RULES OF THE GAME ARE CHANGING: AUTOMOTIVE TURNS INTO MOBILITY ECOSYSTEM

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Abstract

Türkiye's Automobile Initiative Group was launched by bringing together the country's leading or prominent groups in their fields under the leadership of the Union of Chambers and Commodity Exchanges of Türkiye (TOBB), Türkiye's largest non-governmental organization. With the aim of creating a globally competitive mobility brand, of which the intellectual and industrial property rights would be owned by Türkiye, Togg was officially established on June 25, 2018, with Anadolu Group, BMC, Kök Group, Turkcell, Zorlu, and the Union of Chambers and Commodity Exchanges of Türkiye joining forces. The current share distribution of the company, which has a capital of TL 2 billion 643 million 774 thousand, is 23 percent for Anadolu Group, BMC, Turkcell and Zorlu Group, and 8 percent for the Union of Chambers and Commodity Exchanges of Türkiye. Togg describes itself as a user-centric and global mobility technology and services company. As of October 29, 2022, the brand has started serial production of the C-segment SUV, its first born electric, connected smart device, at the Gemlik Togg Technology Campus. Togg develops new services, new user experiences, and new business models in the field of mobility within the ecosystem to be created around the smart and connected device. Togg's brand DNA can be summarized as "a character that is interested in what is going on in the world, constantly learning, forward-thinking, proactive and transforming its environment into a better place; passionate about its work, entrepreneurial, prioritizing competence, true to its word, caring about its own prestige and the prestige of those around it, striving to add value to every life it touches, stylish, and full of life".

Founded with the aim of creating its own automobile brand, which has been Türkiye's dream for 60 years, and becoming the first global mobility brand of our country by pioneering the transformation of the Turkish automotive industry, Togg will break new ground with the technical and hardware features of the smart devices it will offer to the market, as well as the mobility ecosystem vision it has developed.

The C-SUV model, which will be produced as Türkiye's first born electric, zero-emission, and smart car, will be ahead of its competitors with features such as the longest wheelbase, the largest interior volume, the best acceleration performance, and the lowest total cost of ownership in its class. The first smart device of Togg, which set out to provide "outside-the-box mobility solutions" that can already respond to future smart transportation needs, will hit the road first in Türkiye in the first quarter of 2023 and then in Europe approximately 18 months after the completion of homologation tests. Togg has established the company Siro with Farasis, the world's leading lithium ion battery manufacturer, to develop and manufacture its own battery technology and will offer energy storage solutions for mobility and stationary storage applications. Siro, which will develop and manufacture battery cells, modules, and packs, will provide services in 120 countries alongside Togg. In 2021, Togg established a company called Trugo to provide smart energy solutions and strengthen Türkiye's charging infrastructure from end to end. Accordingly, Trugo has initiated its efforts to establish a total of 1000 fast charging stations in more than 600 locations in 81 provinces.

Keywords
User-centric, Born electric, Smart device, Mobility, Ecosystem

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Megatrends Transform the Mobility Industry

Megatrends, which affect the world from the easternmost to the westernmost part of the globe and provide significant clues about the future today for those who can grasp them, also offer great opportunities. These opportunities are especially favorable in the field of automobile technologies. If we can properly seize this opportunity – a goal we have been reiterating on every occasion – it would not be a far-fetched estimation to say that we will be part of Türkiye's future not only with the smart devices on the road bearing our brand, but with so much more.

We see that in line with changing user expectations, a transformation much like the transformation in phone technology over the past decade is now affecting the automotive industry. At this point, I would like to point out the megatrends in 3 major areas that trigger all these developments and will start the transformation of mobility from 2023 onwards;

Figure 1: *The automotive industry is transforming into a mobility ecosystem*

1) In the technological sphere

Transformation of automobiles

-Electric

-Autonomous

-Connected

2) In the social sphere

-Smart homes, buildings, cities

-Shared economy

-Working life outside the office

3) In the regulatory sphere

-Protectionism, government incentives

-Environmental and emission standards

The impacts of the said trends, which transform mobility, can be summarized as follows:

The transformation in technology and advances in battery technologies have made electric vehicles affordable. Relatedly, automobiles with internal combustion engines have reached maturity in the product lifecycle and will be fully electric, autonomous and networked sooner than we think.

