with, but also waste management, energy and carbon emissions, resource optimization in times of increasing scarcity, and many other topics. So why is this sector, which has so far managed to feed this rapidly growing population and economy, accelerating development and urbanization, now at risk? Why do leaders and experts come together to discuss the food industry at United Nations talks and all global warming summits?

Problem and Linearity in the Food Industry

We may be doing more damage to our environment than we realize by growing, processing, packaging and transporting the food that comes our way. According to figures released by the United Nations, the global food industry consumes 30% of the energy we produce and accounts for 22% of greenhouse gas emissions. The system continues to dig its own well with declining productivity, water consumption and a deteriorating ecosystem.

In short, changing our food system is one of the most effective ways to fight climate change, create healthy cities and rebuild biodiversity.

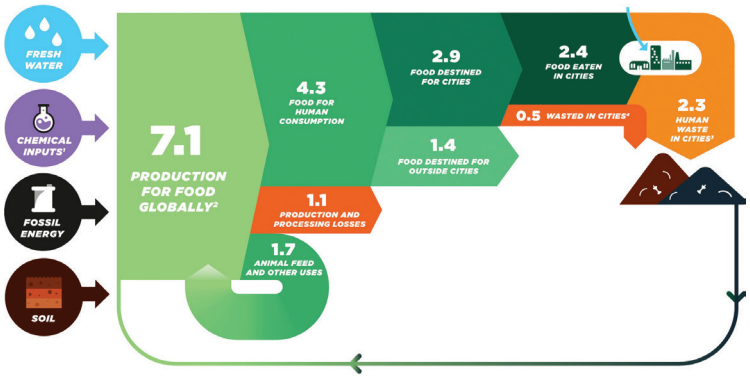
Our most fundamental problem is linearity. A linear economy is based on a 'buy, make, consume, discard' system. In this system, products are devalued, and resource scarcity leads to volatile prices and an imbalance of raw materials. This is also the case in a linear food system, faster and more resources are consumed. Our food loses its nutritional value as our farmland is devastated, and the antibiotics and pesticides we use to keep up with rapid consumption

threaten human health.

Sustainability is about meeting the needs of the present in a way that does not threaten future generations. The current state of our food industry is not sustainable. But it doesn't have to be this way. It is in the interest of all stakeholders in the system to break this cycle.

Circularity and Tackling Food Waste

The universal food waste caused by linearity and rapid consumption accounts for almost 40% of the food produced. Only 2% of food by-products and household food waste produced in cities is efficiently reused. However, by recycling these products for consumption, we do not lose valuable nutrients and raw materials, and we can create new economic opportunities.



1. Such as fertilisers or pesticides; 2. As per FAOSTAT 'Production' definition, i.e. typically reported at the first production stage (farm level for crops and animal products; live weight for seafood); 3. Human waste includes solid and liquid waste, expressed in wet mass; 4. Food wasted in cities includes distribution and consumption stages Source: FAOSTAT, Food Balance Sheets (2013); FAOSTAT, livestock manure (2013); WBA, Global Bioenergy Statistics (2017); The World Bank, What a Waste (2012); Scialabba, N., et al., Food wastage footprint: impacts on natural resources (2013), United Nations University, Valuing human waste as an energy resource (2015), Cities and the Circular Economy for Food analysis 22 The Wellcome Trust (Taylor, J., et al.), Estimating the economic costs of antimicrobial resistance: model and results (2014) 23 The Global Alliance for the Future of Food and IPES-Food, Unravelling the food–health nexus: addressing practices, political economy, and power relations to build healthier food systems (2017) 24 Cities and the Circular Economy for Food analysis – for details see Technical Appendix calculations based on costs: McKinsey Global Institute, 2012 [obesity]; share due to agriculture: The Global Alliance for the Future of Food and IPES-Food, Unravelling the food– health nexus: addressing practices, political economy, and power relations to build healthier food systems (2017) 25 Max Planck Institute (Pozzer, A., et al.), Impact of agricultural emission reductions on fine-particulate matter and public health in Atmospheric Chemistry and Physics (2017), 17, 12813–12826 • Antimicrobial resistance currently costs USD 0.3 trillion and could have by far the largest food production health impact on the next generation. Inadequate wastewater treatment and misuse of antibiotics in fish and livestock farming contribute to resistant pathogens and antibiotics leaching into waterways and other natural systems, allowing antimicrobial resistance to grow and spread. The result is that the efficacy of many antibiotics against previously treatable diseases is lost. Antimicrobial resistance is a major looming public health crisis, with the societal cost.

