# Industry 4.0
# A New Era In Cosmetic Industry

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**Autumn 1403**

CDIE
Cosmetics
Detergents
Industrial
Event
2024 20 -21 November
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**1st**
1760–1820
Industrial Revolution

Steam power | Water power | Mechanization

**2nd**
1871–1914
Technological Revolution

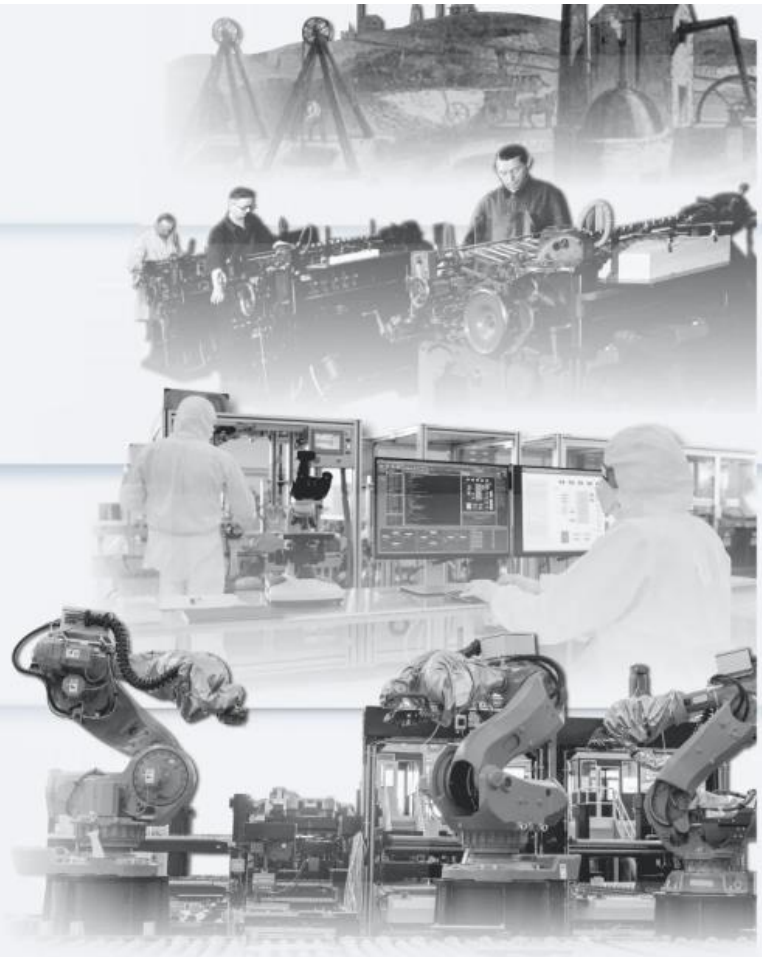
Electrification | Mass production | Division of labor

**3rd**
1969–2000's
Digital Revolution

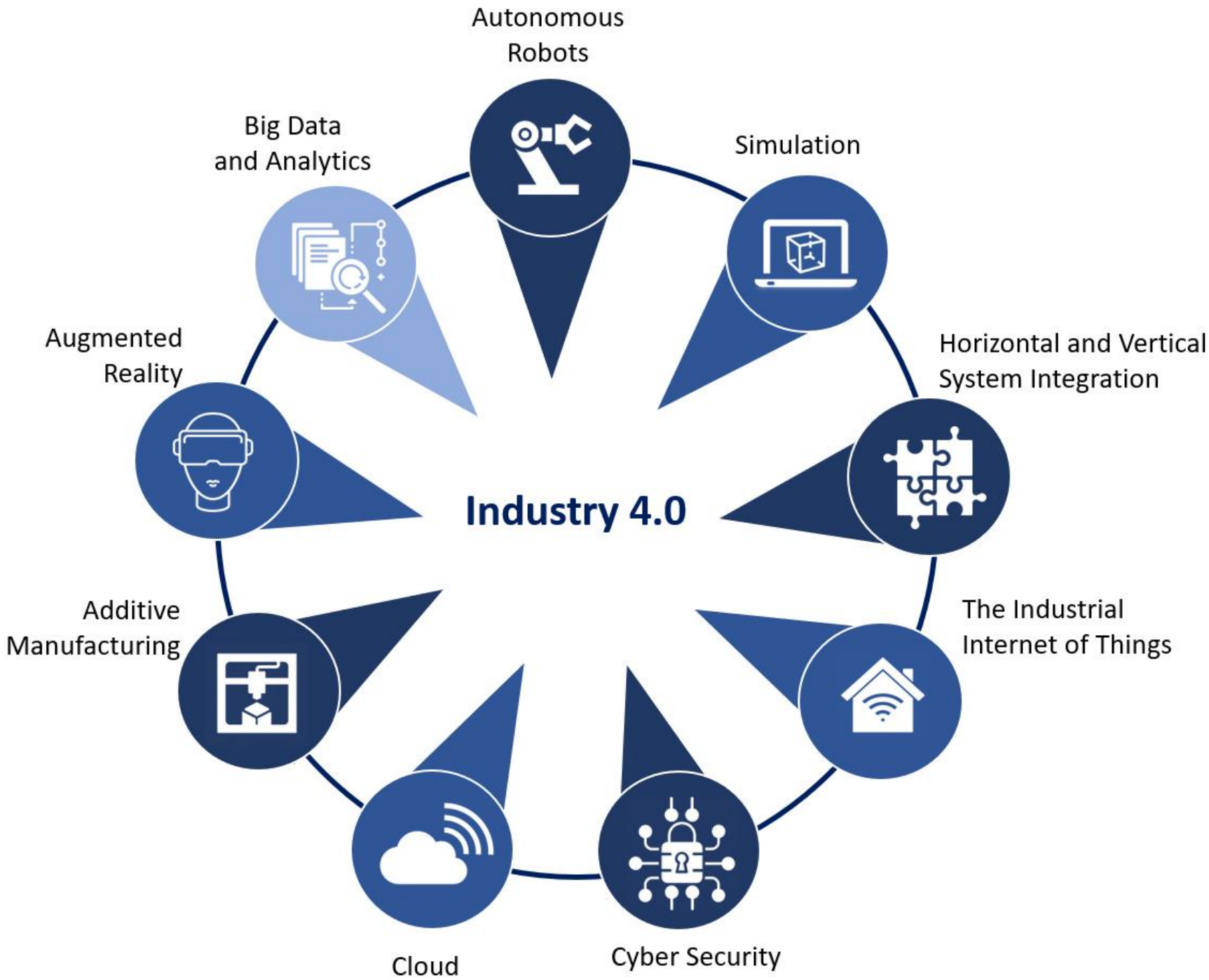
Computers | Internet | Automation

**4th**
2010's–Present
Industry 4.0

Cyber physical systems | Internet of things | Robotization



The next major evolution of manufacturing, Industry 4.0 utilizes smart technology to unlock the next steps in automation.



**1.0**

**Pre-digital plant:** Manual processes, paper-based documents, standalone lab instruments

**2.0**

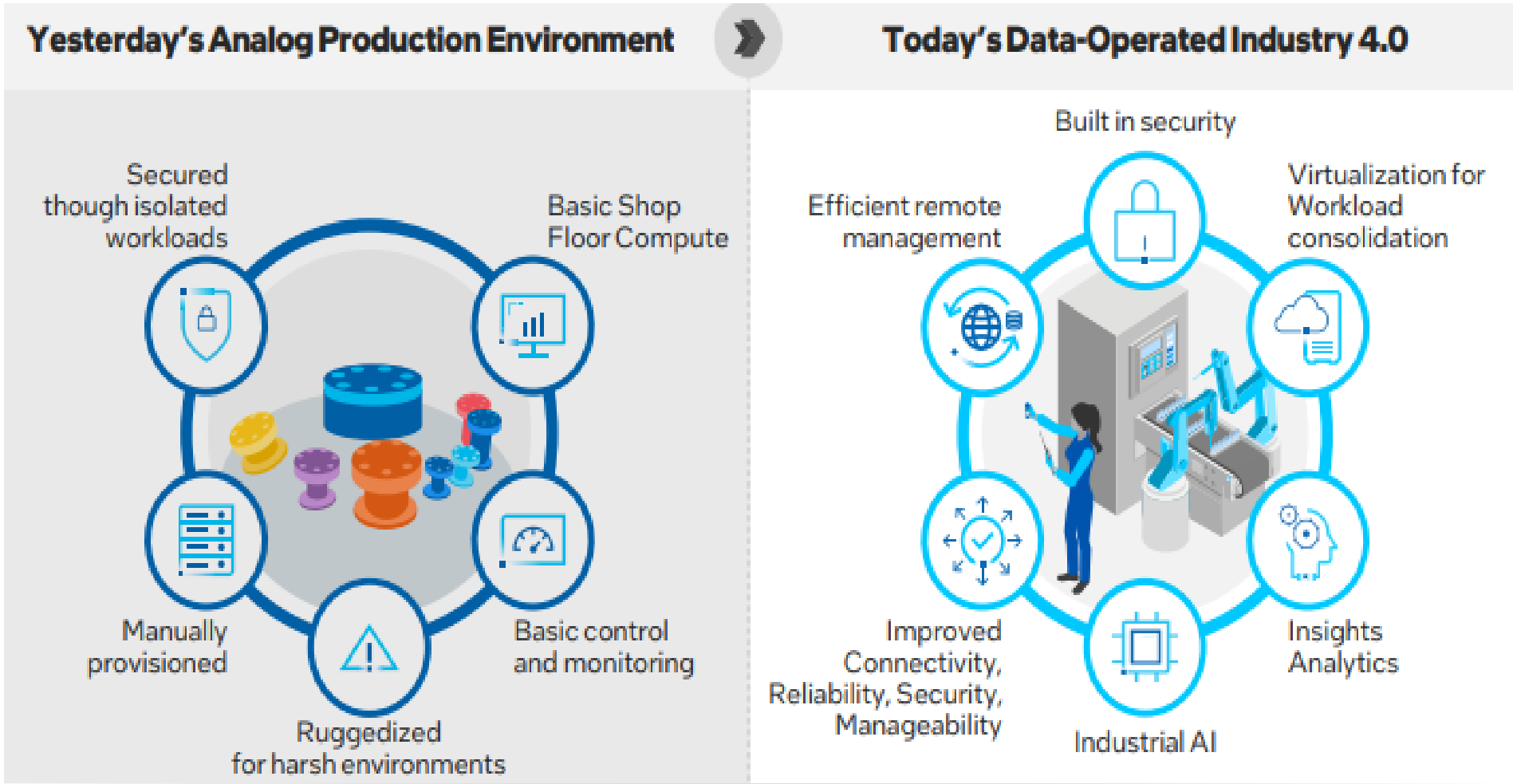
**Digital Silos:** Networked lab instruments with mass production and manual data analytics

**3.0**

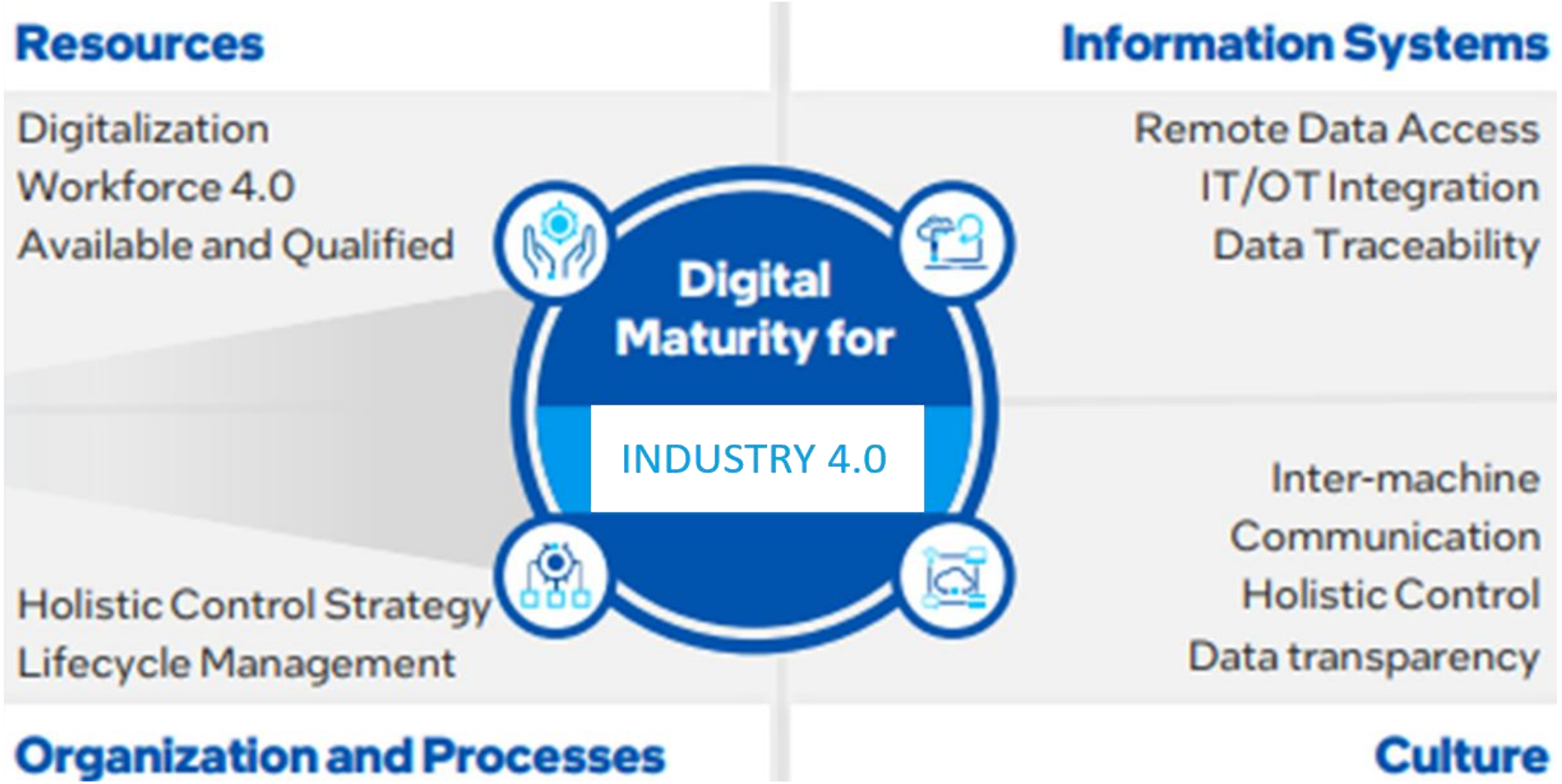
**Connected Plant:** Networked lab instruments centrally managed across sites, integrated global systems