As a result, the automobile, which today is used between home and office, but wastes considerable time, will become a third living space, offering the comfort of the home, the practicality of the office as well as driving safety that is far more advanced than today's.

This new habitat and the ecosystem it will create will rapidly change the automotive industry's share of profits by 2035.

Becoming part of this third living space is at the heart of competition in the sector. This new habitat is why global digital companies, whose core business today is not mobility, are interested in these issues today.

We can see the most important impacts of this transformation by looking at how profits in the industry have changed hands. In 2019, the worldwide turnover of the automotive industry amounted to approximately USD 4 trillion. This figure is estimated to rise to USD 6 trillion by 2035. Turnover will increase, but classic car manufacturers, which today receive 99% of the industry's profits, will only get 60% of the profits by 2035. Others, namely new mobility actors, will see their share of profits rise from around 5% today to around 40%. This 40 percent, which is estimated to reach a volume of USD 155 billion by then, will be shared by the ecosystem, i.e., demand-based mobility products or data-driven business models whose autonomous and electric vehicle technologies are yet to emerge (BCG, 2022; Togg, 2022).

This interaction will give rise to many job opportunities. Many of today's map-based, sharing-oriented, and business idea-generating startups will become the biggest winners of the mobility industry in the future.

In other words, all business models that connect the automobile, which will transform into a smart device with the support of artificial intelligence, with smart buildings, homes, factories, transportation, energy, cities and other smart devices will form the mobility ecosystem. Business models such as energy management, robo-taxi, robo-shuttle, micro-mobility, on-demand transportation, intermodal transportation will emerge and grow in big cities, including traffic management, security, grid and charging infrastructure management.

The tools and services created by the ecosystem, as well as the new understanding of transportation that will enter our lives with fully electric vehicles, will completely redefine our expectations related to transportation.

Here's some possible future daily life experiences: You left your home in the morning, drove to work and parked your car. Your car will know that the car owner next to you has the same taste in music as you, communicate with that car and share your music and theirs, or it will notice that the battery level of the car next to you is low and transfer energy to it.

Maybe you'll be able to rent out the parking space in your house that's vacant while you're at work until you get home, or sell all the driving information your electric car generates during your journey to engineering firms. While doing all of that, you will be able to use "blockchain" technologies for both security and payment.

The transformation in the field of technology will inevitably trigger the social sphere and lead to significant changes in urban planning legislation along with smart cities. In the coming years, we will hear much more about smart cities, smart and autonomous vehicle parking systems, public transportation systems integrated with smart and individual transportation, and shared transportation systems. We will not only hear about them, but will start using them.

The last megatrend, which rapidly makes all these developments possible, is the environmental policies and protectionist approaches of countries. When we look at the countries that care about such approach and the way they adopt it, we see that China stands before us as the country that does it in the most systematic, profound and sublime manner. It is estimated that investments in this area in China over the next 10 years will amount to over USD 136 billion.

It is with these facts that Togg's claim that "We set out to do more than just automobiles" rings true.

