ILI.DIGITAL

Accelerating Circularity: The next frontier of untapped potentials.

Science to business

Scientific advancement is driven by being inquisitive, and business is no different. ILI. DIGITAL has emerged from research: we bring together science, business, and technology to foster new thinking and business model disruptions.

We believe that data driven disruptions bring fascinating changes to the industrial landscape: better customer experience, new value business models, increased operational efficiency, and more.

With our origin, digital mindset, and solution competence, we provide the right setup to do so. Our multidisciplinary team combines data analysts, software developers, engineers, sociologists, etc., with a deep expertise in design research, behavioral economy, artificial intelligence, and beyond.

We see it as our responsibility to accelerate the transition from scientific concepts to executable business. With the intention in mind, ILI.DIGITAL Team presents a series of white papers on the trending topics — sustainability, circularity, digital health, metaverse, behavioral economics, — that show scientific advances in each area and their application in practice.

How ILI.DIGITAL Can Help Your Company Become More Circular

ILI.DIGITAL can rethink your business model, understand your current situation and how you can improve your circularity. There are many opportunities in circularity. For example, new business model like Product as a Service can change your way to do business and change from a model where you sell a product in one shot to a model where your product become a constant source of revenue. Within the company, we have strategists capable of taking your business to the next level in the circularity.

ILI.DIGITAL is also experienced in executing circularity projects. There are many opportunities to achieve circularity through a mobile application, a SaaS (software as a service), or simulation (augmented and virtual reality). It is a very accurate way to improve the productivity and connect the product with the client. For example, sharing and reselling is done today mostly through SaaS applications. Over the years, ILI.DIGITAL has acquired a great experience in the implementation of circularity projects. We worked in different sectors such as the construction and the automotive with the biggest players in the market.

Finally, we can help you with your data. Circularity is about traceability: the more you track your product, the more insights you have into how to optimize your production steps and get closer to a circular model. The knowledge you extract from your data helps you discover new opportunities and create a new business model.

Let us stay realistic: we are not going to switch instantly to a full-circle economy, but we can improve each part of it until we achieve this goal. The best example of circularity is nature. There is no waste and everything is optimal. But nature took millions of years of evolution to get to this point. The best lesson that nature can give us to achieve this objective is: It's an iterative process that needs to start now.

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Management summary

In an era of heightened environmental concern and ‘net zero’ carbon reduction targets, how can the movement of digitalization help in the most efficient way globally?

Embracing a circular economy will be key in ensuring that global production and consumption are in line with sustainability targets. By focusing on the principles of a circular economy, the circularity model will allow brands to increase the life cycle of a product, reduce waste, and optimize consumption while simultaneously optimizing supply chains to build a sustainable business model.

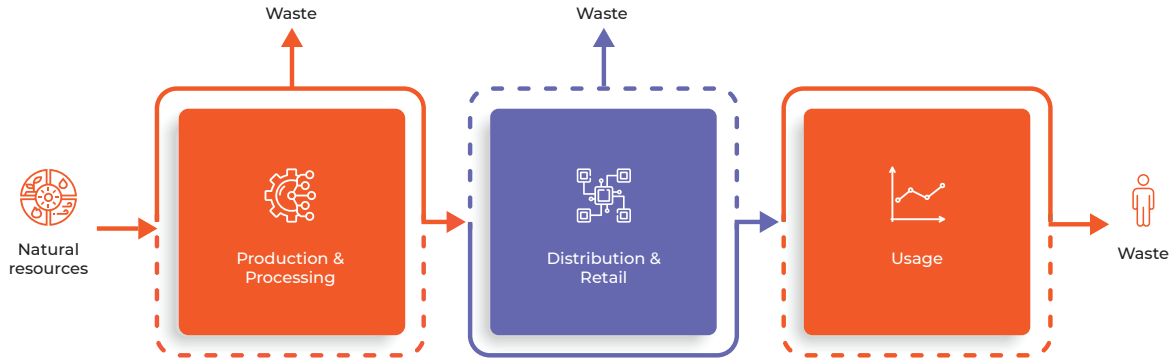
Major players in various industries are actively looking towards adopting the circular economy model by adjusting their production processes and facing challenges, as well as discussing potential solutions for rolling out and scaling up circular economy solutions.