**4.0**

**Predictive Plant:** Enterprise-wide integration with predictive analytics embedded in processes



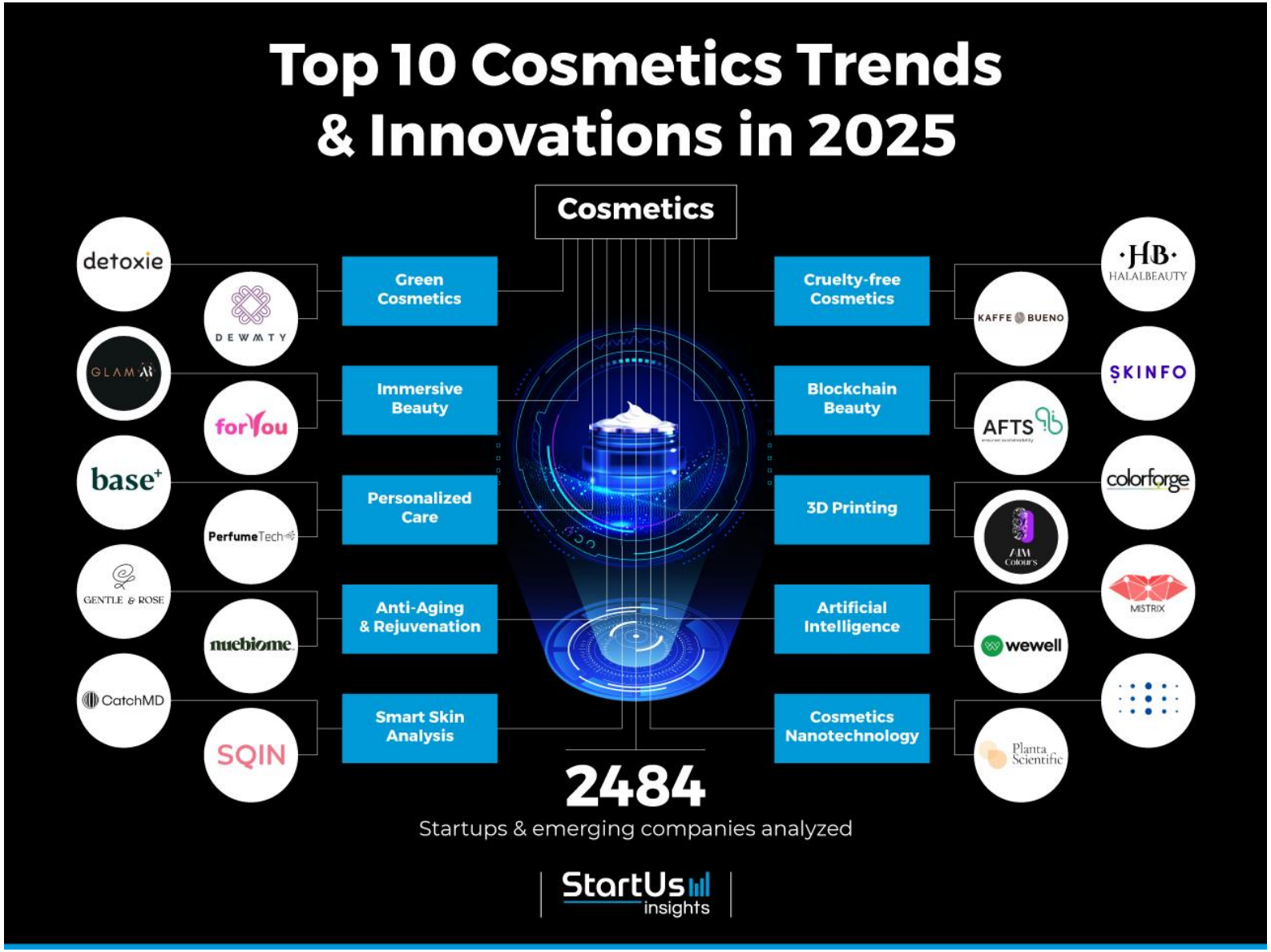
# Current Cosmetic Manufacturing Facilities Have an Opportunity to Improve



# Current Cosmetic Manufacturing Facilities Have an Opportunity to Improve

The fourth industrial revolution moves from connected to predictive by utilizing big data, networking, artificial intelligence, and machine learning technologies to:

- **Access better data –** Use advanced analytics to isolate process issues and quickly respond to bottlenecks.
- **Reduce mistakes –** Automate quality assurance process to reduce the labor costs and concerns often associated with human error.
- **Evolve with the state of business –** Swiftly address changes in the manufacturing process and product variability.
- **Increase efficiency –** Using automation, optimize processes and accuracy in drug creation.

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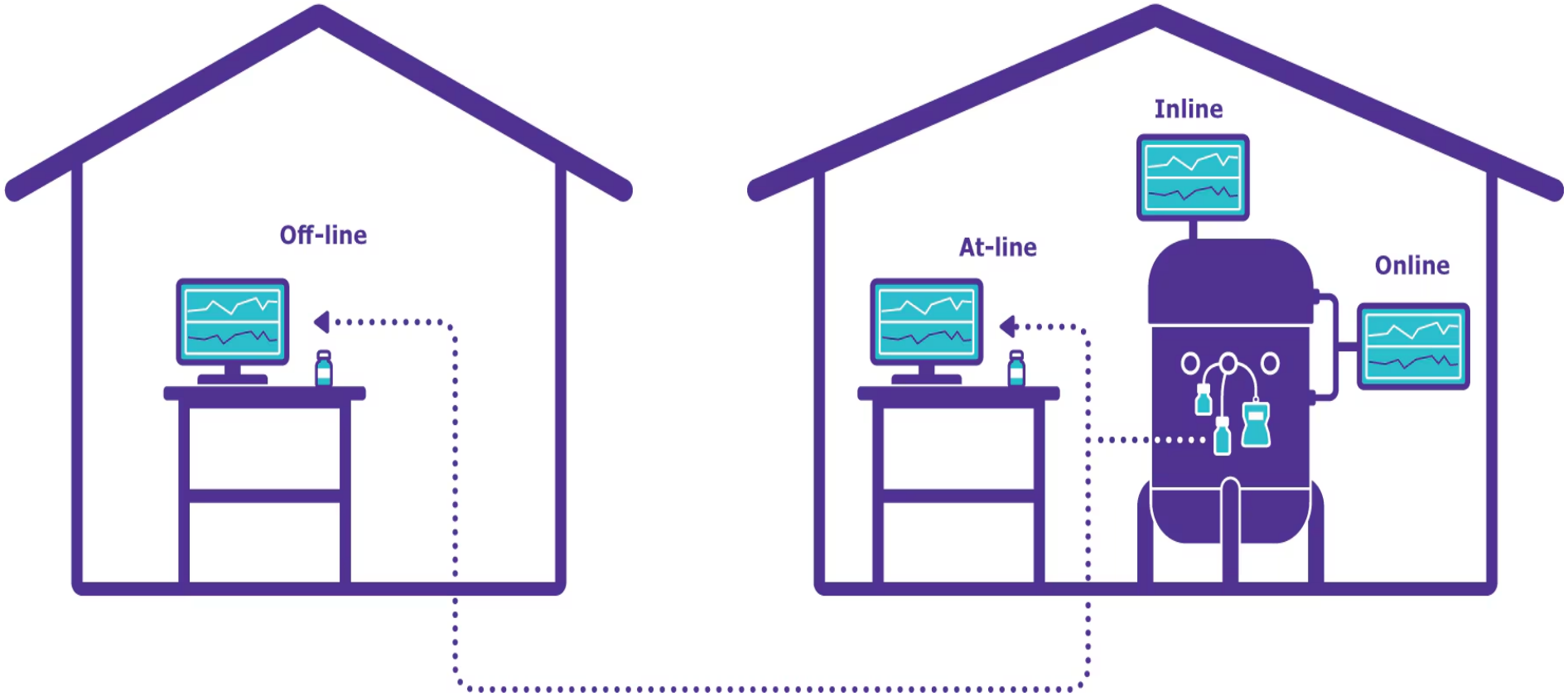
# PARADIGM IS SHIFTING



The Core of Industry 4.0

# SMART FACTORIES

## Principles

The core design principles identified as integral to Industry 4.0.

1. **Interconnection**
   Machines, devices, sensors, and people in the manufacturing process all connecting and communicating with each other.
2. **Information transparency**
   Comprehensive data and information being collected from all points in the manufacturing process, allowing for more informed decisions.
3. **Technical assistance**
   Improved technological facility of systems assisting humans in decision-making, problem-solving, and difficult or unsafe tasks.
4. **Decentralized decisions**
   Cyber physical systems that are able to make decisions on their own and perform tasks autonomously.


With the rollout of 5G and improved digital capabilities, Industry 4.0 is becoming a reality for more industries.

**$337.1B**

Projected Industry 4.0 market size by 2028, up from $116.1B in 2021.

Source: Fortune Business Insights

## Components

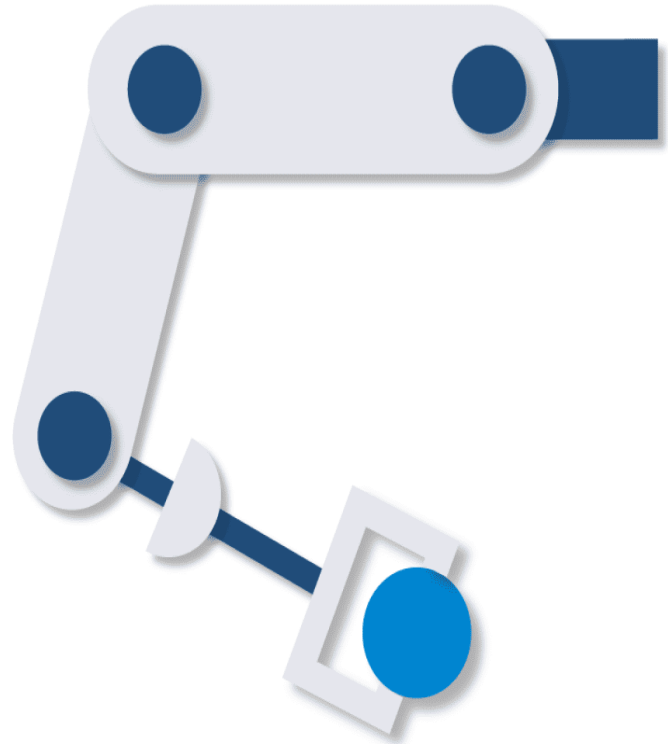
The technologies that define Industry 4.0.

1. **Cyber-physical systems**
   Machines (computer systems) controlled by algorithms.
2. **Cognitive computing**
   Systems with artificial intelligence that adapt, iterate, and improve over time.
3. **On-demand availability**
   Computer system resources able to be utilized at any time.
4. **Internet of things**
   Network of machines exchanging data.

But the more robust the technology, the more readily manufacturers can unlock the furthest evolution of a smart factory: the lights-out factory.

# What LIGHTS-OUT FACTORIES Look Like

Unlike traditional factories true lights-out manufacturing refers to factories that operate completely autonomously.



Fully automated

No human presence

Can operate 24/7

# INDUSTRIES USING LIGHTS-OUT FACTORIES

## Robotics

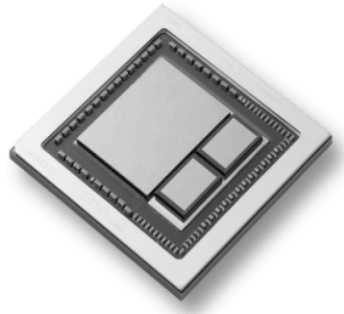
FANUC in Japan has been building robots with other robots as a lights-out factory for 20 years.

## Devices

Philips in the Netherlands produces electric razors with a lights-out manufacturing line of 128 robots.

## Food and Beverage

Ocado in the UK is an online-only grocer with a warehouse of 3,000 robots for fulfilling orders.



## Semiconductors

ASE in Taiwan uses completely automated factories to help create, assemble, and test semiconductor devices.

# UNLOCKING LIGHTS-OUT FACTORIES

More and more businesses are gearing up to incorporate lights-out factories that unlock huge potential, but there are significant challenges to first overcome.

## Opportunities Unlocked

### Cost
Savings on material, inventory and management costs.

### Efficiency
Products can be made more quickly and accurately with trained machines.

### Scale
Operations can continue uninterrupted for days or even weeks at a time.

### Staff
Workers can be upskilled and better utilized outside of the factory floor, resulting in better wages and time management, and a safer working environment.

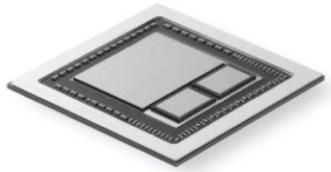
## Challenges to Unlocking

### Cost
Implementation requires purchasing machines, setting up the line, and working out early issues.

### Efficiency
Significant changes to manufacturing (different products or setup) need to be made by humans.

### Scale
Full utilization requires large product volumes and ability to customize production.

### Staff
Skilled workers are needed to implement the factory, and they need to be continuously trained to keep up-to-date with improving technology.

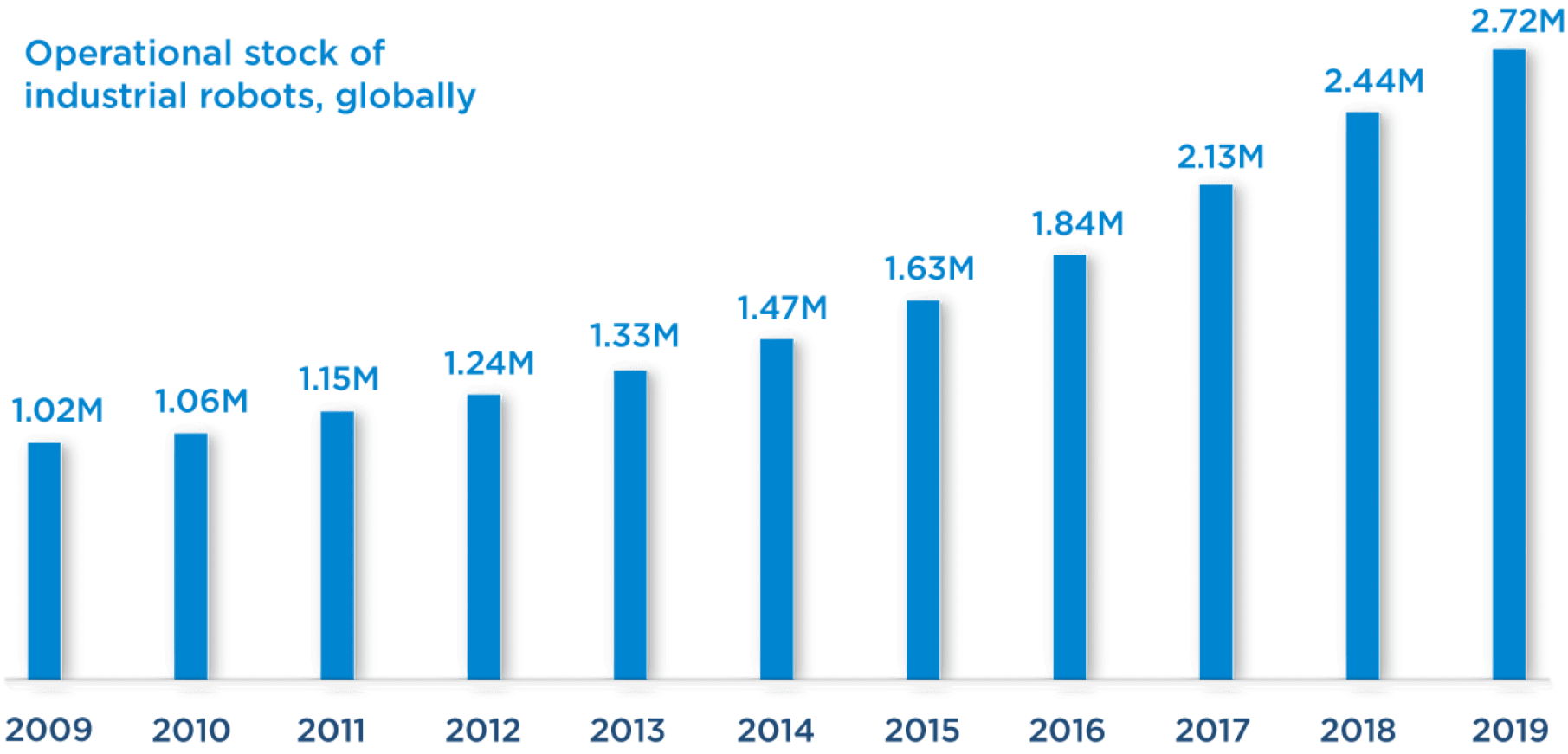


The semiconductor supply chain, with its millions of uniquely-designed products, is able to tap into the opportunities and overcome the challenges.