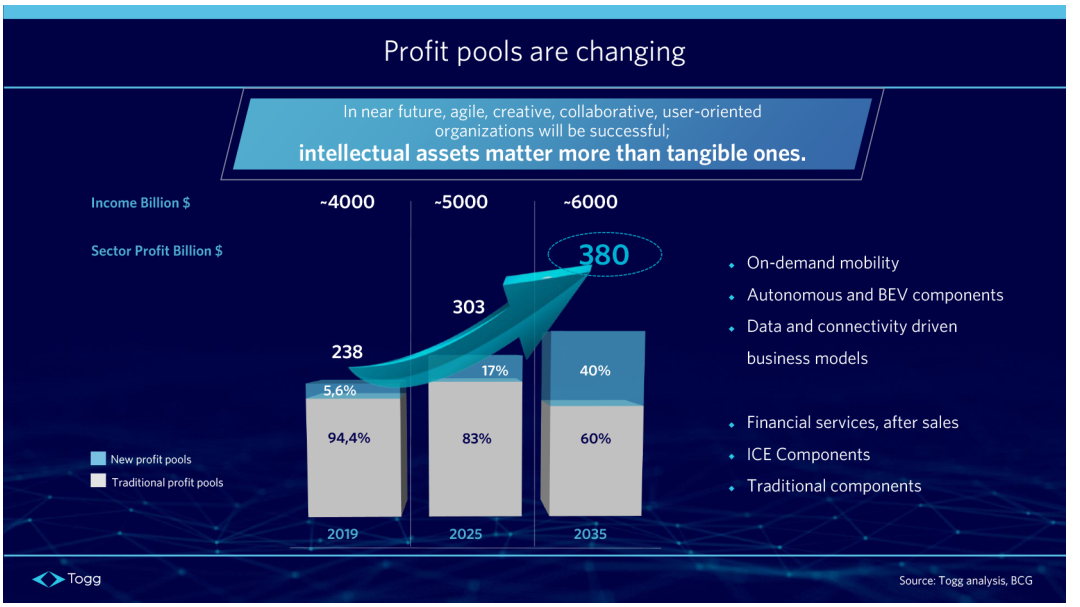

Figure 2: *Variations in sectoral profit pools*

We Have Identified 8 Conditions That Must Be Met for Success

The first thing we did when we set out was to look at other companies around the world that had already started working on smart devices. As a result of this study, we conducted with the Boston Consulting Group, one of the world's leading consulting companies, we determined the areas where these companies succeeded and failed, and identified 8 essential criteria that we always consider when following our roadmap.

These conditions are:

1- The first condition was that there had to be an opportunity. As I mentioned above, there is an opportunity today triggered by megatrends. Originally estimated to close in 2022, this window of opportunity has extended to 2023 due to the Covid-19 pandemic, which gripped the world for two years. Togg's first smart device will be available before the window of opportunity closes.

2- The second important condition was to create a globally competitive brand and build the product portfolio necessary to reach the targeted market share. Togg is working with a strong team with international experience to build its global brand. It aims to enter users' selection basket with 5 different smart devices it will launch.

3- Achieving the cost and profitability target was identified as one of the essential targets for bringing high-tech devices to the market at competitive prices.

4- Creating intellectual property rights belonging to our country is one of the most important conditions for an original and national brand.

5- Forming a team of multidisciplinary experts and a user-centric, agile, and autonomous organization was one of the important items of the 8 criteria.

6- Not only achieving world-class quality but also exceeding this target and making positive surprises beyond expectations is one of the important conditions for global success. We started working with the principle of "If something is worth doing, it should be done in the best way possible".

7- Ecosystem: Connecting the smart automobile with smart objects. Autonomous driving and the transformation of the automobile into a third living space and the transformation of mobility from mere transportation into a service (Mobility as a Service, Connected Everything) stand out as important prerequisites of the new league. In building its ecosystem, Togg has not only transformed partners that have been supplying the internal combustion vehicle industry for 60 years but has also made it a point to keep a perspective that is similar to start-ups'.

8- Financing: Togg's shareholders, each of whom is pioneering brands in their respective fields in Türkiye and Europe, have come together to fulfill this requirement and have formed a brand-new type of partnership, a first for Türkiye.