Digital technologies are considered essential enablers of a circular economy and can support for implementing circular strategies for many companies.

In this white paper, we explore the potential of the circularity market and how digitalisation can boost the transformation towards a more sustainable circular economy.

Introduction

The current “take-make-waste” paradigm that most economies are familiar with today is a linear process, a value chain that operates as follows: it starts with material in raw form being taken and sourced from several locations. The material is then placed into a production process to create the final product for the end user. It is within this production process that the levels of energy and material used are extremely high. In this step of the paradigm the amount of waste being produced is growing with no apparent intent of a plan to reuse such “waste”. Finally, the products are “distributed” to the end user, where the waste left behind accumulates to a stage that, if mishandled, can make a deteriorating impact on the environment.



The last few events in the past few years that we have witnessed globally in terms of climate change and resource use have shown us that now, more than ever, the global production process needs to be changed. The price of sourcing raw materials for the production process is skyrocketing with no stabilization in sight. Supply for such material has become very challenging and costly due to the scarcity. Moreover, we can no longer stand by and watch as the consequences of global warming are becoming irreparable to our planet. The vital question we need to answer is how can we preserve what we have left in such an environment? One possible answer is shifting towards an economy focused on the concept of circularity. A linear model no longer seems viable due to the negative impact it leaves on the planet and on brands due to the rising costs of sourcing a scarce material. To put this into perspective, every year, we throw away over 50 million tons of electronic goods valued at over US$62 billion[1], including rare earth minerals like gold and copper. As for the environmental impact, earth takes almost 1.5 years to generate what we use in a year. However, just about 5% of the remaining value of material goods is recaptured and used when we dispose of the products[2]. We are starting to dangerously come close to passing a point of no return.

At the same time, we are starting to see certain markets adopting circular thinking in practices related to production and manufacturing. This is because the global economy has started to realize that with facing such dire circumstances, comes the window of opportunity to retain what we have left. For instance, the second-hand fashion market in the USA is expected to grow from US$28 billion (about $86 per person in the US) in 2019 to US$80 billion (about $250 per person in the US) in 2029[3].

What is more promising is that the end-user has started to realize the state of the global economy and root for a change. In 2022, residents of Zurich voted for their economy to transform into a circular model and called on authorities to ensure the considerate treatment of resources and the closing of material loops. Moreover, cities such as Glasgow in Scotland, Umea in Sweden, and Rotterdam in the Netherlands have demonstrated an interest to become carbon-neutral, some initiatives are proposed such as under-pavement pipe networks to melt snow in winter and cool concrete in summer and car parks with solar-paneled roofs to charge electric vehicles.

Before we dive deeper into how the global economy is attempting such a shift, it is important to understand where the concept of circularity is coming from. Why is it important to change the way we think about the global production process? How do companies become part of the solution and not the problem? Lastly, how does digitalization play a part in solving the problem? We will be able to answer all these questions and more in this white paper.

The point of origin

Often, the race to sustainability and an ambition to transform an economy into a circular one is held back by worries and fears emerging from the lack of trust. But what is the problem? What gave birth to circularity? Before we go into that, let us understand the basics of what a circular economy means, where did it all start and why is establishing a functional circular economy important?

Circularity and understanding what it stands for: One of the foundational pillars behind having a robust and sustainable circular economy is the valuation process of materials within a closed-loop system that enables the use of natural resources while reducing pollution or avoiding resource constraints.

What does that mean? To put it simply, it is a concept that proposes a model of how an economy should ideally operate when it comes to waste management. What is happening in this process is that economies are producing and consuming products in which resources are kept within the ecosystem to prevent or greatly reduce waste.

What makes circularity tick: Even with the concept becoming a center of every board room and parliamentary discussion, there is still some confusion as to how circularity differs from the concept of recycling within a circular economy. A circular system is not a traditional linear method with a beginning and an end. It is more of a non-ending way of life in terms of how we manage waste. Circular systems relate to recycling in the sense that they use recycled material as inputs. That is why recycling is an important part of the circular system.