# TOMORROW'S LIGHTS-OUT FACTORIES

**Improved electronics, network connectivity, and artificial intelligence are improving the capabilities of robotics, and increasing both the number of robots and the number of potential lights-out factories.**

## Operational stock of industrial robots, globally

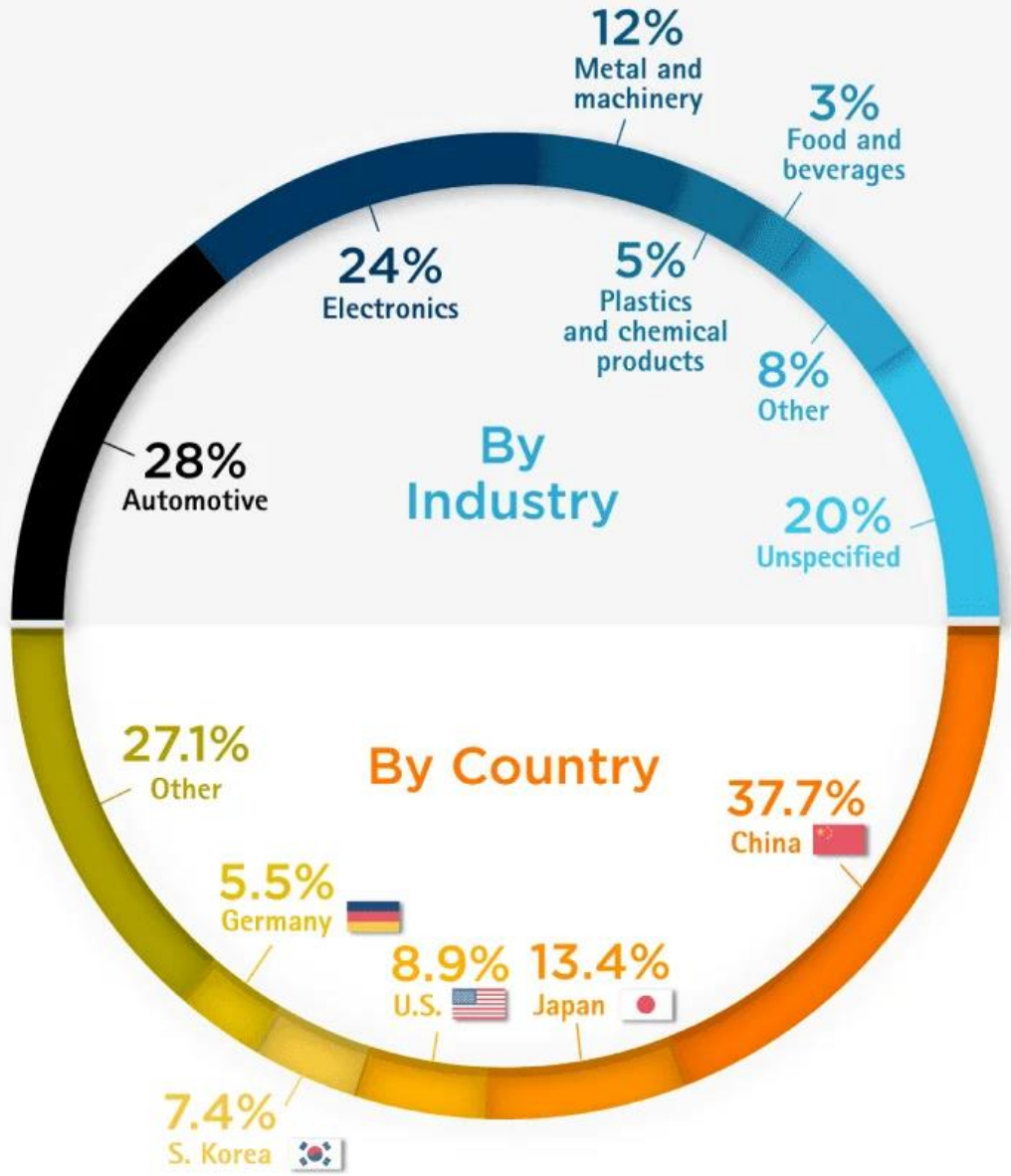



Source: International Federation of Robotics

# NEW ROBOT INSTALLATIONS

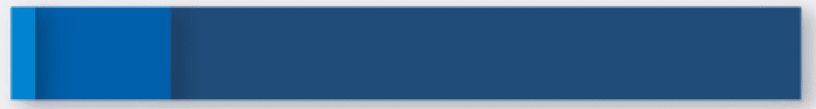
(2019)

Source: International Federation of Robotics



## SURVEYED PRODUCTION PLANS FOR 2025

Global Survey of Firms




Source: Gartner

Like other industrial revolutions before, the rollout of Industry 4.0, robust electronics and lights-out factories follows a snowball effect:

- Demand increases for cyber physical systems, smart machines
- Supply of machines with semiconductors increases
- Bigger and more robust networks of machines are assembled
- Improved capabilities increases demand

# Industry 4.0 – paving the way to sustainable beauty

*The beauty and personal care industry is infamously plagued by waste and sustainability issues, even though there has been a shift towards more natural and sustainable products in recent years. With Industry 4.0 improving and enhancing manufacturing processes, could waste be effectively reduced at last?*

The beauty and personal care (BPC) industry is large and has seen significant growth within the last few years, clocking US$534.00 billion in revenue in 2022, up from US$471.91 billion in 2020. While there has been a strong focus on sustainability in BPC in recent years, the sector is known for generating large amounts of packaging and resource waste.

With the pandemic putting social and environmental issues in the spotlight, consumers are largely opting for brands that can deliver positive change; this is driving the growth of the natural and organic cosmetics market – from almost US$30 billion in 2021 to an expected US$50.5 billion in 2027. In fact many consumers have indicated that they would pay 35% to 40% more for a sustainable version of the BPC products they normally buy.

To keep pace with the demand for sustainable products, companies must find new ways to improve their operational processes and introduce sustainable manufacturing methods. But several questions remain: how can the BPC industry tackle sustainability issues more effectively? Can Industry 4.0 practices help? And have companies been successful in making a difference with new technological processes?

# The role of Industry 4.0 in advancing sustainable development in the BPC industry

The BPC industry has shown a commitment to more sustainable manufacturing over the years, but more still needs to be done to address the immense amount of waste involved. This sector alone accounts for over 120 billion units of plastic packaging annually worldwide, the bulk of it unrecyclable. In addition to excessive packaging, BPC production processes use a tremendous amount of water, with around 52% of it becoming polluted or being lost through evaporation.

To that end, BPC companies like P&G Beauty, The Estée Lauder Companies, Shiseido, L'Oreal and COSMAX are now using various Industry 4.0 technologies like artificial intelligence (AI) and automation to track, monitor and improve their resource use to reduce their environmental impact and boost their sustainability efforts. Apart from these smart solutions, following manufacturing guidelines like those found in Cosmetics Europe's *Good Sustainability Practice for the Cosmetics Industry* report can set the tone for improving cosmetics manufacturing processes.

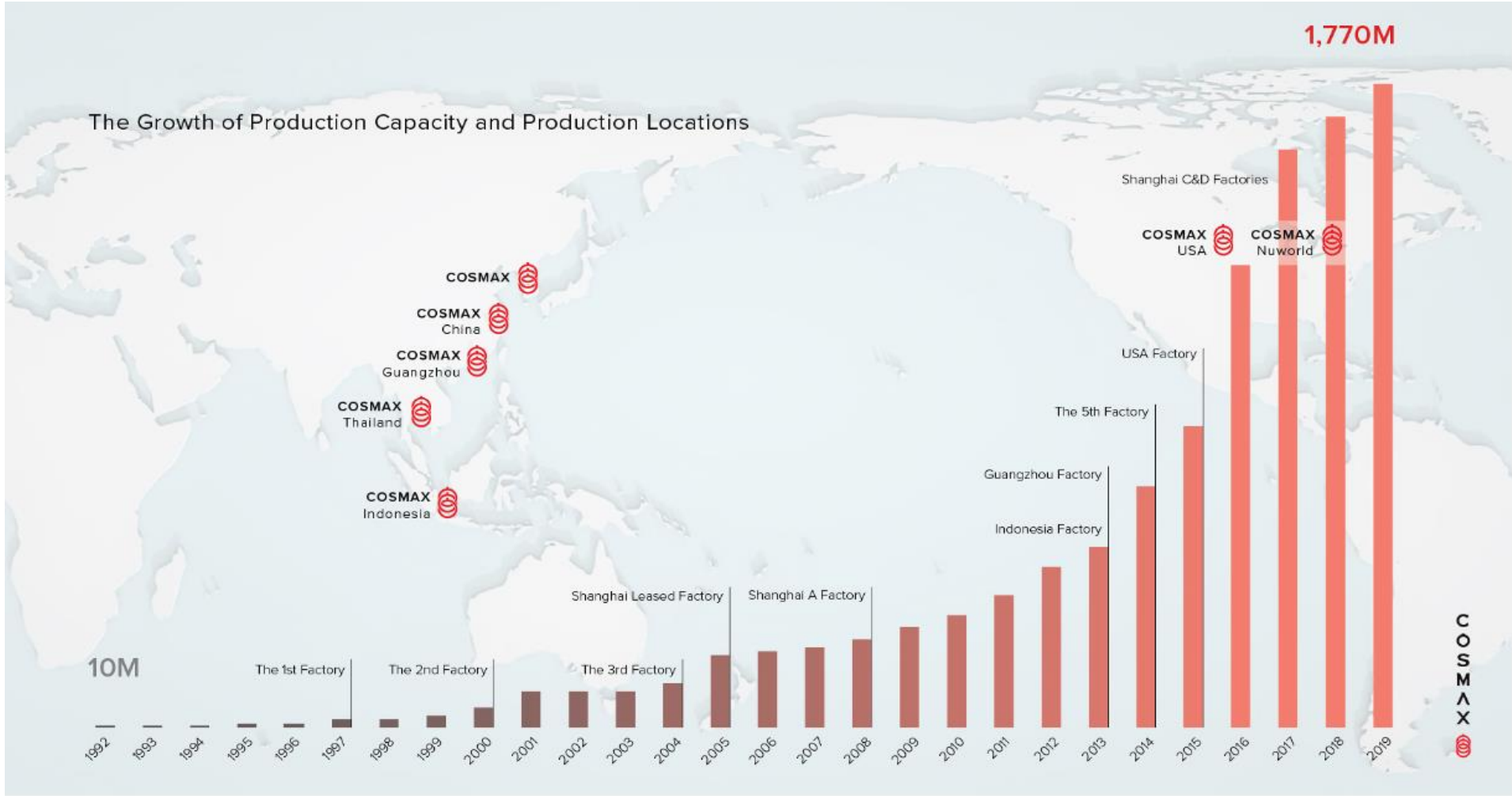
While there are promising signs that these guidelines and tools are steering sustainability efforts in the right direction, a neutral benchmarking tool like SIRI can help facilitate these efforts. By establishing a set of standards and benchmarks, the BPC industry will gain even more clarity regarding its resource use and be able to identify the areas that need more attention, leading to greater efficiency and better resource management in the pursuit of sustainable outcomes.

# Case study: COSMAX

When leading South Korean cosmetics original design manufacturer (ODM) COSMAX wanted to improve its processes and further its growth, it relied on Industry 4.0 processes to innovate and develop speed and flexibility to get ahead of its competition.

With the use of big data, COSMAX was able to adopt several new strategic practices to shorten the supply and demand cycle of raw materials and overcome supply chain disruptions. In addition, COSMAX was able to use modern IoT and supply chain technology to forecast and understand market trends to better understand consumer demands.

In doing so, the ODM was able to more effectively plan and enhance their business, operational and back-end systems, improving their supply chain management, manufacturing and distribution processes. These ultimately led to the development of an eco-friendly packaging roadmap and the optimisation of its distribution network to meet its customers' changing needs and deliver an optimal brand experience.

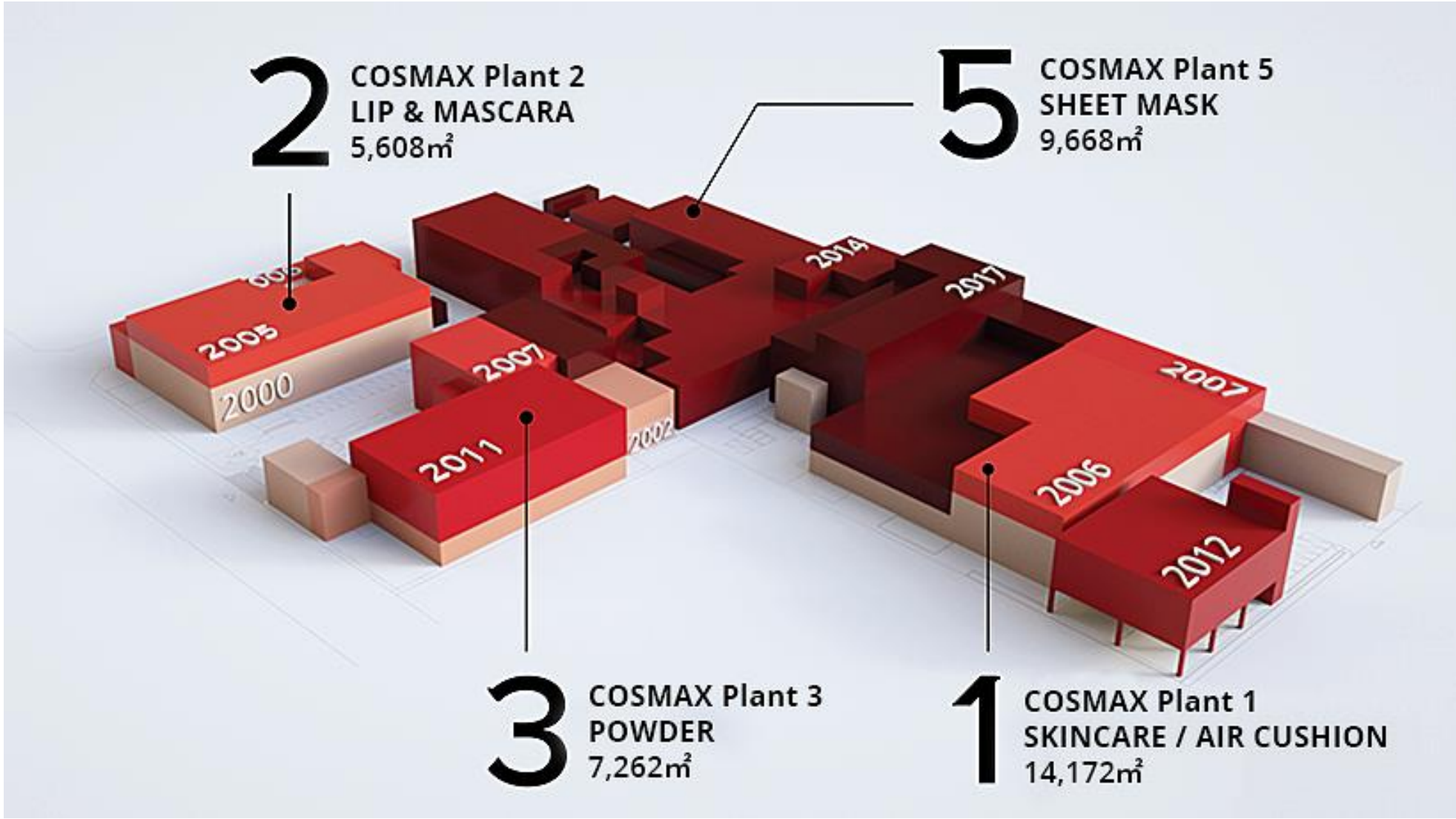



**1,770,000,000**

- As of 2019, the quantity of products that COSMAX is capable of manufacturing amounts to 1.77 billion units, which equates to a quarter of the world's population.