We Seized the Megatrend and Set Off in the Right Place, at the Right Time

So, was there an opportunity for Türkiye? Yes, there was. It was an opportunity that car ownership per 1000 people was lower than in countries with similar GDP per capita and purchasing power. This gap would either be closed with imported vehicles or Türkiye's high mobility needs would be met by an initiative such as Togg. Moreover, especially in the electric car market, the rules of the game and the players were just starting to emerge and get on the starting line. Togg managed to position itself on that starting line – in the right place at the right time.

Togg, which set out to realize the abovementioned goals, and the ecosystem around it will make a great contribution to our country not only in terms of foreign trade deficit, current account deficit, or employment, but also in terms of the emergence of new world-class ideas and technologies, and their survival and popularization.

For us, originality and nationalness mean that all intellectual and industrial property rights belong to us. This is important because owning the intellectual and industrial property rights makes us independent and free. Thanks to this quality of ours;

1- We make our own decisions at our headquarters in Türkiye.

2- We develop our own unique technology.

Therefore, nationalness and authenticity are essential. When you are producing nationally, localization of products and services is inevitable if it provides an advantage in terms of global competition. We announced our localness rate as 51% at the very beginning of production and promised to increase it over the years without neglecting competitive conditions (Togg, 2022). As Togg, we aim to start production with a 51% local content rate with a supply industry that has no experience in electric vehicle production, and then transform the supply industry in the following 3 years, aiming for a 68% local content rate.

We Have Eastern and Western Cultures in Our DNA

We set out with two important goals. The first was to create a brand that would be globally successful. For this purpose, we have initiated our efforts to create a brand that can already respond to future smart transportation needs and strongly convey the message "We are a provider of outside-the-box mobility solutions" to users.

The answer to the question of what kind of character Togg has as a brand is this: "A character that is interested in what is going on in the world, constantly learning, forward-thinking, proactive and transforming its environment into a better place; passionate about its work, entrepreneurial, prioritizing competence, true to its word, caring about its own prestige and the prestige of those around it, striving to add value to every life it touches, stylish, and full of life".

We were aware of the transformation in the world and people's willingness to keep up with it. So, as a first step, we set out to transform the car experience as you know it...

We listen to our users, understand them, become one with them, and offer solutions tailored to them; in this way, we work to offer mobility services with a stylish and smart device that is not just a car, but much more - a device that transforms according to its user and at the same time transforms its user, designed to make life easier.

Our logo symbolizes the intersection of eastern and western cultures, emotion and reason. We were inspired by our brand identity while designing our logo. Multiplicity and human-centeredness born from unity are expressed in the center of the arrows that merge to symbolize the union of Eastern and Western cultures. The logo symbolizes the technology that positions people at the center and mobility solutions that bring people together at the intersection of today and tomorrow, making life easier.

The resulting form also strikes a balance between power and elegance, befitting a global technology and mobility brand.

Figure 3: *Togg's logo*

What Do We Mean by Ecosystem?

As important as Togg's goal of building a global brand is its goal of creating an ecosystem. Ecosystem, as defined in the dictionary, describes an order that is formed by the interaction of living and non-living things, where they constantly feed one another, ensuring continuity. Mobility ecosystem, on the other hand, means a world where all transportation alternatives and all kinds of services that will add value to our lives are smartly connected and interactive. The automotive industry is rapidly transforming into a mobility ecosystem, and the rules of the game are changing. Today's automobile world is concerned with creating the product concept, developing the vehicle, manufacturing it, selling it, and the post-sales process. Our job starts where the classic car manufacturers' job ends: We turn the car into a next generation smart device, because, in line with changing user expectations, the transformation that took place in the phone is now taking place in the automotive industry.

From the very beginning, we have defined our smart device as user-centric, smart, empathetic, connected, autonomous, shared, and electric. Therefore, from the very beginning, we have undertaken all kinds of design and product development with this approach. In English, the acronym CASE is used for connected, autonomous, shared, and electric vehicles. But that was just not enough for us. We added the words user-centric, smart, and empathetic to it because these concepts define the difference, we make in what we do and what we will do. The result was a concept called "USECASE Mobility®". Since we were preparing for global competition, we registered the concept as a trademark worldwide under Togg.