One great example that shows how circularity works is the combination of chemical and mechanical recycling of reusable material such as plastics to redirect plastic waste from landfills and back into use. What you must consider is that you cannot mechanically recycle something repeatedly because the quality starts to get affected. However, by adding a complementary chemical recycling stream, where waste from that plastic is made into livestock feed which can also be used to make other materials, there are more opportunities to bringing plastic waste back into the picture instead of blaming the problem of pollution all on plastic waste. That is what circularity aims to do and how it differs itself. By applying circular principles and values across a product or material life cycle, we can already see so many changes in carbon emissions being reduced as well.

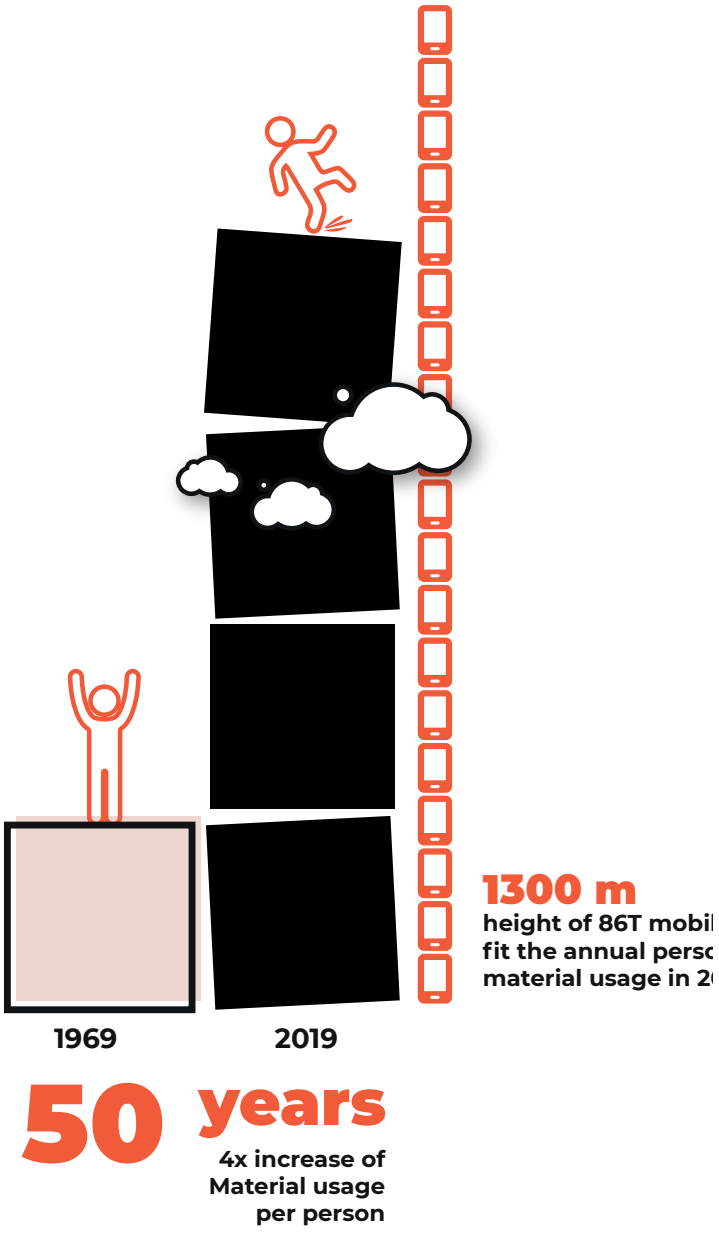
Where the concept came from: It is fair to say that the concept of circularity has first been coined in the 19th century by the “Luddites”, a group of British textile manufacturers that protested the introduction of new machines that they believed would put them out of work. At the time, there was no such thing as recycling – all materials were either used up or burned. The Luddites argued that it would be more efficient to use the new machines to recycle old materials, instead of creating new ones from scratch. This idea was the beginning of circularity[4].