**7 CITIES**

Regions with manufacturing plants (Hwaseong in Korea, Shanghai and Guangzhou in China, Jakarta in Indonesia, Bang Phli in Thailand, and New Jersey in the United States)



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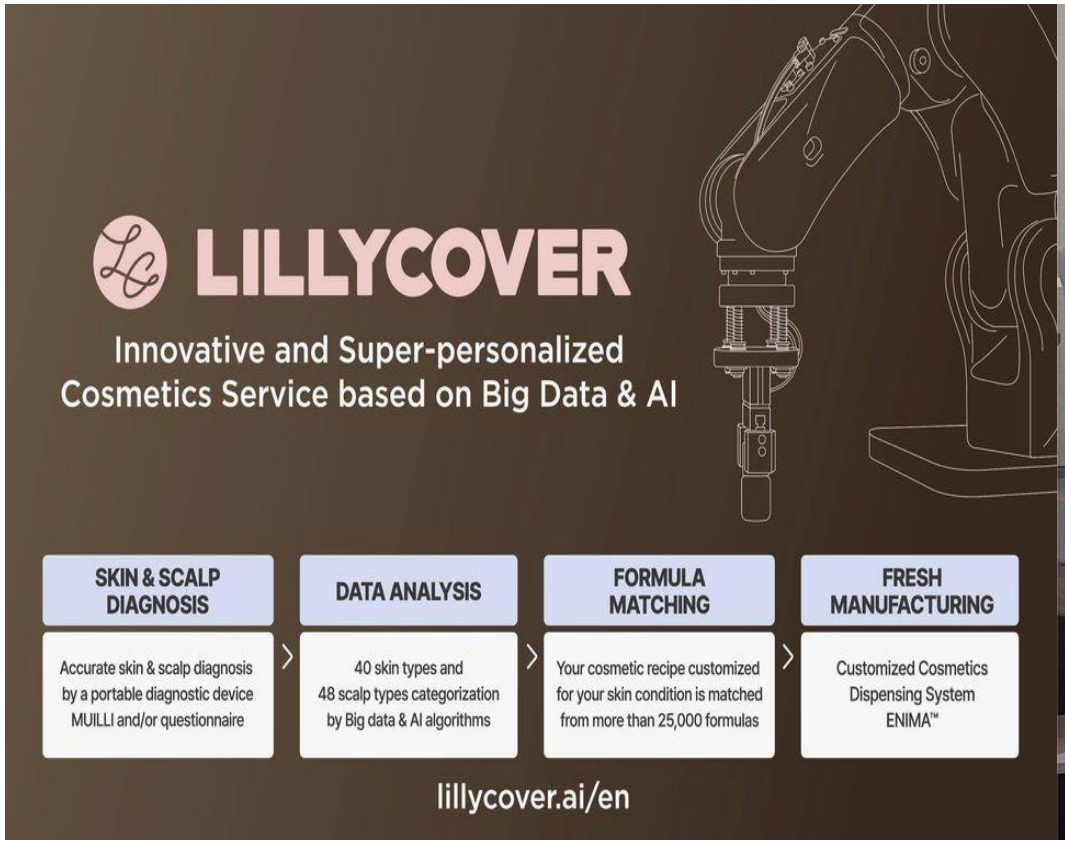
**“The convergence between big data and AI technologies realized by Enima creates hands-on skin diagnostics and high levels of customization for cosmetics' recipes and production.”**

-- SunHee An, CEO & Founder of Lillycover

Lillycover is a part of the NX NIVEA Accelerator program which is led by the German skincare giant Beiersdorf. The beauty accelerator program aims to innovate and revolutionize the beauty industry by collaborating with beauty startups from South Korea.





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# Case study: L'Oreal

One of the giants of the global BPC industry, L'Oréal has made great strides in its supply chain sustainability strategy. The French personal care company has leveraged Industry 4.0 and digital technologies to upgrade many of its manufacturing processes in recognition of the changing sustainability landscape, supporting its commitment to better environmental practices.

Transportation and logistics play a big role in sustainability. To reduce the impact these operations have on the environment, L'Oréal launched a global initiative to build relationships with local transport companies and "co-create custom environmental solutions suited to each geographical zone".

On the packaging front, L'Oréal has rolled out a suite of Industry 4.0 tools like AI, intelligent sensors and robots in its Lassigny factory to simplify the entire production process for its operators. Other tools like 3D printing and VR have helped to accelerate prototyping while reducing resources used in research and development.

The increased connectivity provided by IoT has also benefitted the company by improving product traceability and providing more transparency, so its customers get a clearer picture of where their products come from.

# The future of the BPC industry

Improving sustainability in an industry known for waste is an uphill task. With the constant growth that the BPC industry is experiencing, many companies have understandably attempted to adapt and focus on improving their manufacturing processes to achieve better sustainability outcomes.

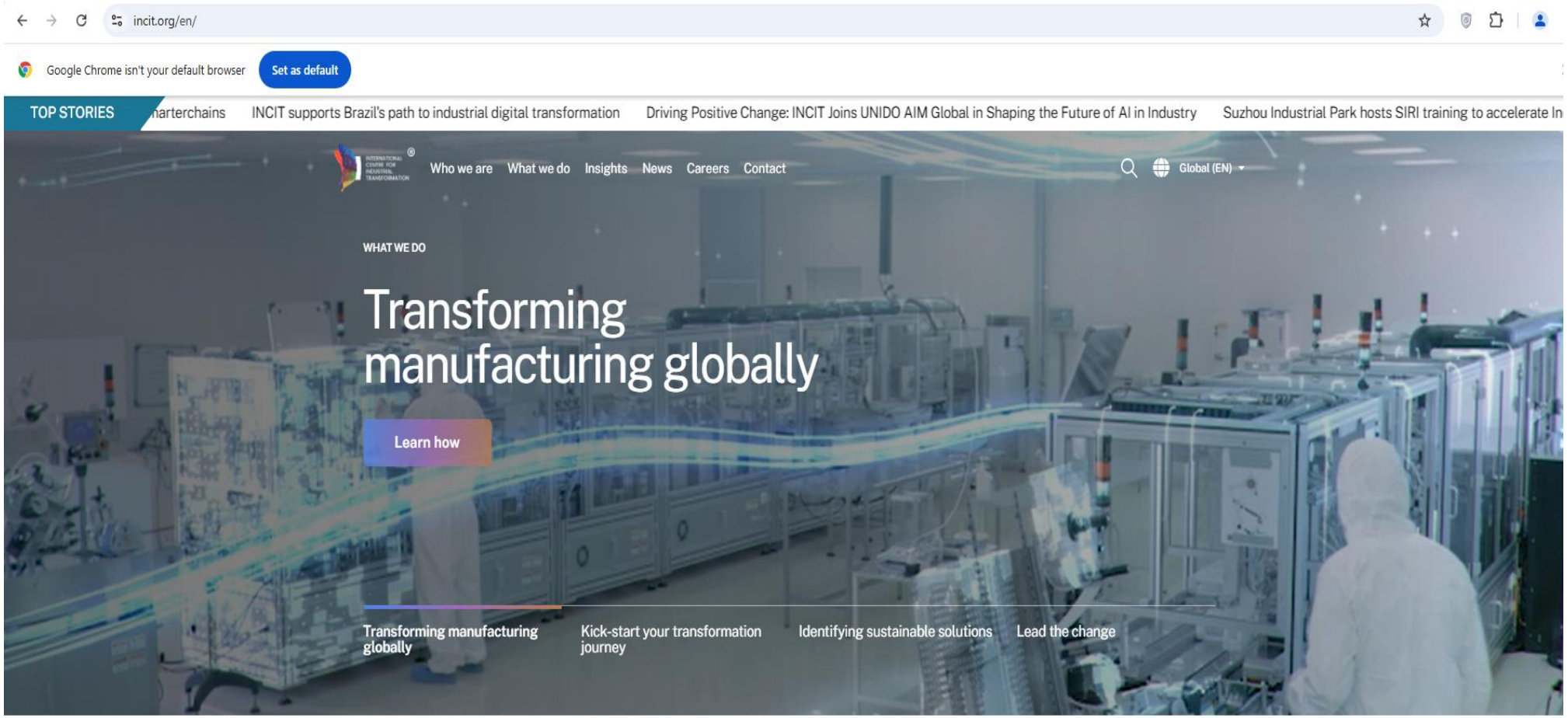
The use of modern technologies driven by Industry 4.0 can help fast-track the digital transformation of the BPC industry and accelerate its sustainability journey. This can already be seen in several large industry players with the use of advanced technologies like AI, automation and 3D printing.

To increase the effectiveness of these technologies and enhance the manufacturing process, SIRI can be used to facilitate the Industry 4.0 transformation of these companies. By adopting this suite of digital transformation frameworks and tools, large enterprises can boost their processes even more while small companies will be able to level the playing field in terms of their development.

# Design an effective transformation journey for success

As a champion of Industry 4.0 adoption, the International Centre for Industrial Transformation (INCIT) has both the tools and the reach to provide support to major industries and manufacturers globally, such as those in beauty and cosmetics, as they prepare to ramp up their Industry 4.0 efforts.

To learn more about how you can design your transformation journey with success, contact us.

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# OUR UNDERSTANDING OF THE SMART INDUSTRY READINESS FRAMEWORK (SIRI)

The Smart Industry Readiness Index (SIRI) is a comprehensive framework developed by the Singapore Economic Development Board (EDB). Its purpose is to assess and guide companies on their digital transformation journey toward becoming smart factories or smart industries. SIRI provides a structured approach to evaluate an organization's readiness and maturity in adopting advanced manufacturing technologies and practices. The SIRI framework consists of four key dimensions:

**Technology:** This dimension evaluates the company's technological infrastructure, including connectivity, data management, cybersecurity, and digital capabilities. It assesses the company's ability to deploy and integrate technologies such as the Internet of Things (IoT), artificial intelligence (AI), automation, and analytics.

**Process:** The process dimension focuses on the company's operational processes and practices. It assesses the level of automation, standardization, optimization, and flexibility in production processes. It also considers factors like lean manufacturing, supply chain management, quality control, and continuous improvement.

**Organization:** This dimension evaluates the company's organizational readiness, culture, and capabilities to drive digital transformation. It assesses aspects such as leadership commitment, change management, talent development, and collaboration within and outside the organization.

**People:** The people dimension considers the skills, knowledge, and capabilities of the company's workforce to embrace and utilize advanced manufacturing technologies effectively. It assesses the availability of talent, training programs, workforce engagement, and the organization's efforts to foster a digital mindset among employees.

The SIRI framework provides a holistic view of an organization's readiness and maturity in adopting smart manufacturing practices. It enables companies to identify gaps, prioritize areas for improvement, and develop a roadmap for digital transformation. By leveraging SIRI, organizations can enhance their competitiveness, productivity, and innovation in the rapidly evolving landscape of smart industries. Below figure depicts the SIRI framework in a nutshell:

Provides clear vision, strategy and a systematic roadmap for Industry 4.0 adoption

SIRI strikes a balance between technical rigor and practical applicability

Defines the end states and the intermediate steps needed for continual improvement

**SIRI aims to equip companies with practical knowledge about:**

- What Industry 4.0 is and the tangible benefits it could yield
- The maturity levels of organizations and facilities
- How manufacturing facilities can improve in a targeted and incremental manner

## Lead Framework

The LEAD Framework reinforces the continuous four-step process of the industry 4.0 transportation.

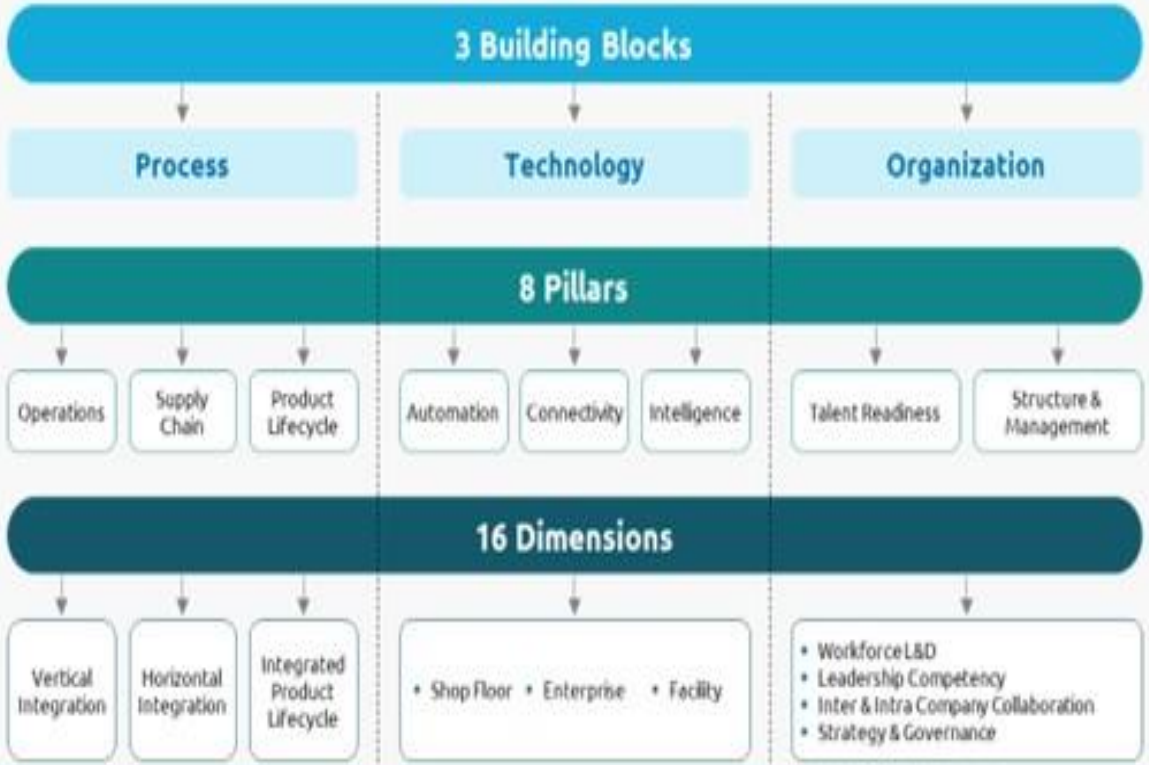
**LEARN**
Learn Industry 4.0 concepts and develop a common language for alignment

**EVALUATE**
Evaluate facilities for current Industry 4.0 maturity levels


**DELIVER**
Deliver impact and continue to refine Industry 4.0 initiatives

**ARCHITECT**
Architect an in-dept transformation and implementation plan

## SMART INDUSTRY READINESS INDEX



# What are the current trends in the cosmetics market?

The **cosmetics sector** has been evolving particularly rapidly since the **Industrial Revolution** and one trend follows another. While the Covid 19 had a strong impact on **consumer habits**, consumers used **less make-up** during confinements but consumed more **beauty care**. Thus, **men,** who until then did not form a significant part of the cosmetics clientele, are now a prime target.