The system that redefines the concept of waste in this way is called the circular economy. The circular economy for food actually mimics nature so that a product does not become waste but instead becomes raw material for another cycle. Just as in nature, each waste can be a source of life for another ecosystem or food chain link, we can adapt this to our own food system. We can do this by going back to the past and using the technologies and innovations that our modern age provides us with.

In short, circularly designed food makes it possible to transform our food system into one that is good for people, our planet, and all its stakeholders' well-being. We need to talk about how to implement this system.

Food Technologies and Upcycled Foods

The future food consists of functional foods produced in a circular system that are healthier and contain more nutrients in smaller quantities. This is only possible with food technologies. Using technology, we can make food production more efficient, increase the nutritional value of food and ensure that products are recycled at their highest value.

Industry giants and start-ups have both a responsibility and an opportunity to develop the food technologies that will shape future food. One of the most effective opportunities for a sustainable future is upcycled food.

As Malty, we use the power of upcycling in our initiative. Upcycling means transforming a used or waste resource into a more valuable product through different processes. It enables food to complete

its circular journey. As Malty, we started by using malt pulp, a by-product of beer production and produced 200 thousand tons a year in Turkey alone. Instead of using this by-product as waste or animal feed, we bring it back into human food as a functional product. Why not add a raw material with a 50% fiber and 30% protein ratio to our foods with the right technology?

Upcycling allows us to turn costs and losses into benefits and opportunities. The sustainable foods of our future are likely to be upcycled foods such as vegetable peel chips, oat pulp cookies and coffee fruit drinks.

What do consumers think about this?

Hundreds of companies globally have started working on upcycled products, and many organizations and investor communities have expressed support for this area. But at the end of the day, it is consumers' demand and habits that will ensure the success of these products and the reduction of food waste. First, 81% of consumers globally seriously believe that companies should help the environment with their products. 66% are willing to pay a premium price for products that make a positive impact on the world. Innova's research in 11 countries for 2022 shows that consumers' top two environmental concerns when choosing their food are reducing waste (43%) and eating in moderation (32%).

When we look at it, as time passes and the damage we are doing to the world is felt more and more, we can see that consumer trends are shifting to take action in this direction. We are at the very beginning of this trend in our country, but there is no doubt that we will reach the desired point as those who have the power become conscious and raise awareness.

Challenges and Hopes

In fact, food waste is a very important but small part of a very big waste problem. In order to create a circular economy, it is absolutely imperative that all sectors cooperate and bring environmentally friendly solutions and economic benefits together.

The good thing is that the power is in our hands. As individuals, we have the power of choice to change the sector's path. We are in an age where we can express our opinions through what we eat, and what we choose to consume.

As dear David Attenborough said, we are all connected and dependent on the finite natural world surrounding us. It's not really about saving the world; it's about saving ourselves.

Food can be the catalyst we need to create a more sustainable world. Let us not forget that power is in our hands, let us use it wisely.

Resources

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https://archive.ellenmacarthurfoundation.org/explore/food-cities-the-circular-economy

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CLIMATE IS CHANGING, CAN TECHNOLOGY BE THE SOLUTION?