Since then, the concept of a circular economy has continued to gain popularity, with increasingly more businesses adopting circular principles. In 2015, the Ellen MacArthur Foundation released a report calling for a “global circular economy” in which products are designed for reuse and recycling. The report was endorsed by over 100 CEOs and government leaders from around the world[5]. The circular economy concept has become a focus of the UN’s Sustainable Development Goals.

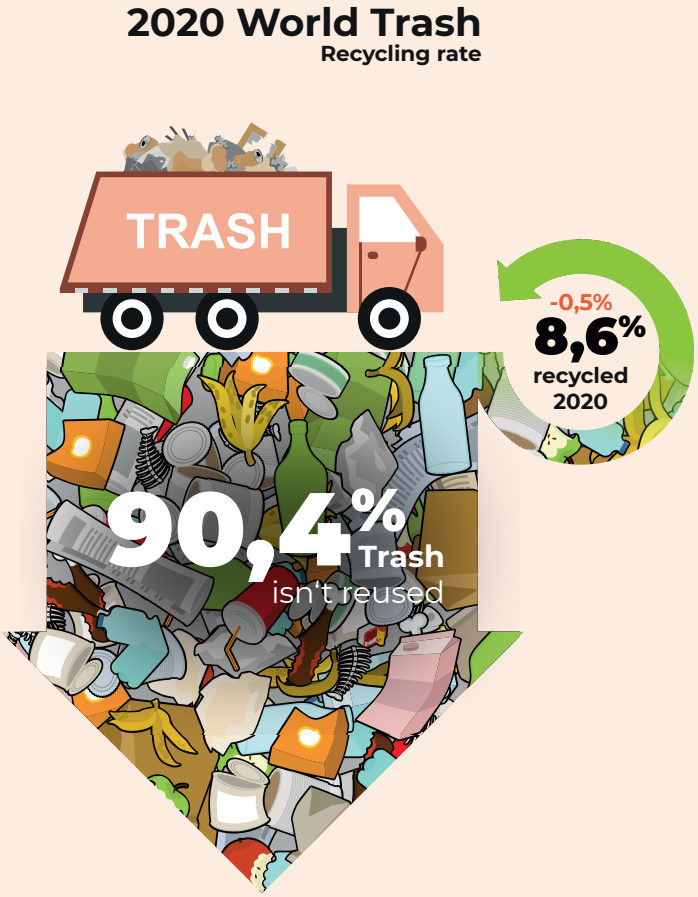
Where are we now?

As mentioned previously, we can say that we are coming dangerously close to the point of no return, where the planet might be unable to repair itself. Here are a few facts that can help put things into perspective in terms of our current standing[6]:

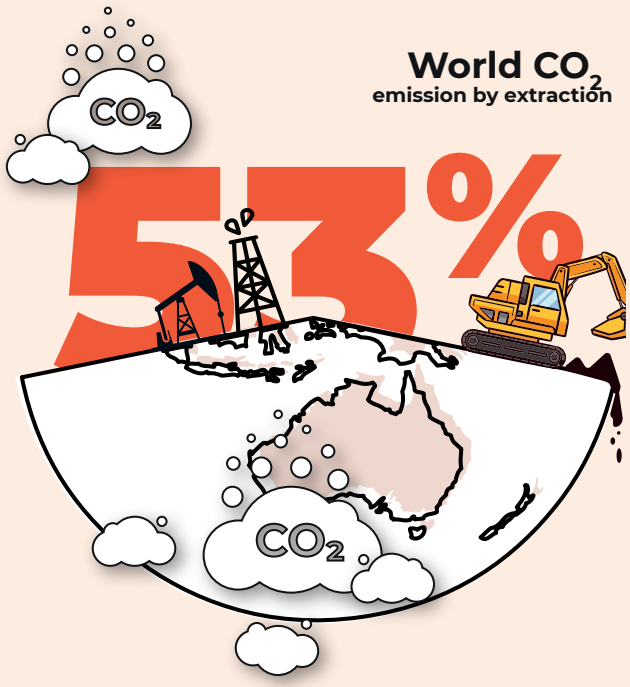
- Between 2015 and 2021 (only six years), 70% of our world's virgin materials was consumed and extracted than what the earth can safely replenish.
- In only 50 years (between 1972 and 2022), global use of materials has nearly quadrupled.