Thus, the cosmetics sector is a sector that is undeniably **facing many changes**. New operating strategies and tools are therefore being implemented in companies to increase their **capacity** to evolve and their **adaptability.**

**82%**

of shoppers want consumer goods brands values to be aligned with their own

**60%**

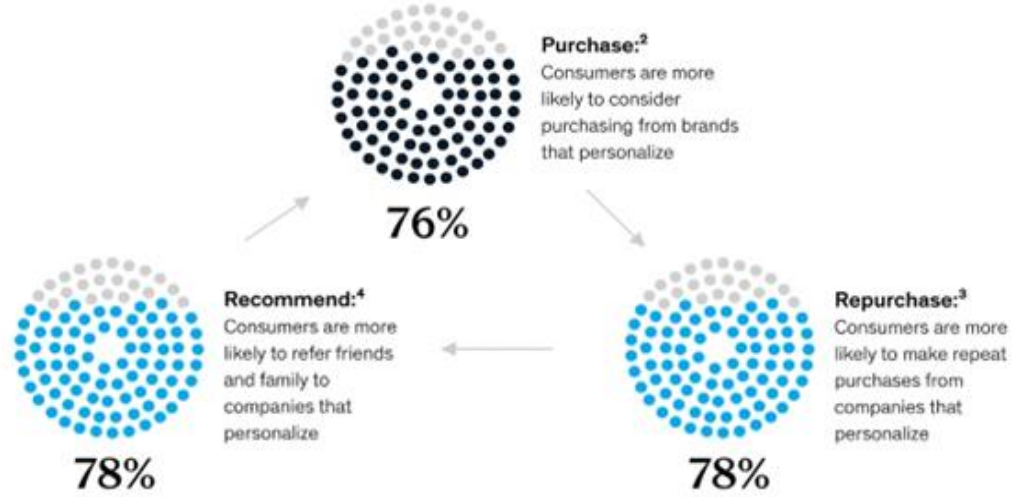
of consumers are voicing some level of concern about the global supply chain

**66%**

of shoppers are seeking out eco-friendly brands and products. 55% say they'll pay more for sustainability.

## Personalization directly influences buying behavior across the customer life cycle.

**Likelihood to purchase, recommend, and repurchase depending on personalization,** % of respondents[1]




[1] Question: "Please indicate how much you agree or disagree with the statements below when it comes to personalized communications and products/services from brands/businesses."
[2] Purchase: "I am more likely to consider buying from brands/businesses that engage with me in a personalized and tailored way."
[3] Repurchase: "I am more likely to repurchase from brands/businesses that offer personalized communications and products/services."
[4] Recommend: "I am more likely to recommend brands/businesses to my friends and family that offer personalized communications and products/services."
Possible answers: "strongly disagree"; "disagree"; "somewhat disagree"; "somewhat agree"; "agree"; "strongly agree." Numbers shown indicate respondents that selected "somewhat agree"; "agree"; and "strongly agree."
Source: McKinsey Next in Personalization 2021 consumer survey 9/7–9/8/2021 (n = 1,013), sampled and weighted to match the US general population 18+ years

McKinsey & Company

## A case study: L'Oréal

To illustrate this quest for adaptability, **L'Oréal** reveals its management of the new **challenges of Industry 4.0** in the cosmetics sector. These new challenges, centred around the **new consumers** who seek to obtain products quickly and transparently, include

- Accelerated **product development**, to make products available as quickly as possible,
- **Connected product**s, to ensure better product traceability and optimise the supply chain,
- **Agile and flexible operations** to respond more quickly to consumer demand,
- Increased **customisation** of products, which is one of the major trends today,
- **Added services**, driven by intelligent data management.

These **marketing challenges** lead to **industrial challenges**, to ensure operational excellence. Committed to giving maximum **autonomy** and **efficiency** to its employees, L'Oréal relies on real-time tools for optimal data circulation, which facilitate worker mobility, and long and medium-term optimisation and simulation tools to **process and analyse the data** collected in the field.

# What role for digital technology?

In this context, **digital technologies** are becoming **indispensable. Big Data**, **artificial** intelligence, the **IOT** (Industrial Internet of Things) and connected sensors are revolutionising the approach to beauty and offering **infinite solutions** to satisfy these new consumers.

Digital technologies, in addition to **optimising the industrial performance** of factories, are essential for personalising products and adapting needs. For example, thanks to **data**, it is now possible to **diagnose the skin** by carrying out an in-depth dermatological analysis, and thus to recommend an adapted and tailor-made routine. Product **customisation** is also developing thanks to the **processing of collected data**, which makes it possible to compile clinical cases and better manage atypical skin.

**Augmented reality** is a real marketing tool that makes it possible to create more fun and practical **experiences** for customers.

The applications of **new technologies** in the cosmetics sector are almost endless. Below are some examples of **technological innovations** that have marked the last few years:

- **Sephora** has launched a connected shop with **selfie mirrors**, robots, vending machines and connected sensors.
- L'Oréal offers a **make-up test application** using augmented reality.
- For the launch of its perfume "Manifesto", **Yves Saint Laurent** has set up a **bottle and case recognition screen.** Thus, when the perfume is placed on the intelligent screen, it is able to display the perfume information.

  More environmentally friendly products

Digital tools are not the only significant changes in the cosmetics industry. One of the most resounding trends concerns **ecology.** Customers, especially young ones, are now looking for **efficient** and **environmentally** friendly products that are **transparently** produced. Companies are therefore being pushed to adopt an eco-responsible activity to please customers who are increasingly looking at company practices.

This trend has given rise to "**slow cosmetics**", which is part of a logic of short circuits and which promotes more reasoned consumption, with **ecological, healthy and natural products.**

# Exploring Sephora’s Augmented Reality Mirror: Expert Opinion

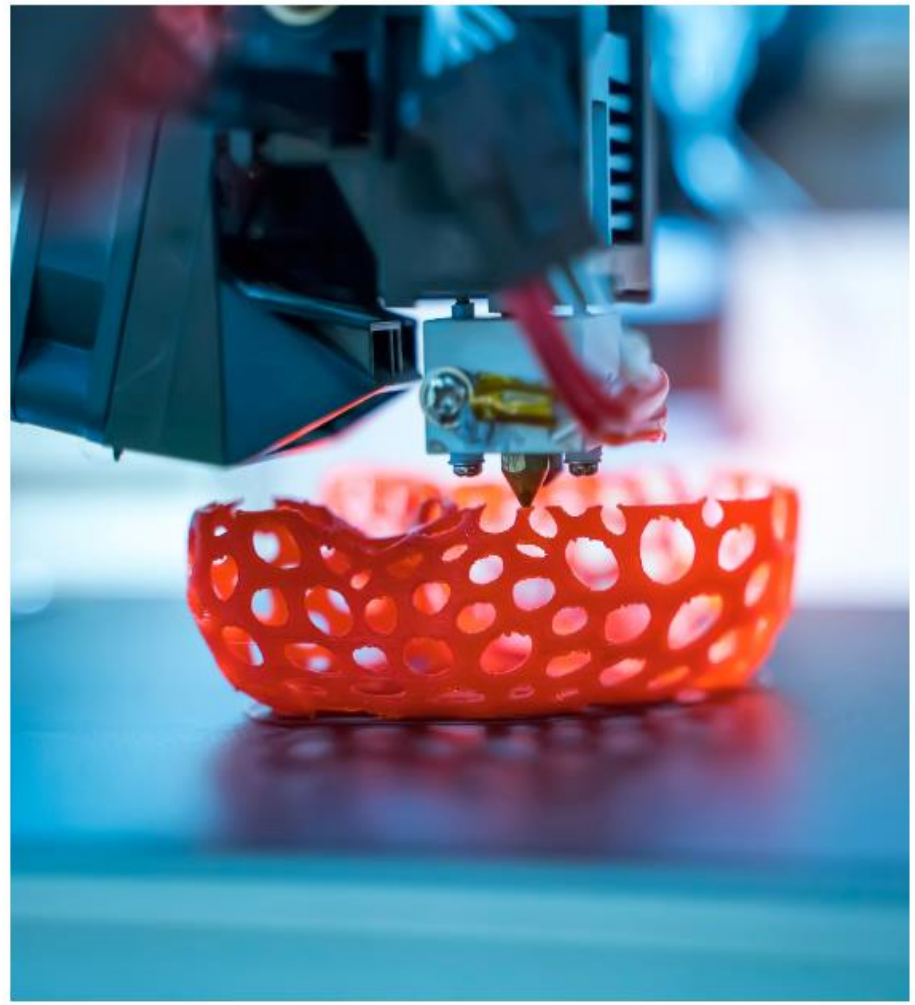
May 26, 2024

# Additive manufacturing (AM)

Cosmetic companies are teaming up with AM specialists to create products that fit like a glove around the customer's shape and size.

What else does AM offer to the cosmetics industry? Enlisting AM in cosmetics operations is a good call to reduce waste and environmental impact. The technology promotes lower material and energy requirements than traditional manufacturing methods.

L'Oréal is an AM pioneer in the industry. They started 3D printing partnerships to produce personalized patches for the delivery of active ingredients to the skin. And rely on other AM technologies for product packaging purposes. The results have been so overwhelmingly positive that in 2018, L'Oréal created a division to promote the development of in-house 3D printing.



# How L'Oreal Is Bringing Blockchain & Personalization To Its Manufacturing

L'ORÉAL

Digital transformation and **Industry 4.0** have been an ongoing process for some time now, with brands the world over at various stages of concept and implementation.

Industry 4.0 covers a whole suite of technology, including robotics, Internet of Things, data, blockchain, virtual and augmented reality, artificial intelligence, and more. All these technologies have a place in the modern industrial framework, and can all be deployed to streamline processes and make manufacturing more productive and efficient than ever before.

While some companies are taking a cautious approach to Industry 4.0 implementation, cosmetics heavyweight **L'Oreal** is going all in with a range of technological innovations.

# L'Oreal

The Paris-based cosmetics brand's digital transformation is leading it to partner with some big names of the tech world - names such as IBM, Google, Amazon, Facebook, and Apple. However, keen not to ignore some of the new faces in the industry, it has also been working with a host of smaller tech startups as well.

"In digital manufacturing, it's important to source the technologies where they are starting," **said** Chief Digital Officer for Operations at L'Oreal, **Stephane Lannuzel**. "That's what I'm telling the team: When you see this new technology, make sure you open your eyes and are resilient. Try to understand them before you just say, it's not for us. For example, in 3D printing, five to seven years ago, people said, it wasn't for L'Oreal because we produce seven billion products, and with 3D printing it takes an hour and a half to do one. Now we have 3D printers in our development offices here in Paris where, for every single launch, we make prototypes."

Other innovations being introduced directly into the L'Oreal manufacturing process include sensors, magnetic conveyors, and laser measuring.

These technologies are backed up by powerful artificial intelligence software which is enabling L'Oreal to manufacture 30 different bottles of perfume on the same production line, with the technology able to switch automatically within 15 minutes, depending on the exact product in front of it. While 15 minutes may seem like quite a long time to the layperson, consider the fact that, under previous generations of technology, switching format took more than four hours.

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# Artificial intelligence (AI)

In the cosmetic industry, AI offers an unprecedented advantage. Study the customer and create personalized feedback based on their likelihood and preferences. Moreover, when brought to the R&D and manufacturing departments, this wizard-like technology enables the optimization of processes, marketing strategies, and customer service using advanced data analysis.

Many cosmetic titans have started to capitalize on the benefits of AI:

- To improve customer interaction, Sephora launched an AI-powered virtual assistant that helps them find the right makeup products based on their skin type, tone, etc. Additionally, the company made the Virtual Artist tool available to create and try a gazillion shades of lipstick, eyeshadows, and more using facial recognition and augmented reality (AR).
- With Perso, in 2020, L'Oréal unveiled a 3-in-1 smart device (paired with a mobile app) programmed to screen the customer's skin, compile environmental information from the location, and formulate customized skincare, foundation, and lipstick.
- A smart perfume by Ninu came in 2021. The 100-fragrance one-bottle marvel uses a micro-precision extracting system to spray the perfume in different ratios and volumes. According to Ninu, only high-quality and environmentally friendly materials—vegan, phthalate, paraben, and sulfate-free—were used.
- You might love or hate ChatGPT, but how do you feel about Ula Beauty and Haut.AI's SkinGPT? Here's an AI-enabled skin simulation platform where users can upload their photos and predict their skin transformation over time based on the use of specific care products.
- AI has been used to predict how sensitizing cosmetic ingredients might act once applied. The ongoing research looks at physicochemical properties and then compares the results with data from past studies involving animals and "omics."

# New applications on the way

At CES 2020, we unveiled *Perso*'s capabilities for skincare. However, the 3-in-1 device will also be able to create custom formulas for lipstick and foundation — which will be launched at a later date."*L'Oréal is one of the most trusted names in beauty, and with Perso, we are putting personalized technology directly into the hands of our consumers*," said Guive Balooch, Head of our Technology Incubator. "*Perso* uses AI to optimize the formulas and actually gets smarter as you use it."

# How Perso works

Perso creates personalized skincare formulas in four steps:

**Providing a personal skin analysis:** Our customer will launch the Perso mobile app and take a photo with their smartphone camera. Thanks to the ModiFace technology we have acquired in 2018, their overall skin condition—including deep wrinkles, fine lines, the appearance of dark spots, and pore visibility – will be analyzed with the help of AI.

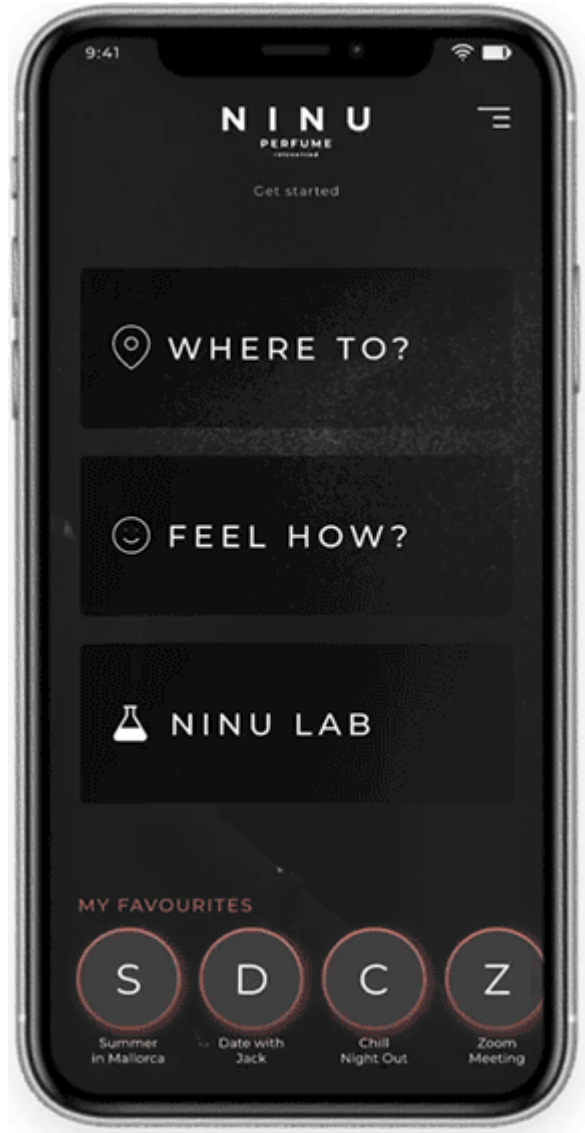
**Analyzing the Environment:** Using Breezometer geo-location data, Perso takes into account the local environmental conditions that can influence the state of our customer's skin. These might include weather, temperature, pollen, UV index, and humidity.