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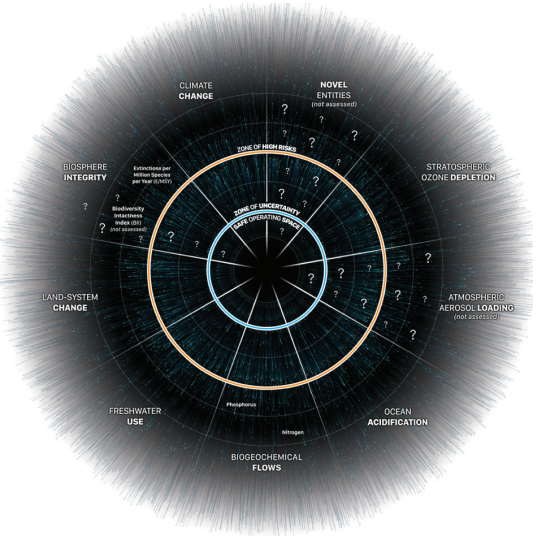
According to NASA's 2022 data, since 1880, the global temperature has risen by 1.01°C and sea level by 4.0mm, while the carbon dioxide level in the atmosphere has been recorded as 419 ppm. According to the Intergovernmental Panel on Climate Change (IPCC) reports, we have no chance to prevent the world temperature from rising by 1.5°C by 2030. However, if we act today, we can keep the global temperature increase constant at 1.5°C in 2030.



When the global temperature increase does not stabilize at 1.5°C and rises by 2°C, 16% of plants living on Earth, 18% of insects and 8% of vertebrates will become extinct. 99% of coral reefs will disappear due to ocean warming and acidification. In a climate without human intervention, extreme weather events will increase from 1 to 6 in 10 years. 410 million+ people will suffer severe drought, almost half of the world's population will not have access to water, and groundwater will be depleted. On the other hand, 1.5 to 2.5 million km^2 (3 times the size of Turkey) of permafrost will thaw,

and carbon stored under glaciers for centuries will be irreversibly released into the atmosphere. The incidence of forest fires will double, and there will be many other known and unknown impacts of global temperature rise.

Since 1972, when the first UN Conference on the Environment took place, solutions have been sought. The Paris Agreement, which aims to limit the increase in global average surface temperature to 2°C and, if possible, keep it below 1.5°C, entered into force in 2016. In 2019, the Green Deal Action Plan was presented, aiming to make Europe climate neutral by 2050. The Glasgow Climate Agreement, adopted at COP26 in 2021, agreed to phase out coal and regularly review emission reduction plans. We are eagerly awaiting the outcomes of COP27 and the steps that countries will take. In addition to carbon emission reduction, living in harmony with nature and a sustainable economy stand out in this process. We need to develop innovative solutions with the power of technology. With these solutions, we must fight against the climate crisis together as individuals, communities, states, companies, or national or international organizations. The climate crisis is a common problem for everyone, regardless of religion, language, race, gender, socioeconomic and socio-cultural differences. The solution lies in taking action with a holistic action plan based on empathy and solidarity, not self-interest and competition.

According to the UN Green Technology Choices Report, in the scenario of limiting the increase in global average surface temperature to 2°C, the global economy needs to limit carbon dioxide (CO2) emissions to 16 Gt/year by 2050. Around 60% of the annual CO2 emission reduction is expected to come from the energy supply side, with the rest coming from demand-side measures.

In this context, a concerted effort to implement both demand- and supply-side low-carbon technologies is crucial to achieving the goal of limiting the increase in global average surface temperature to 2°C and, if possible, keeping it below 1.5°C. As a matter of fact, the decisions taken with the Paris Agreement and the Green Deal were in this direction. According to PwC's 2021 State of Climate Tech Report, there are 3,000+ climate tech startups, and $222 billion has been invested in this space from 2013 to the first half of 2021. Investment in climate technology totaled US$87.5 billion during the second half of 2020 and the first half of 2021. That's a 210% increase compared to the previous year. On the other hand, according to the report, the number of unicorn startups in the field of climate technologies has increased to 78, and their breakdown by sector is as follows; 43 of them operate in transportation, 13 in food, agriculture and land use, 10 in industry, manufacturing and resource use, and finally 9 in the energy sector.