- In 2000, the world consumed up to 54.9 billion tones (about 9 tones for each person). After 9 years, in 2019, it surpassed 100 billion tones (more than 13 tones for each person) and wastes over 90%.



- In 2020, only 8.6% of the material that the world consumed are back into our economy.
- Our current global economy is responsible for 53% of the world's carbon emissions and more than 80% of biodiversity loss.



To dive deeper into the sectors details, here are some facts:

Construction materials account for more than one-third of global resource consumption. In addition, construction and demolition waste contribute up to 40% of urban solid waste. The sector operates on a linear model, records high energy and resource use, and is currently unsustainable[2].

The construction sector alone is not the only one that needs to pivot in its operating model. Consumers also need to adjust their consumption behaviour if we want to cut the journey short and realize a faster way to circular economy adoption: 75% of municipal solid waste is comprised of discarded consumer goods. 80% of household items are used less than once a month. Globally, consumers waste up to US$460 billion each year by dumping still-wearable clothes in landfills[2].

In addition, 22% of global emissions come from the food sector. This sector is also responsible of 30% of energy consumption. At the same time, one-third of all food produced is wasted, and food waste continues to be the top product found in landfills[1]

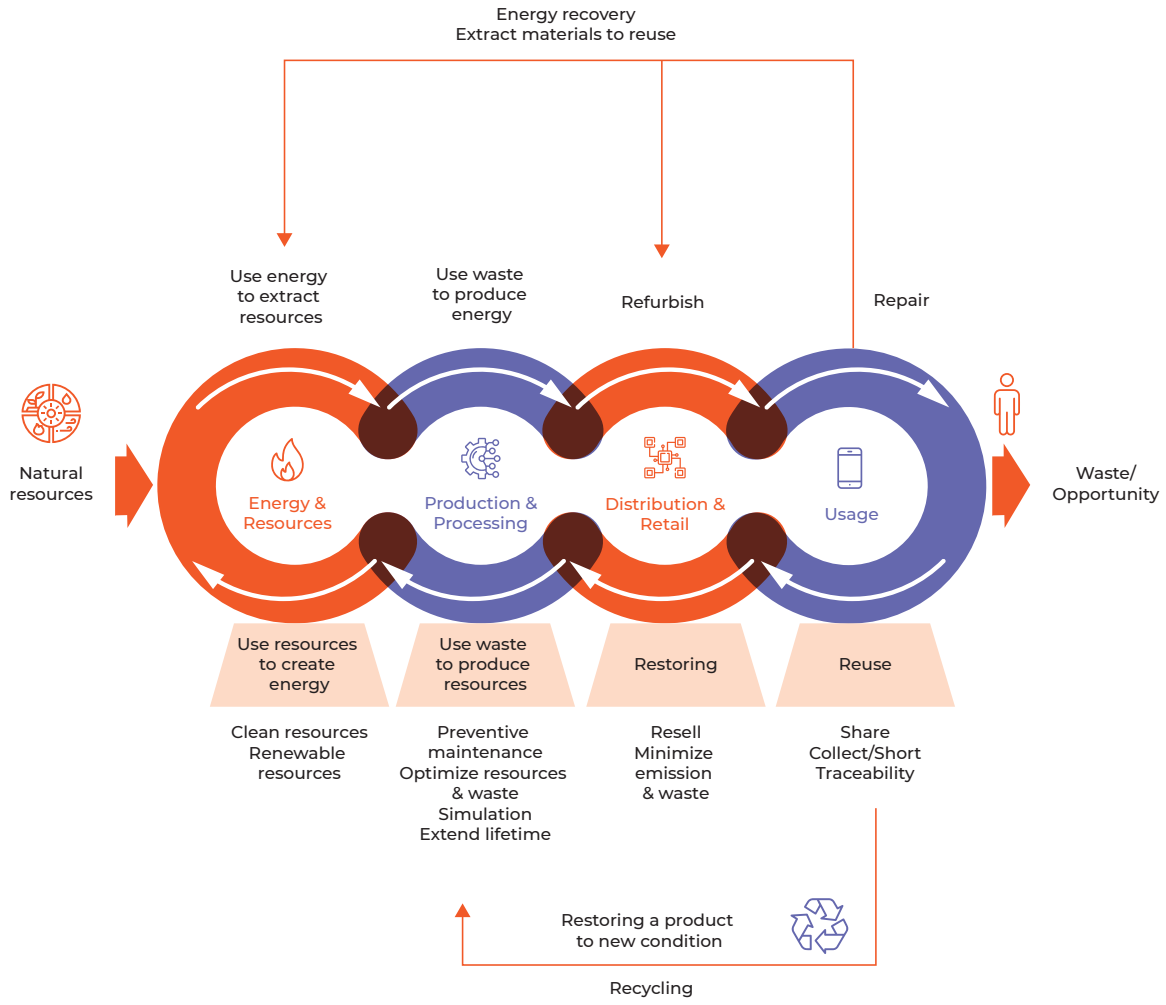
Circular economy business models offer a clear pathway toward achieving our collective climate goals and tackling the greenhouse gas emissions tied to the extraction, processing, manufacturing, and landfilling of good.