We say "We are a global USECASE Mobility provider" when describing Togg. That is to say, we are a global platform model provider in the field of mobility. But we define our current work as "We are the Mobility USECASE of Türkiye" by reading this concept in reverse. In other words, we define ourselves as Türkiye's model platform provider in the field of mobility.

Figure 4: *Togg's innovative world and how it differs from classic car chains*

We Created User-Centric Scenarios

We studied more than 350 user scenarios and identified over 40 innovative concepts. We conducted quantitative research with more than 2000 respondents and one-to-one interviews with over 30 focus groups. We created a User Journey map based on the concepts we prioritized.

Here is where we make a serious difference: With the USECASE Mobility® approach, we are not only developing our smart device, but we are also working to establish the ecosystem that will be formed with the business models that our smart device will need and introduce.

We define this area as the NewLeague, where the customer turns into the user, the internet in the vehicle turns into the vehicle within the internet, mechanics, mechatronics, and electronics turn into wireless updates, horsepower turns into processing power, physical lock turns into blockchain, naturally electric platforms are used, zero emission vehicles are on the agenda, suppliers, and start-ups turn into business partners, localness gives way to authenticity, and most importantly, the brand we own instead of the brands we adopt stands out.

Figure 5: *Togg and User-centeredness*

We Are Agile and Organized but We Have No Organizational Chart

Due to the nature of our work, we live in a "VUCA" (volatile, uncertain, complex, ambiguous) world of concepts, because in the new world of mobility in which we operate, both the technology and the users are not yet mature enough. The new structure is based on user expectations, megatrends, changes in technology, rapid adaptability, and accelerating change. If such organizations were placed on an X-Y plane, we would be headed for environments where technology maturity decreases, unknowns increase, and user expectations turn into questions that even the users themselves do not have the answers to.

We are organized in an unusual way, a difference that stems from the confidence we have in the expertise of our people. We are organized into work streams, which are decentralized, cross-functional, self-organizing teams with decision-making authority. This type of organization is also called "agile collaboration". Today, many companies are trying to adopt this type of organization, but we stand out from them since "We were born into it".

For us, the solidity of arguments is more important than hierarchy in shaping decisions. Approval processes do not work as they do in traditional structures. Everyone is responsible for taking initiative in the processes related to their field of work; they inform the relevant parties, achieve the necessary consensus and take action. There are not many ways to do this anyway.

We do not include practices that may hinder agility in this structure. That's why we don't use a classic vertical hierarchical structure and titles. Likewise, we do not limit skills to specific job descriptions. Everyone has the opportunity to work on, further themselves in and learn more about their strongest competencies and areas of work as well as topics they are knowledgeable about.

In the agile structure, classical titles are replaced by a different structure. We form working groups around a topic to solve or mitigate a specific problem. Relevant experts and natural leaders can be proactively involved in these groups. Once a topic is handled, the group

disperses. Then another group is formed for another topic or project. The cycle repeats in this way.

The lack of an organizational chart certainly does not mean that we do not have a particular way of doing business. We consider ourselves as a project. When you are organized as a project, there is no need for a classical organizational chart.