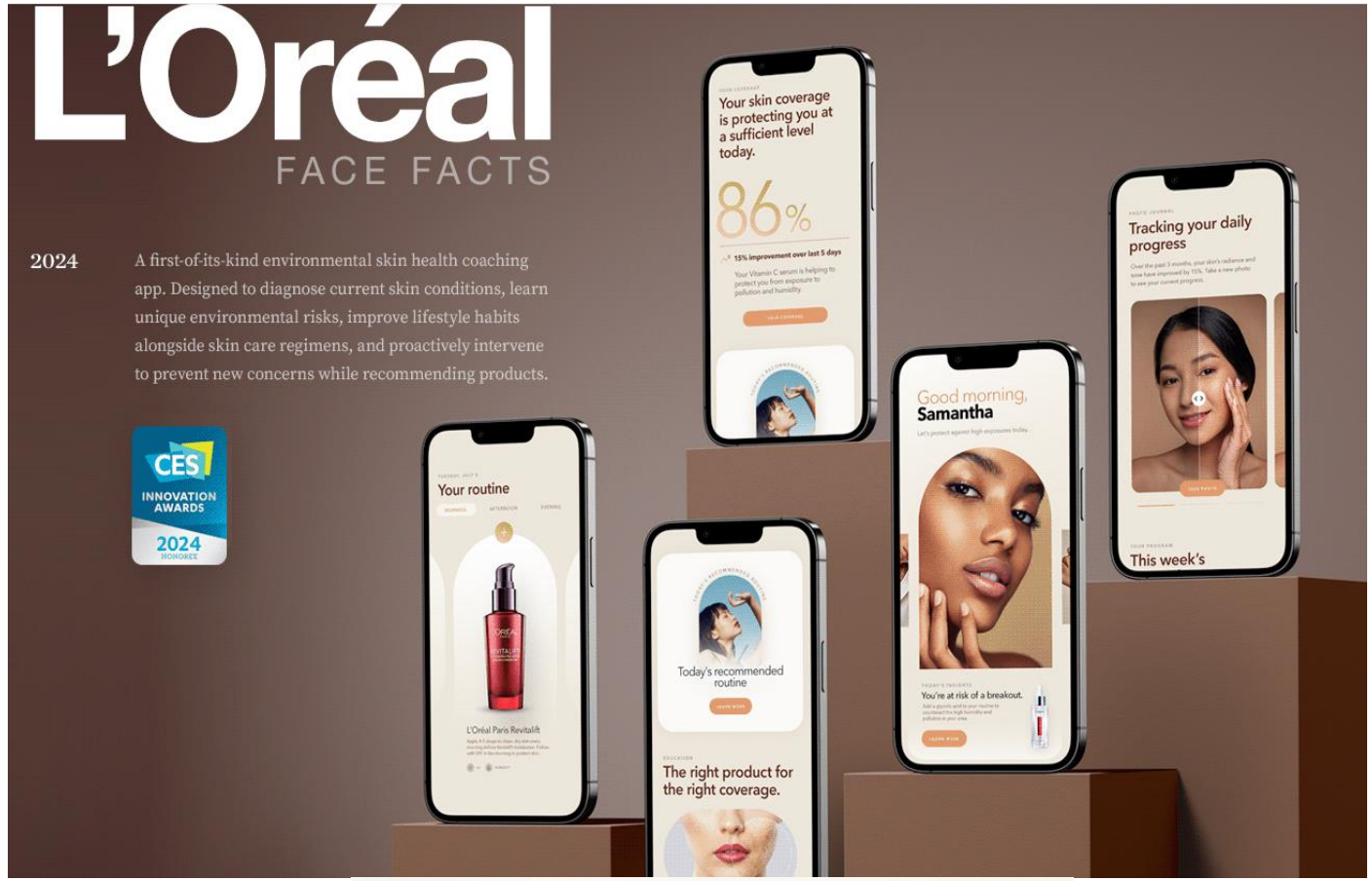
**Adapting to personal preferences:** The next step is to enter personal skincare concerns into the Perso app, including fine lines, dark spots, pigmentation, pore size, radiance, and dullness. To customize the unique formula of moisturizer, serum, and under-eye cream even further, the preferred texture and hydration-level can also be added.

**Making a custom formulation and dispensing:** All of this data helps to create a personalized blend of high-performance skincare, dispensed in a perfectly portioned, single dose at the top of the device for easy, clean application. The technology adjusts for morning and evening application, and the device features a detachable mirrored top so that our customers have the option of taking a single or larger dose with them on-the-go.

Perso's hardware features a patented motor system located at the top of the device which moves and compresses the formula from the cartridges at the base of the machine in an upward motion to the dispensing tray above.








BeautyGenius
Your Personal AI Beauty Assistant

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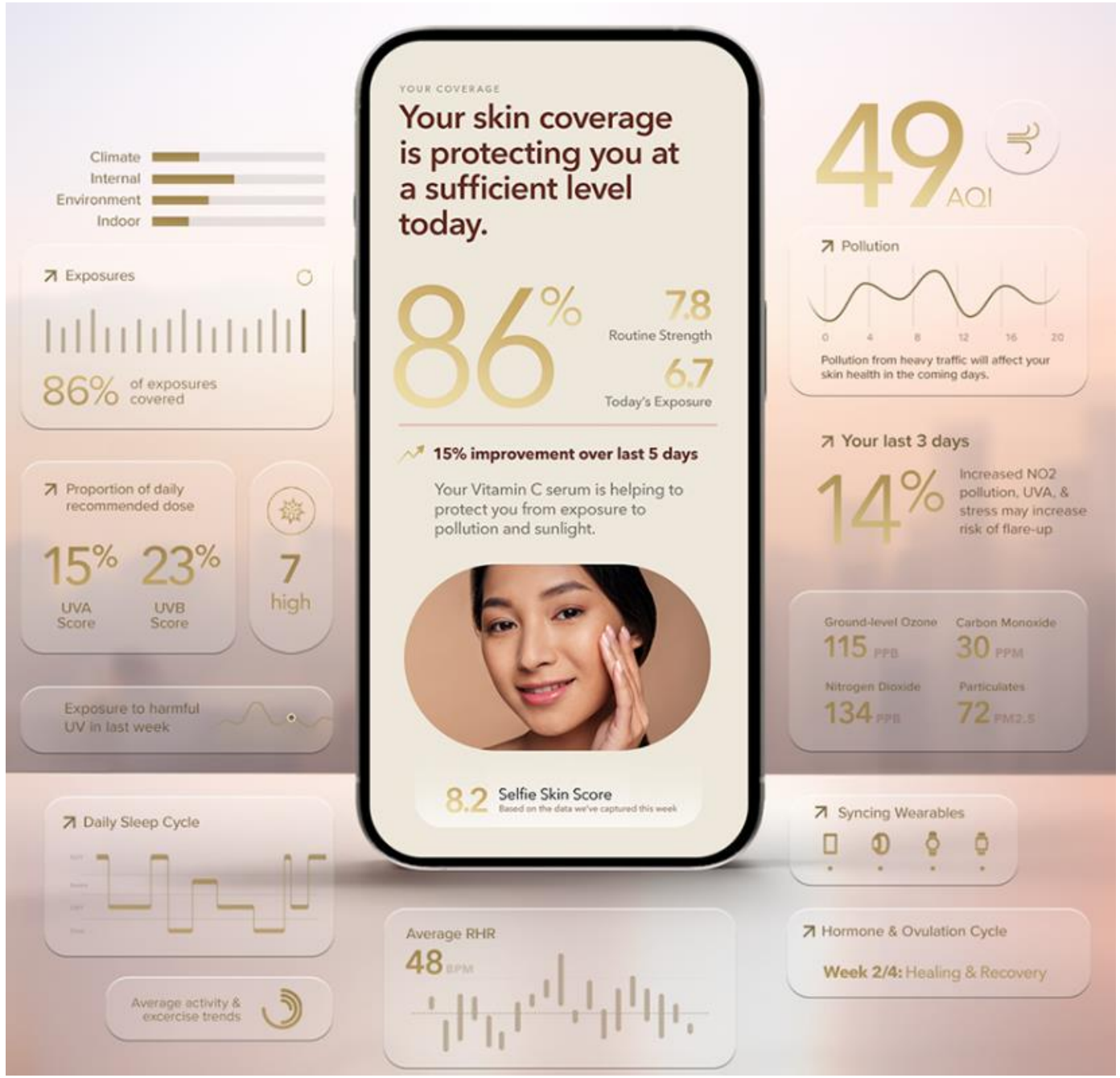
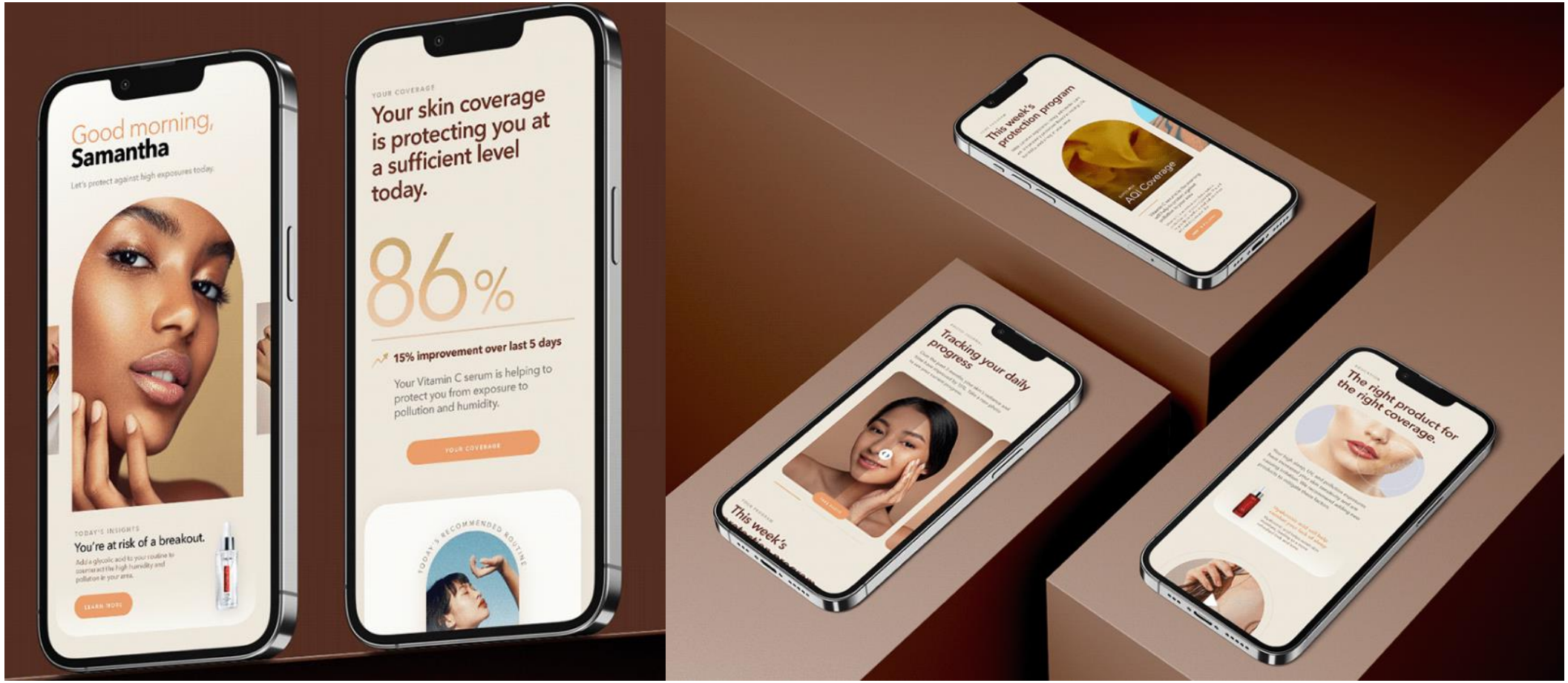
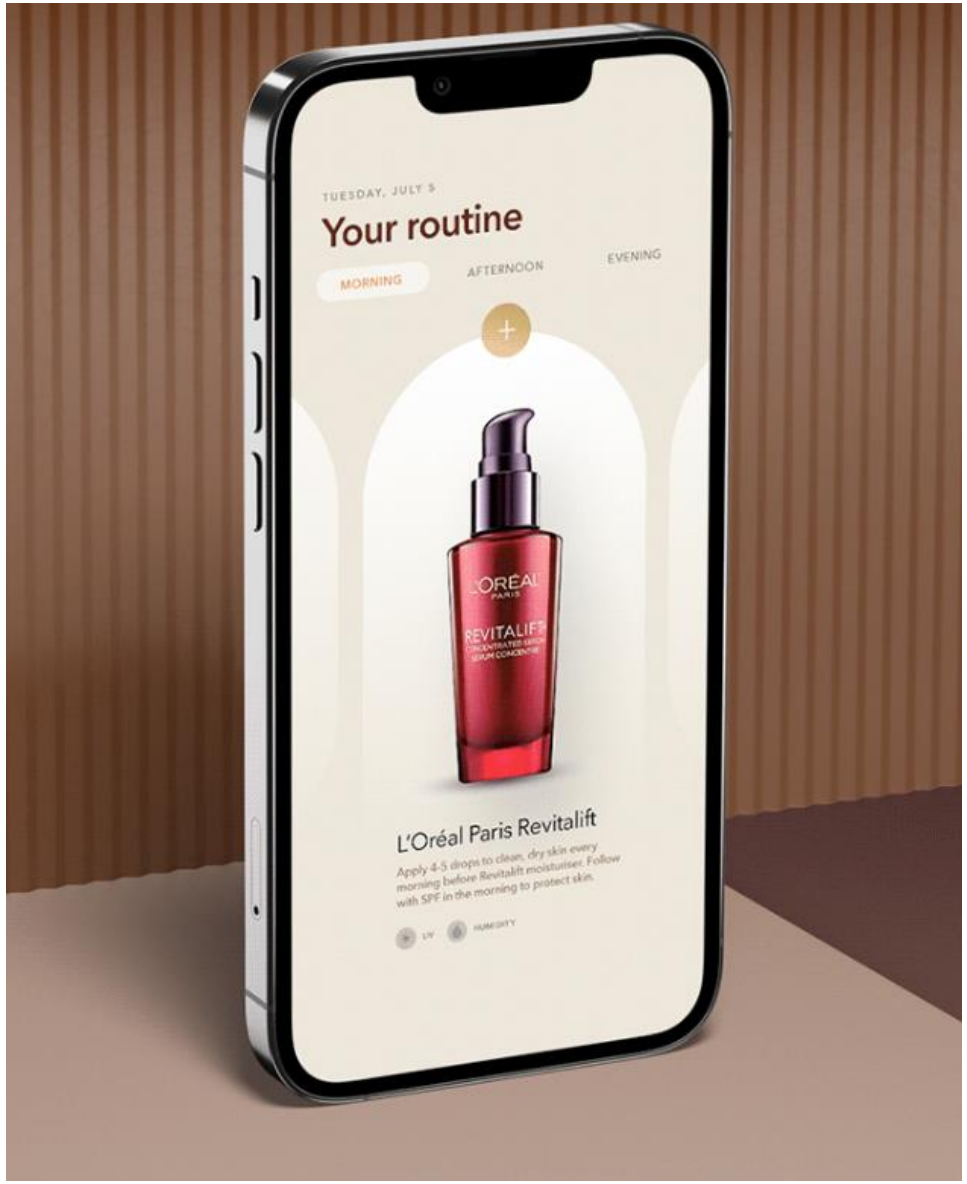