For a better future — Building tomorrow's world together

To help improve our current standing globally, let us try to understand circularity from an operational perspective and what are the prerequisites for shifting from a linear economy to a more efficient loop model.

It is worth noting that the main objective of circularity as a concept is to transform the "waste" part of the production process into an opportunity to optimize the use of resources. In doing so, we can help minimize the use of natural resources, using only what is needed, which, in turn, will allow such material to have sufficient time to regenerate.

The following figure summarizes how circularity works in a seamless flow regarding the different practices and components involved.



Natural resources: As shown above, it all starts with the most precious resource in the production process and is considered the start in the model. These resources belong to everyone. The more we use these resources intelligently, the more we allow their regeneration on the planet. The objective is therefore to optimize the use of natural resources as efficiently as possible, and this is what circularity can achieve.

Energy & Resources: What goes next is the step of building a product, for which we need resources and energy. From this point starts the essence of the circular model. We need resources to create energy, and we need energy to extract resources. At this point, one of the best practices recommended is to optimize the use of energy and resources through using clean and renewable energy. In fact, many companies are starting to explore the use of renewable energy. For instance, in 2021, *Total Energie* invested US$3 billion in further exploring strategies towards adopting renewable energy technologies[7].

In the same year, *Statkraft* AS, a Norwegian company that provides the most output in terms of renewable energy sources in the EU, realized a net income of $16 billion[8]. With the rise of prices in sourcing fossil fuels, circularity is starting to look like an attractive alternative in the energy market. These resources and energy will be used in the production step of the figure shown above.

Production and processing: Production is an essential part of the value chain. Circularity in production starts with optimizing the use of resources. The factories are constantly optimizing the use of energy and raw materials. This is not only a good practice but also a money-saving thought process. It is about minimizing the amount of "waste" produced. Each amount of "waste" is an opportunity, if the factories manage to reuse their amount of "waste" produced or sell this to another company, it will help further advance the move towards living in a circular economy. By 2039, *Mercedes-Benz* will have a target of achieving CO2 neutrality via its newly proposed fleet of commercial automobiles. Moreover, their new car models are 85% recyclable, and by 2030, they are planning to use 40% recycled materials through their production lines[9]. It is not only looking bright for the automobile industry but also commodities!

By 2025, *Unilever* will use 25% recycled plastic in their packaging, and 100% of their plastic packaging will be designed to be fully reusable[10]. In addition to this, many efficient practices can be integrated into production processes.

One of the most efficient best practices is extending the lifetime of the resources, what can also be called the "life cycle of a product". For example, the use of preventative maintenance processes in production, can help companies extend the lifetime of their machines used. Simulation programs are a particularly effective way to understand how not to waste resources. Thanks to simulation programs, companies can make optimal decisions and optimize resource use towards an efficient "need-based" manner.