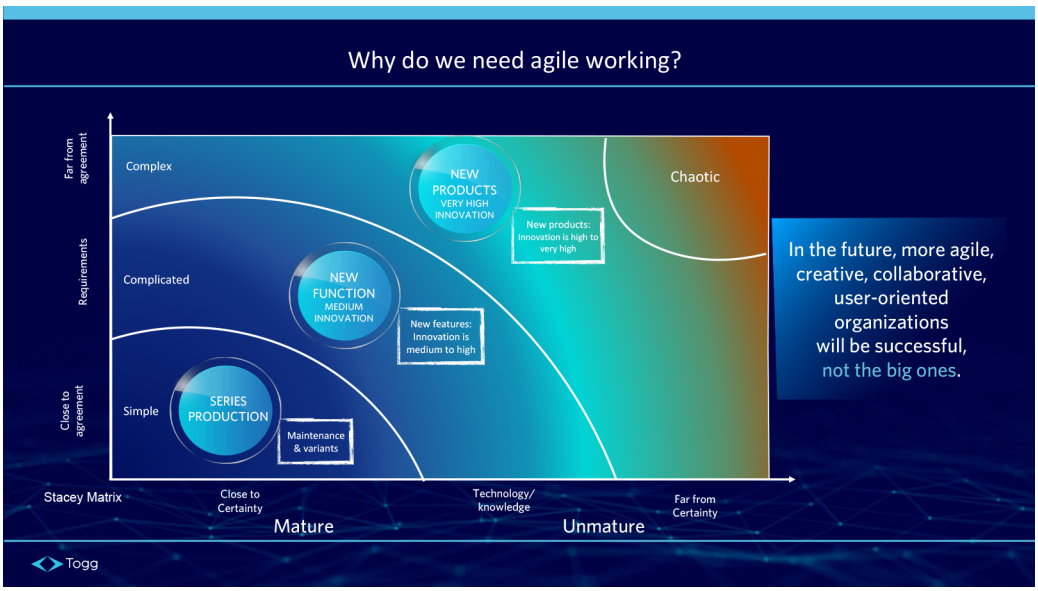

Figure 6: *Stacey Matrix and Togg*

Born Electric, Born Zero Emission

The aim of the EU Green Deal is for all cars, buses, trucks and lorries in Europe to be zero emission by 2050. The European Commission aims to reduce greenhouse gas emissions from transportation by 90% by 2050. In November 2021, at the COP26 conference (26th Conference of the Parties to the United Nations Framework Convention on Climate Change), 33 countries, including Türkiye, signed an agreement to transition to zero emission vehicles. The agreement envisages the replacement of gasoline- and diesel-powered vehicles with zero emission vehicles in the automobile markets by 2035 (European Commission, 2022)..

We set out with the promise of "born electric" and "zero emission technology". We are taking the necessary steps to implement practices that will make a difference in the fight against climate change and to make the entire ecosystem a part of it, in line with and even beyond international standards. In our facility in Gemlik, for example,

1. We are working to cover all suitable roofs with solar panels. In this way, we will meet a significant portion of the energy we consume from these panels.

2. We are working on projects for the recycling of wastewater and rainwater.

3. We are building the cleanest facility in Europe by planning to emit volatile organic compounds in our dyehouse at 1/9 of the legal limit in Türkiye and 1/7 of the legal limit in Europe.

We pay regard to our environmental sensitivity at every stage of our business. From our fabrics to the tiniest pieces we will use, questions such as "Can it be recycled?", "Can it be

more organic?" are of top priority for us. We have added the questions "Do you have a carbon footprint certificate?" and "Do you have an energy management system?" to our processes with our business partners.

The most critical component for electric vehicles is the battery. At this point, our Siro investment must be mentioned. Silk Road Temiz Enerji Depolama Teknolojileri A.Ş. (Silk Road Clean Energy Storage Technologies Inc.) is the product of our partnership with Farasis for energy storage solutions for producing battery cells, modules and packages in our country with our own intellectual and industrial rights. Carbon-neutral production, recycling and "second life" of our batteries are some of the areas we are working on. As is well known, standards for electric vehicle batteries are only just emerging around the world. We are working with the Ministry of Environment, Urbanization and Climate Change on this issue. We are involved in studying examples from the world and setting standards, in short, determining the road map. At Togg, we have formed a sustainability team consisting of colleagues with expertise in different fields from R&D to finance, and we aim to publish our first sustainability report in 2022.