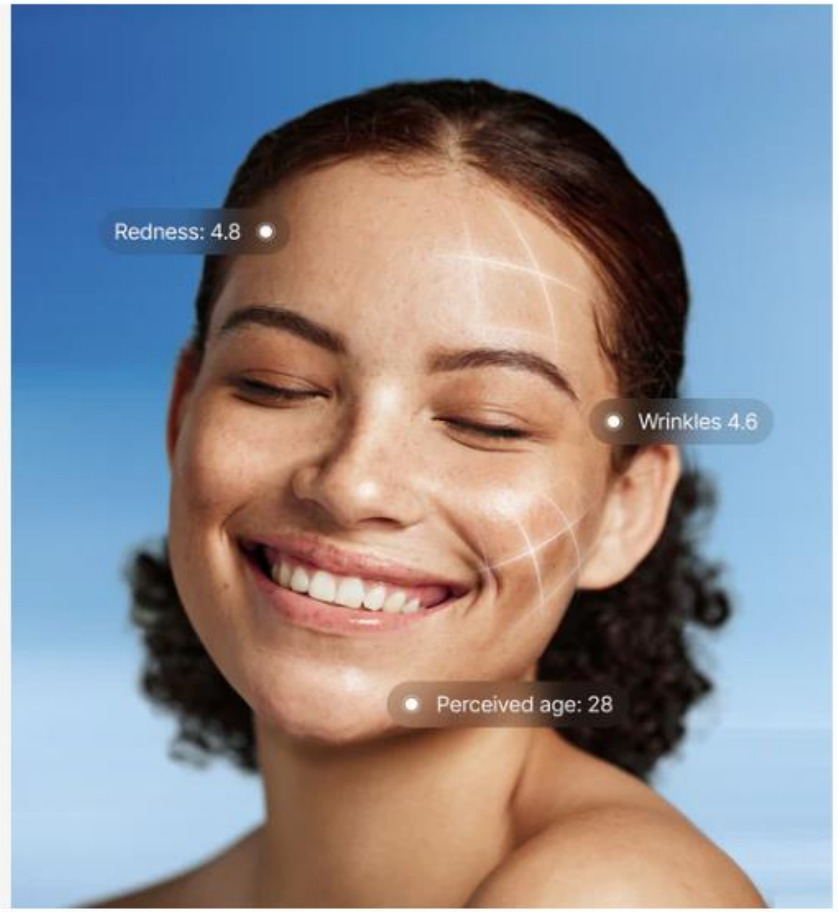


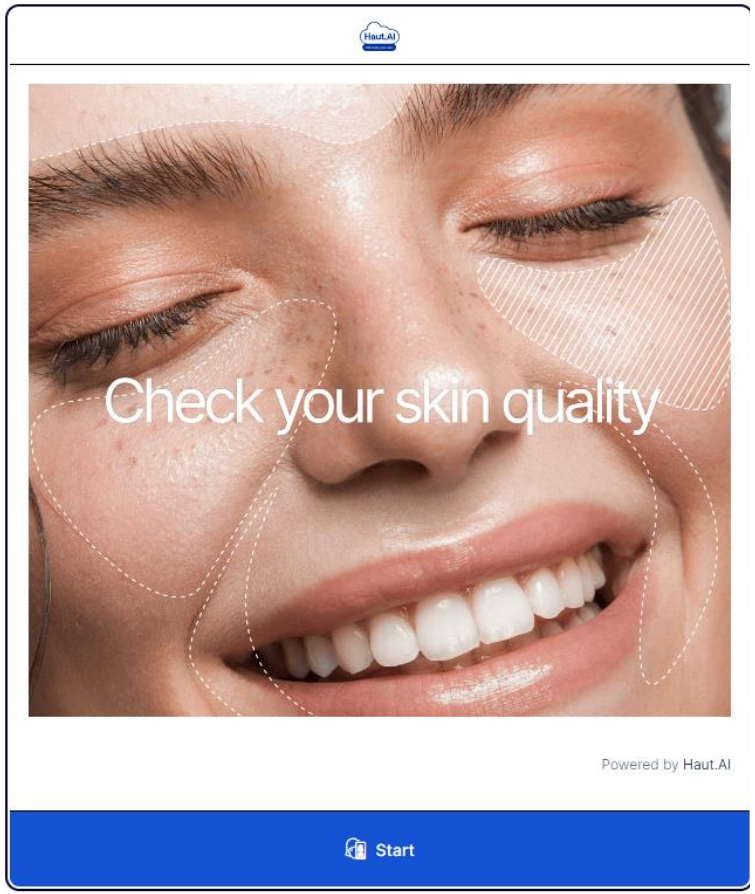


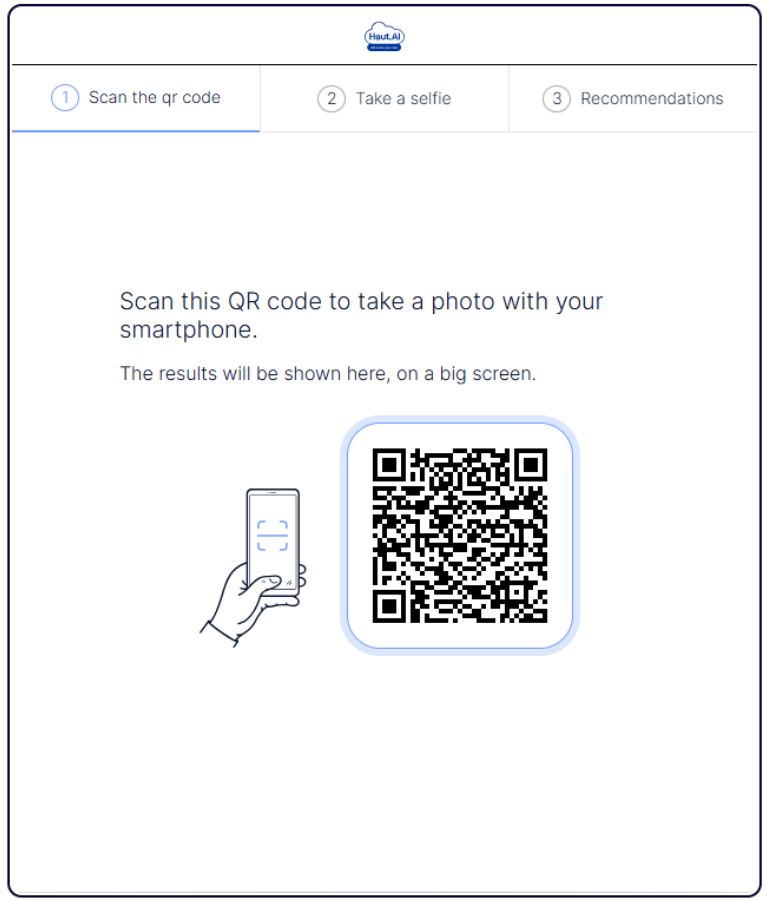
# AI Skin Analysis by Haut.AI

**Haut.AI** is an AI company that develops science-backed technologies for the beauty & skincare industry. Our AI solutions help brands provide engaging, and hyper-personalised digital shopping experiences that drive growth and customer satisfaction.

Below, you'll find a demonstration of how our AI skin analysis and personalised product recommendation technology works.

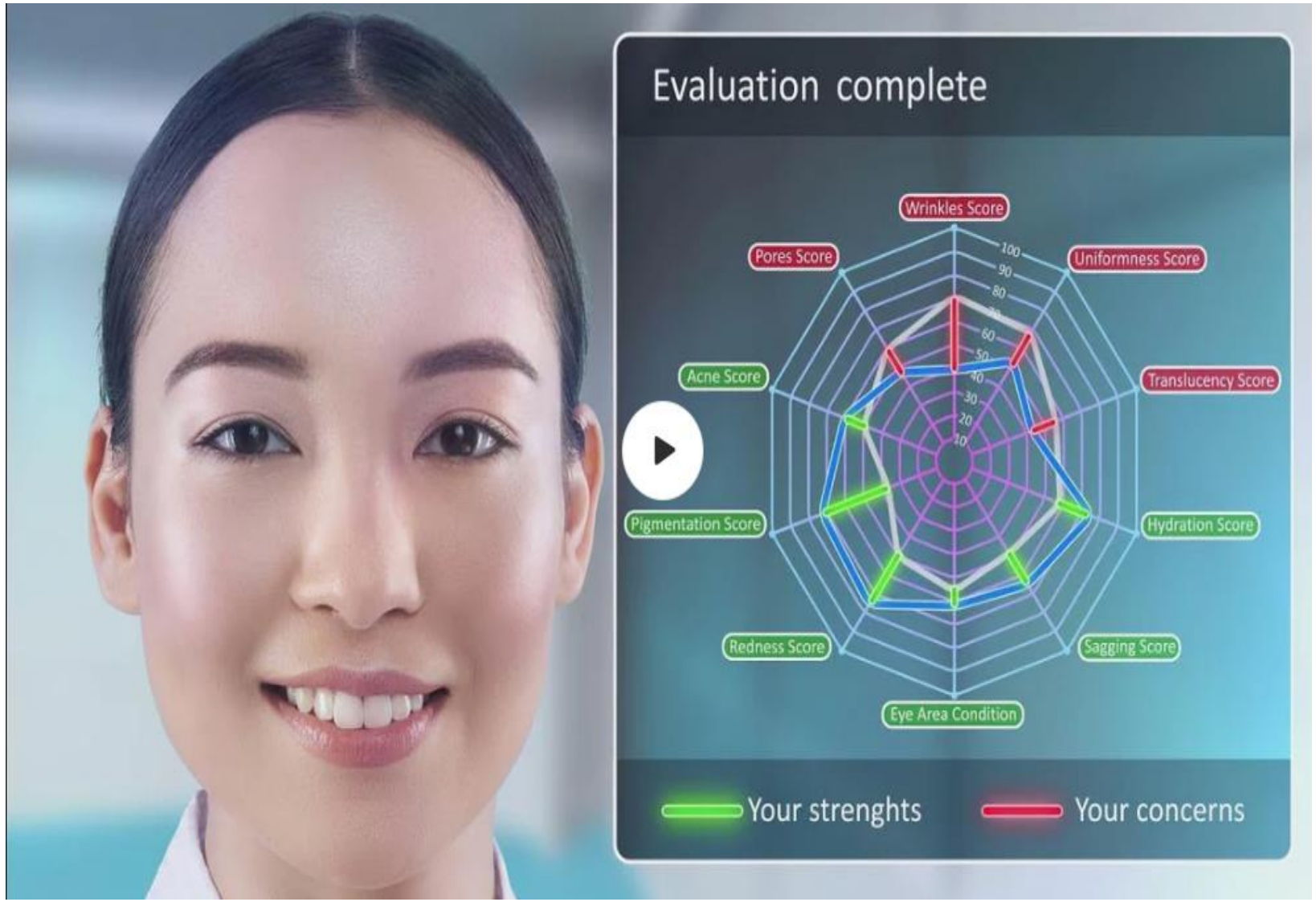




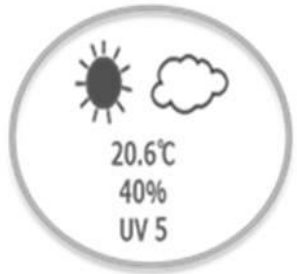

# Leading Skincare Hyperpersonalisation SaaS

Haut.AI's skin analysis platform is powered by advanced algorithms trained on over 3 million facial images, which can evaluate more than 150 unique facial biomarkers and analyse over 15 essential skin health metrics. Developed by a team of skin experts, our AI technology is engineered with a strong emphasis on diversity, ensuring its effectiveness across a wide spectrum of skin types and tones.



Skin measurement by dedicated smartphone app

Mood/condition




Environment of the day, menstrual cycle, etc

Cloud server
<algorithm>

Special machine

Set cartridges filled with skincare products

Data analysis to determine the type and amount to be extracted

EN Find a Store Customer Service

LANCÔME
PARIS

Email sign up My Account Elite Rewards My cart (0)

NEW & TRENDING SKINCARE MAKEUP FRAGRANCE GIFTS & SETS SALE LEARN & EXPLORE VIRTUAL SERVICES OUR COMMITMENTS SEARCH

# YOUR PERSONALIZED SKINCARE IN ONE SELFIE

Upload a selfie to get a personalized skincare diagnosis and product recommendations. Our first virtual Skincare diagnostic tool is powered by artificial intelligence, built on a database of 10,000 clinically graded images, and backed by 85 years of skincare expertise.

Scan the QR code with your smartphone to get started!



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# Production automation (with innovative instrumentation)

Adding modern automation and instrumentation solutions to cosmetics production (continuous or batch processes) is a trend on the rise for these many benefits:

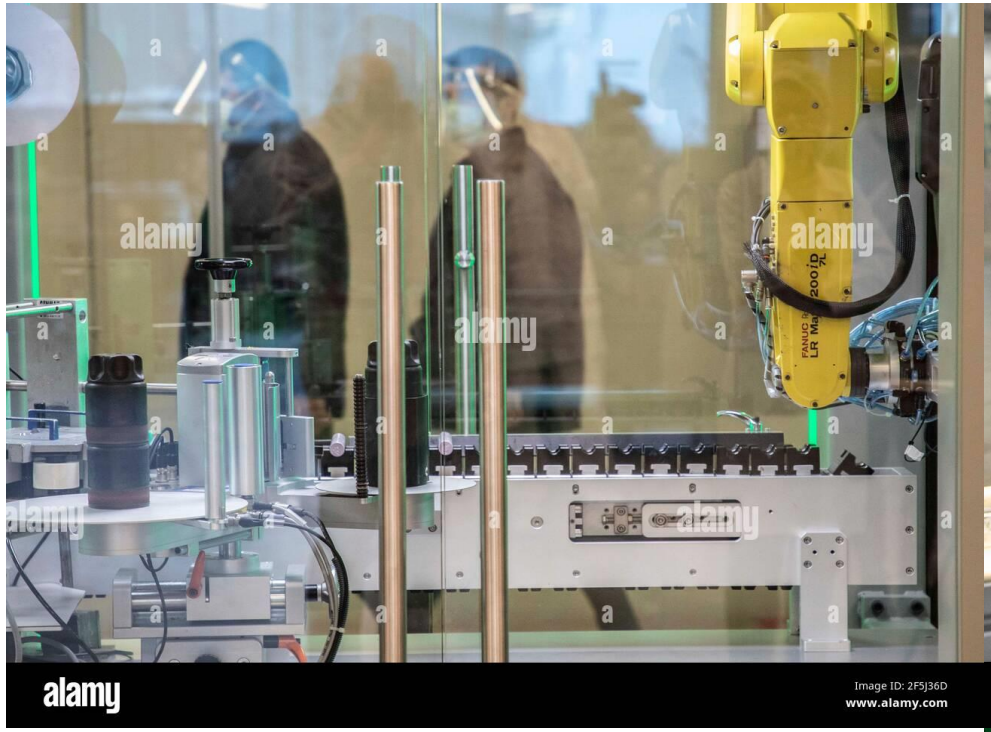
- Exceed 98% accuracy in filling, dosing, and mixing operations.
- Enhance inline measurement with optimal control of critical parameters, such as viscosity, pH, and density.
- Improve on-site calibration and process availability while attaining full compliance.
- Match raw material, energy, and utility consumption to actual process and production demands.
- Optimize inventory and supply chain management with real-time monitoring, tracking, and alerts for agile decision-making.

Robots have become a welcome commodity in production automation.

Istanbul-based Erkul Cosmetics switched to FANUC robots to increase output in their eyeliner manufacturing lines. Now, in the blink of an eye (pun intended), they make 90 eyeliners per minute—a whopping 30% increase—and former quality issues remain in the past.