Distribution and retail: Distribution plays a key role in the value chain. It is important to have a chain as "clean" as possible which would help reach CO2 neutrality by optimizing transport and logistics output into the environment. But in circularity, this process goes a step further than just that. The retail industry can also play a role in the recovery and refurbishment of the products and commodities. For instance, the market for second-hand items is becoming increasingly popular. The U.S.'s marketplace for second-hand fashion items is expected to grow up to US$80 billion in 2029[3].

Due to this method of operating in circularity, new business models have emerged and have become increasingly more prominent. Product-as-a-Service (PaaS) is one of these emerging models. *Michelin* decided to launch the tire-as-a-service model due to their recently capability to recycle tires more efficiently in line with reuse aspects[11]. Thanks to this way of operating within the principles of circularity, *Michelin* can acquire a new source of income, and the consumer only pays per use. Eventually, the "waste" becomes a new window of opportunity rather than a burden.

Usage: In circularity, it's not only up to the company — the consumer can also choose to be active and contribute to the value chain. For instance, Lithuanian online marketplace *Vinted* allows customers to resell second-hand items[12]. Sharing is another powerful best practice that can become an opportunity. Mobility-as-a-Service (MaaS) is a good example. The market of MaaS will grow to US$40 billion by 2030[13]. The car sharing *Stellantis* service *Free2move* set a goal of 15 million customers and €2.8 billion in revenue by 2030[14].

Waste opportunities: Unfortunately, even with the circularity model, the economy has not found a way to have zero waste, but we must continue to see waste as an opportunity to give it value.

The role of digitalization in advancing circularity

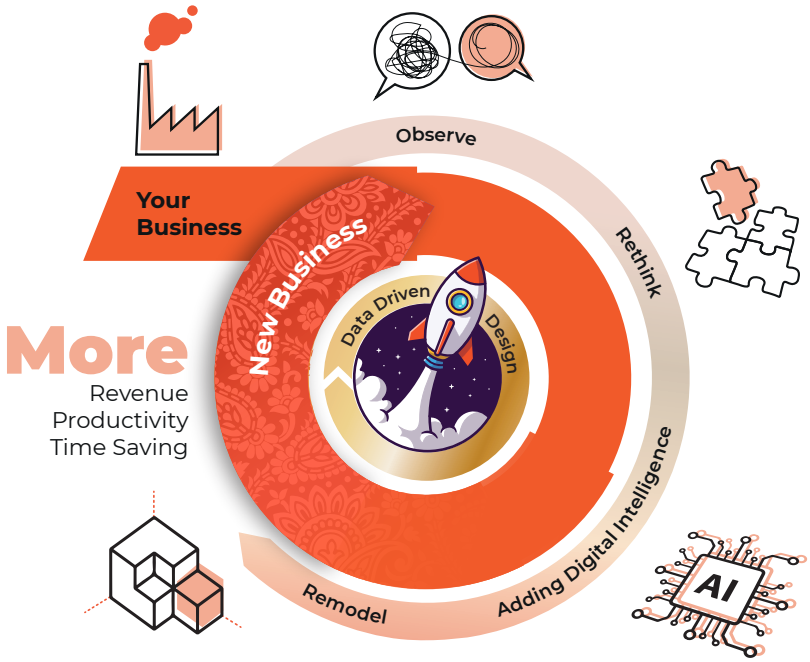
Circularity is about new economic opportunity. In December 2020, BMW AG, Mercedes Benz AG, Deutsche Telekom AG, Robert Bosch GmbH, SAP SE, Siemens AG, and ZF Friedrichshafen AG created a new association named Catena-X Automotive Network15. It is an extensible ecosystem with the purpose of creating a uniform standard for information and data sharing. One of the main objectives of Catena-X is to improve the circularity by creating an environment where all the actors can have access to the data and seize new opportunities to reduce the waste. Without digitalization, this platform could not exist. More globally, digitalization can bring significant added value. In this section, we will explain, how the technology fits into the circularity model.