In this context, McKinsey & Company technology companies; Stripe, Alphabet and Shopify, together with Meta, have established a platform called Frontier, which offers a $ 925 million Advanced Market Commitment to 2030 to accelerate the development of technologies to capture carbon in the atmosphere. On the other hand, the Google-backed non-profit Climate Trace collects images and data from more than 300 remote monitoring satellites and data from more than 11,100 sensors installed worldwide. Based on this data, the company tracks greenhouse gas emissions from power plants, factories, cargo ships and forest fires, among others. On the other hand, big tech companies Google, Apple, Facebook, Amazon and Microsoft have made large-scale investments to generate the electricity needed for their data centres from renewable sources.

We Have 47 Unicorn Climate Tech Startups Worldwide

Investment in climate technologies is increasing in many countries and geographies, particularly in the US, Europe and China. Advances in technology and innovation offer the opportunity to develop ways to tackle the climate crisis without further damaging nature. As of 2022, there are 47 unicorn climate technology startups worldwide. One of these unicorn startups, Apeel, helps double or triple the shelf life of many fruits and vegetables without refrigeration with its plant-based products. Another unicorn startup, Rubicon, a digital marketplace for waste and recycling, provides innovative software-based solutions to businesses and governments worldwide.

Among the unicorn startups that have developed technologies mainly for renewable energy, transportation, agriculture and food, food startups attract my attention the most. UPSIDE Foods produces artificial meat from animal cells, while the number of plant-based food producers is growing. Moreover, Nature's Fynd produces mushrooms, Perfect Day produces plant-based milk, and Ynsect produces insect protein, making them key players in a more sustainable future. On the other hand, while we are rapidly moving towards the era of electric vehicles, scooters and even aeroplanes in transportation, we encounter vertical farming initiatives in smart and closed farms established near city centres.

Initiatives Working on the Climate Crisis Vertical are on the Rise in Turkey

In Turkey, companies are adopting a sustainable approach in different areas, especially in their production processes, and the number of initiatives working on the climate crisis vertical is slowly increasing. These initiatives include B-PREG, which develops composite materials from fiber plants such as flax and hemp; Evreka, which offers solutions to improve waste collection processes; and Fazla Gıda, which offers technological solutions to prevent food waste. On the other hand, another initiative that caught my attention is Biolive, which produces bioplastics from olive pits. Our social enterprise ecording, which I am the founder of and which we have been working on for about four years, develops sustainable, innovative and technological solutions against the global climate crisis.

As ecording, we aim to be a part of the solution, not the problem, in the fight against the global climate crisis with the products we develop by utilizing the power of technology and to contribute to stabilizing the global temperature increase of our planet at 1.5°C. First, we developed ecoDrones to prevent one of these critical thresholds: deforestation and biodiversity loss. With ecoDrones,

the unmanned aerial vehicles we have developed, we started to support the reforestation and biodiversity efforts in the world by using technology, primarily by firing seed cannons into hard-to-reach areas. Secondly, we focused on reducing carbon emissions, another critical threshold, and developed ecordingApp. With the Earth-friendly tasks we created in ecordingApp within the scope of these thresholds, we aimed to ensure that environmentally friendly activities that people can implement in their daily lives become a habit with a reward system. Our main motivation was to show people the enormous change that we can create even with a carbon footprint reduction of only 1% per year individually and to present that we are actually the solution with our actions.

We will support our fight against the climate crisis, which started with ecoDrones and continues with ecordingApp, with alternative technologies that we will develop within the framework of the critical thresholds mentioned until 2030. From 2030 to 2050, we are determined to repair the damages caused by the climate crisis together with all our stakeholders.

Resources

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