About 25% of the world's carbon dioxide emissions come from transportation, and about 20% of this comes from vehicles with internal combustion engines, which we call motor vehicles. Therefore, the transition to electric vehicles would solve a significant part of the problem. Accordingly, we have a vision of a zero-emission transportation sector by 2053.

But this is not enough; the electricity used must come from renewable energy sources. For example, if 90% of the electricity used in charging came from renewable sources, the reduction in carbon dioxide emissions would reach 80%. But if the country's electricity generation does not include enough renewable energy, the spread of electric vehicles would not suffice for sustainability. For this reason, as the use of electric vehicles becomes widespread, we envision a sector where the charging infrastructure is especially encouraged to use renewable sources.

We have started our work for the Togg smart and fast charging infrastructure. Before our first vehicles hit the road, we will have put 1,000 fast charging stations with 2,000 sockets into service at more than 600 locations in 81 cities.

As mentioned in the introduction, profit pools are changing hands in the automotive world. In 2035, 40% of the industry's total profitability will be shared by companies engaged electric vehicle technology and data-driven business models (Togg, 2022). So, this is where customer expectations and the sector's potential for growth lies.

We consider this transformation to be user-centric and holistic. Accordingly, here is our vision for the vehicle itself, its ecosystem and its energy:

1. Vehicle designed around battery, power electronics, sensors and cameras
2. A vehicle in the internet instead of internet in the vehicle
3. Wireless OTA (Over the Air) update
4. Processor power instead of horsepower
5. Cybersecurity applications with blockchain technology instead of physical locks
6. Centralized computing in electrical and electronic architecture

In the smart and autonomous transportation ecosystem where vehicles are connected

1. Advanced technology systems where X2X systems can operate and integrate with each other to develop smart city infrastructure

2. Intelligent intermodal transportation systems requiring digital infrastructure and data analytics
3. Machine learning-supported, data-driven and user-centric decision-making systems
4. Use of financial technologies

In relation to the energy that the vehicles will use

1. Feeding the charging stations with electricity generated in solar and wind power plants near or next to the charging stations
2. Providing renewable energy solutions to users by tracking the source of electricity generation with blockchain technology
3. Digital solutions supporting vehicle-to-grid (V2X) electricity transition
4. Using batteries used in electric vehicles in residential energy storage solutions as their second life

Figure 7: *Automotive industry transforms into a mobility ecosystem*

Conclusion

Togg is a global USECASE MOBILITY® provider whose intellectual property rights are owned by Türkiye and will compete on a global scale. Founded on June 25, 2018, Togg continues its activities with the cooperation of Anadolu Group, BMC, Turkcell, Zorlu and the Union of Chambers and Commodity Exchanges of Türkiye.

Togg develops new generation electric and connected cars and creates a mobility ecosystem around these cars. The company develops new technologies, services, user experiences and new business models within the ecosystem it has built around smart and connected cars. Togg aims to reach 1 million production units by producing 5 different electric and connected models on a common platform by 2030.

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M. Gürcan Karakaş was born in Antalya in 1965 and grew up in Germany. In 1988 he graduated from the Middle East Technical University (METU) with a degree in mechanical engineering. In the same year he joined Aselsan in Ankara. In 1990 he began his career at Bosch. In 2002 he joined the executive board and in 2004 he was promoted to CEO of Bosch Türkiye. In 2007 he took over the management of global sales and the Bosch Car Service network at the Bosch Automotive Aftermarket division in Karlsruhe. In 2011, he took over the management of marketing and sales and automotive strategies at the Bosch headquarters. In 2013 he returned to active operational business and became a member of the Executive Board of the Electrical Drives division with global responsibilities with a focus on the NAFTA and Asia markets. After a long and successful career at Bosch, he took over as CEO of the Türkiye's mobility brand Togg, a joint venture of 4 industry and technology holdings of Türkiye together with the Turkish Chamber of Commerce and Industry, on September 1, 2018.