Prevention is better than cure: maintenance is one of the best ways to extend the lifetime of the machines used in production and to have less waste. Machine learning is a powerful tool able to predict failure points and overloads to take care of your machines. Thanks to deep learning, we are now able to perform recognition and quickly detect faulty pieces to exclude them from the final product and thus avoid creating faulty products. In distribution, prediction is also an effective way to reduce waste. Thanks to modern machine learning algorithms, we are now able to predict consumption and reduce waste. Here are some examples where machine learning can help in the circularity. Many others are to be discovered according to the application.

Stay connected: Sharing, resell, second hand, — all these opportunities of usage are possible through technology. Technology connects different stakeholders and allows them to create a circular economy. “Tomorrow products will no longer be designed for single use. The economy will be circular”, This is the vision of the French start-up Lizee.

Sharing applications have never been so numerous. Lynk & Co, a Chinese car brand, decided to sell a shareable car and provide the mobile application with it. Technology can create so many opportunities to optimize the use of the product.

Fake-it until you make-it: One of the best practices is to simulate before executing. This practice reduces waste in production. Technology is essential in this field. Augmented and/or virtual reality, optimization algorithm and machine learning are at the origin of particularly important software in simulation today. Simulation can also be done to optimize the extraction of resources and optimize the use of energy. Optimization algorithms are used to simulate different alternatives to optimize the transport and logistics in distribution. Technology continues to evolve in this direction, and many other opportunities are waiting to be explored.



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About ILI.DIGITAL

Founded in 2010, ILI.DIGITAL is a company focused on digital business model transformation with expertise in multiple different fields. With 82 employees, ILI.DIGITAL has two offices across two countries (Germany and Pakistan). ILI.DIGITAL's mission is to "make corporates entrepreneurs again", empowering people from the upper management level to rediscover their inner entrepreneur and take the next steps for their company's future.

ILI.DIGITAL focuses on collaborating with customers from the automotive, pharma-, chemistry, and construction sectors as well as the industrial sector. The portfolio of the company's project-based services includes:

- Digital Business Building
- Strategy Consulting
- Project Management
- Marketing
- User/Design Research
- Development
- 3D Development
- Machine Learning
- Data Engineering
- Artificial Intelligence
- E-Learning
- Gamification
- Psychology
- Behavioral Economy
- Customer Experience

The company's multidisciplinary team combines entrepreneurs, business consultants, strategists, project managers, marketers, user researchers, designers, engineers, developers, 3D developers, gamification experts, and psychologists across a diverse spectrum of specializations.

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Team

Serhan Ili (CEO & Founder)
Serhan has a keen sense of opportunities, strong execution skills, and a passion for business. He has the right mindset, which empowers and dynamically pushes the team and projects. He makes success independent of coincidence. By turning physical assets into virtual miracles in the Metaverse, he enables the next generation of business models.

Vera Schott (CMO)
Vera creates strategic concepts for projects and designs virtual business models for a sustainable future. To further exploit the opportunities for the customer's journey in the Metaverse she brings in powerful marketing perspectives. "By combining these two skills, we elevate customer experiences by unleashing the magic power of extended reality."

Vinicius Ferraz (COO & Data Scientist)
Vinicius is where technology and behavior meet. He combines both topics and thus has a unique understanding of the two drivers in the Metaverse. As a data enthusiast, his ever-growing data knowledge enables him to rule core Metaverse technologies and predict potential outcomes.

Tim Krodel (Strategy & Extended Technologies)
Tim is with the customer throughout the entire journey of digital business building. He builds strategic concepts for projects and helps turn physical assets into virtual miracles. With his deep understanding of future business models and extended technologies, he is key to bringing a business into the Metaverse.

Omar Abdelkafi (Project manager & Data Scientist)
Omar has a doctorate in artificial intelligence since 2016. With a solid technical background and a very fine knowledge of innovation, he is able to have a deep understanding of digitalization projects. Researcher in the soul and entrepreneur in the spirit, he will take your project to the next level.

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