Italian manufacturer Cosmint added Comau NJ-40 articulated robots to pick, clean, rotate, and deliver custom-printed plastic bottles at the superhero rate of 150 pieces per minute.

Powder filling, lipstick assembly, and blister packaging machines are also gaining popularity in cosmetics manufacturing.





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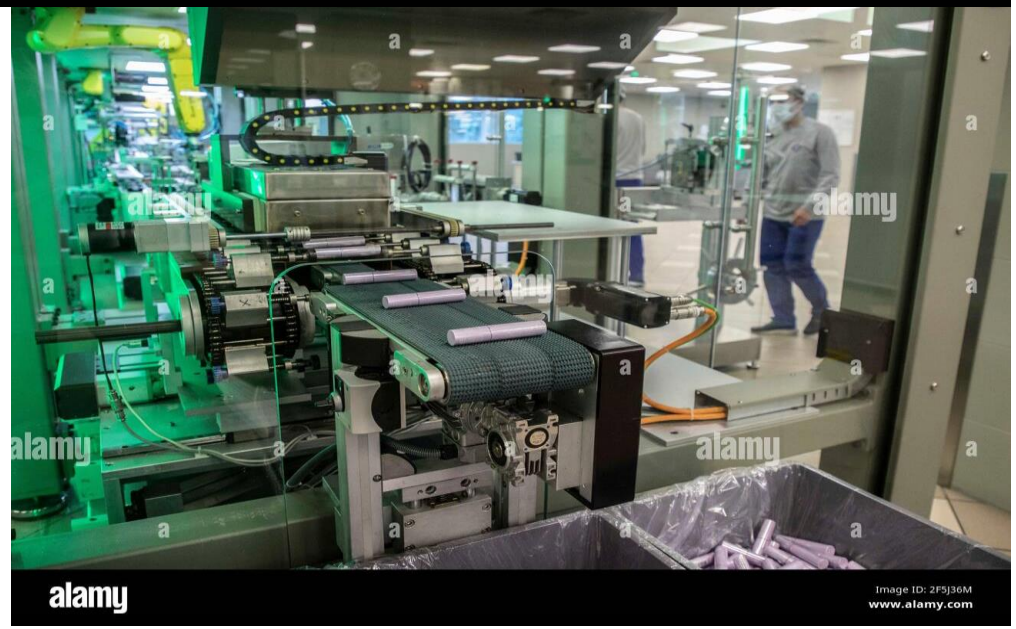


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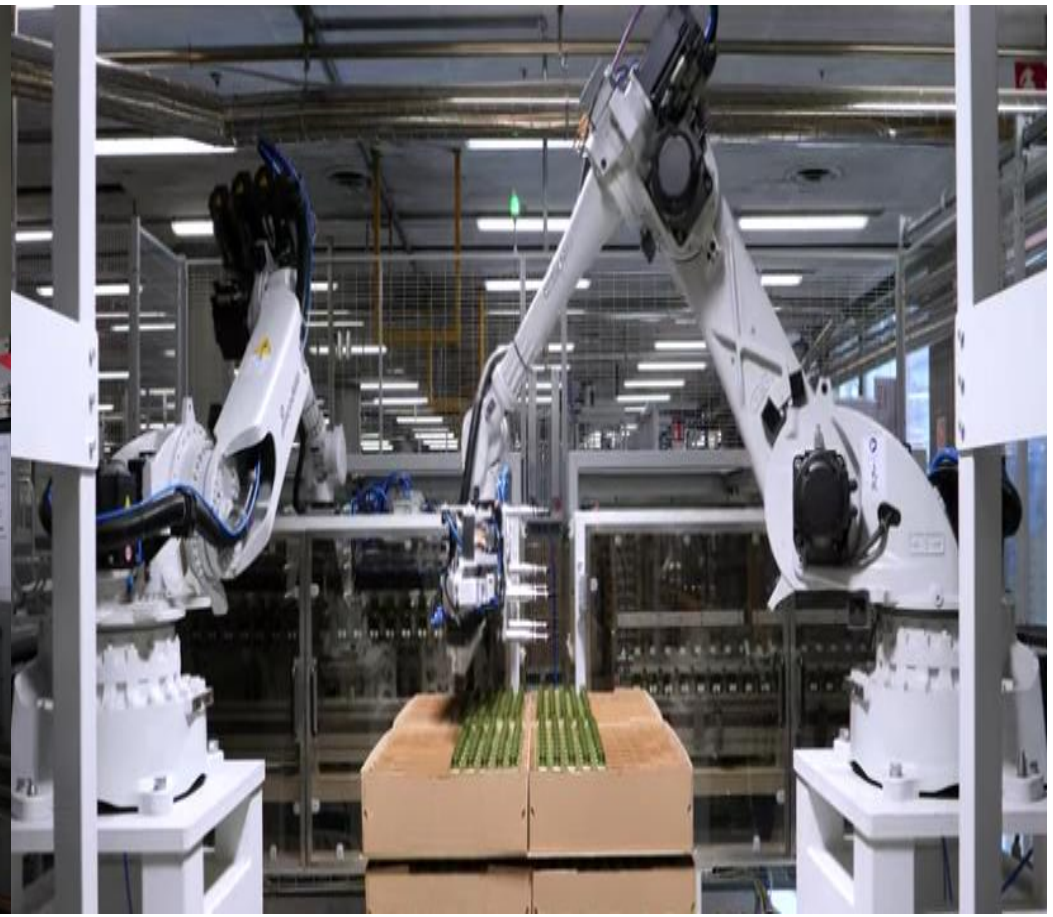
# The Story – Third Parties Collaboration

- **Comau** has collaborated with **Siscodata** to develop an innovative robotic cell designed to clean and handle high-end, pre-printed cosmetic bottles without leaving any scratches .

- In an effort to increase production capacity at **Cosmint** – a premium cosmetics manufacturer working with some of the world's largest brands in the industry – Siscodata has deployed two Comau NJ-40 robots in a high-speed depalletizing solution that picks, rotates and cleans custom-printed plastic bottles at an accelerated rate of 150 pieces per minute . The new cell replaces three standard machines previously installed at Cosmint's facilities.

- Challenged to design a complex solution in just four and a half months from start to finish, Siscodata, with whom both Comau and Cosmint have a long-standing relationship, successfully delivered the jointly designed system despite the tight timeline. The fully integrated system protects the aesthetic quality and purity of the final product, achieves the desired production rate of 0.45 seconds per vial , and ensures mechanical, electronic and electrical efficiency. It also allows Cosmint to guarantee delivery to the end customer of a contamination-free product that fully complies with their rigorous standards.

- The automated depalletizing solution features two Comau NJ-40 6-axis articulated robots that deliver the speed, precision and repeatability the application requires. Using specialized grippers and a high-resolution 2D camera, each robot picks up a series of vials from fragile corrugated cardboard shipping containers. Working in tandem at very high speeds, the robots rotate the vials before moving them to a cleaning station to remove more than 99% of residual particles or contaminants left over from the manufacturing, shipping and depalletizing processes. This part of the solution is quite complex and requires synchronized "on the fly" movements by the medium-duty robots to handle a production rate of more than 9,000 vials per hour.

*"Collaborative robots have helped eliminate the ergonomic risk completely. They are user-friendly, maintenance-free and extremely efficient. We are really happy to have Universal Robots' cobots on our line."*

- RANJIT EKDE, Head of Manufacturing Supply Chain, L'Oréal India Private Limited

## Automation challenges solved:

- ✓ Complete eradication of high ergonomic risk to humans
- ✓ Increase in Overall Equipment Effectiveness (OEE) by 5%
- ✓ Cobot(s) Deployed: 2 UR10s

## Key value drivers:

- ✓ No AMC (Annual Maintenance Cost)
- ✓ Easy to use and program accurately
- ✓ Reduction of downtime
- ✓ Flexible redeployment on shop floor to any line
- ✓ Saves employees from potentially injurious tasks

## Tasks solved by collaborative robots:

- ✓ Palletizing

# In short

L'Oréal – one of the world's largest cosmetics companies – was facing issues at its Indian plant in Pune, as end-of-the-line operations were being carried out manually, posing a severe ergonomic risk to workers. The deployment of collaborative robots for automatic palletization proved to be efficient, while completely eradicating ergonomic risk, allowing for flexibility in deployment on the shop floor for various applications. The cobots are also worker-friendly and maintenance free, and led to the plant witnessing a 5% Overall Equipment Effectiveness (OEE) improvement due to the time saved in pallet replacement.

## The business transformation

After an internal ergonomic risk analysis, the L'Oréal India Private Limited plant in Pune realized that their workers were at risk handling manual tasks in the end-of-the-line operation i.e. putting the boxes on the pallet. Each operator lifted 8,500 kilograms of product per 8-hour shift, presenting what L'Oréal classified as a Level 4 ergonomic risk – one of the highest levels of danger to the human body and posture, with Level 5 being the severest.

## L'Oréal India

**Industry**
Medical and Cosmetics

**Country**
Asia

**Number of Employees**
100-500

**Cobots used**
UR10

## Adapting to the market

L'Oréal's rapid success can be explained by its ability to be flexible and agile in catering to the needs of the market.

## Cosmetic industry giant

L'Oréal is one of the world's largest cosmetic companies, and has been present in India since 1992. The organization produces a range of several products and is in the top suppliers of perfumes and fragrances, haircare products, and cosmetics.

## Robots for fully automated QC labs

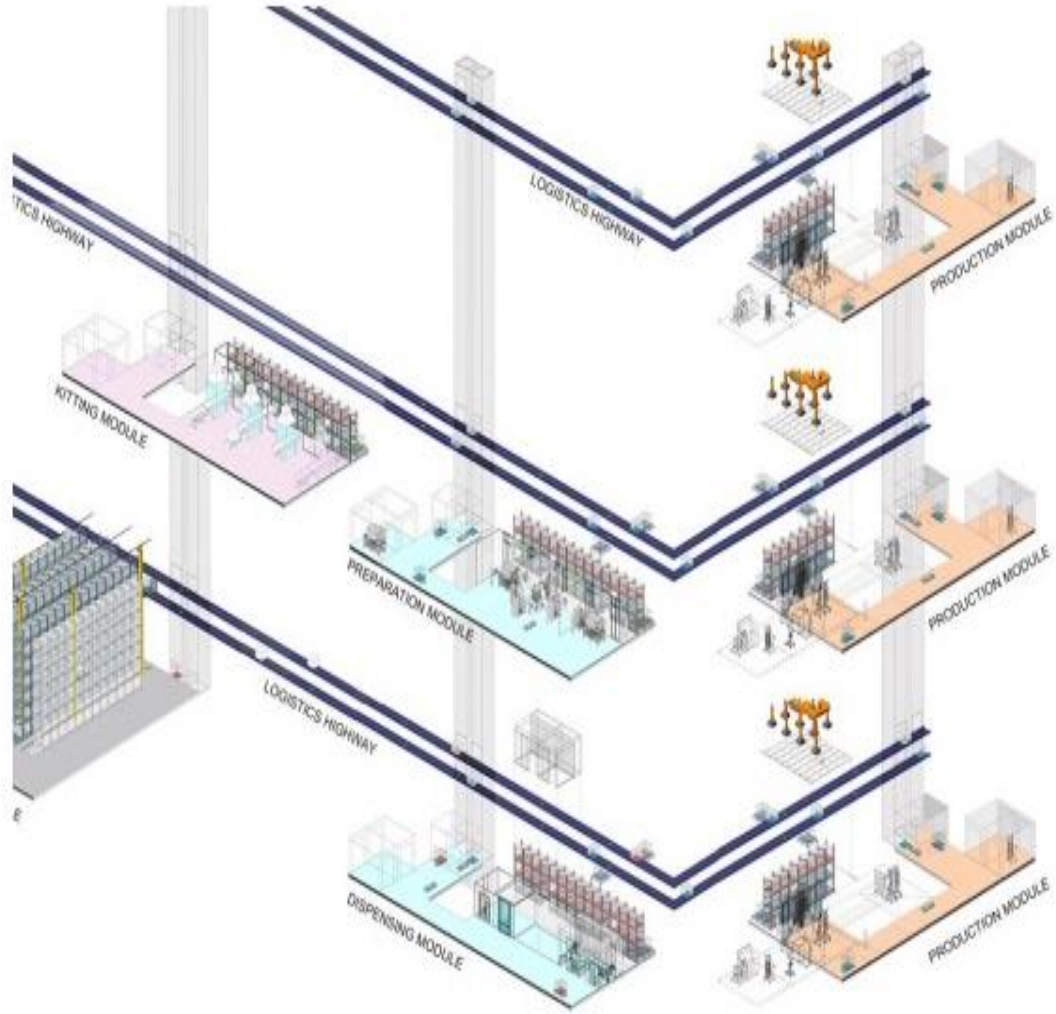
Lab automation has many considerations. These include movement, equipment, operation, storage and containment. Development of the lab's digital footprint and standardisation are key to achieving high quality lab designs.

**'Project Arthur'** seeks to fully automate quality control labs with both mobile and static robots.

# Material transport and logistics

Material transfer and logistics are two of the biggest challenges in facility design. Our solutions include smart facility architecture incorporating robotics and automation. These include using conveyor technology to enable the automation of single use bag processing in a production environment.

'**Project Karn**' is a collaboration between PM Group and Technical University Dublin (TU Dublin). It involves a robot's independent transfer through material air locks. The aim is to develop a self-sanitising material air lock.



AM, AI, and production automation are new manufacturing technologies that offer cosmetics the chance to attain:

- Higher output.
- Faster time to market.
- Less waste generation.
- Improved quality control and compliance.
- Tightened grip on what goes on in your process and supply chain.
- Thrilling ways to engage with customers and create buzz about products.
- Grip on the competition.


## What is Web 3.0?

Web 3.0 is a relatively new phenomenon, subject to interpretation. Web 3.0 is defined as the next generation of decentralized Internet based on blockchain technology. It includes concepts such as NFTs, Blockchain and Metaverse. While Web 2.0 relies on the centralization of user data by major corporations such as Amazon, Meta or Alphabet, Web 3.0 disintermediates these tech giants to give back control of data and privacy to users. In addition to providing security and privacy, Web 3.0 breathes new life into the customer experience. Thanks to this new digital touchpoint, the brand can cultivate stronger relationships with customers and reach a new audience.

This is an opportunity for cosmetic brands to make customer experience a key differentiator.

# Key opportunities with Web 3.0

There is currently a growing interest in the cosmetics industry in exploring the potential of Web 3 technologies. Through large investments, industry giants are demonstrating a clear objective: to be pioneers in beauty tech.

Web 3.0 offers many opportunities for these players and can match consumer expectations in terms of corporate responsibility and immersive experience:

- **Transparency**

Web 3 technologies can help create a transparent and seamless supply chain. Implementing technologies such as NFT, blockchain or RFID tags can help the supply chain to minimize adulteration incidents, while allowing all stakeholders to trace the sourcing and ingredients used.

Aveda, the Estée Lauder hair care brand, uses blockchain to trace vanilla sourced from Madagascar, verifying the vanilla supply chain's compliance with the highest ethical and environmental standards.

- **Collaboration**

As an essential component of Web 3, DAOs enable collaboration between members of a community, without a central direction. Based on a blockchain, decisions are taken by the community via electronic voting and a set of defined rules.

In early 2023, NYX launched GORJS, the first DAO dedicated to the beauty world, inviting a community of Web 3 designers, 3D artists and beauty product manufacturers to collaborate to shape the future of digital beauty.

- **Authenticity**

Blockchain-based digital identity can be used to verify the authenticity of cosmetics and prevent counterfeit items. A goldmine for luxury brands, recent surveys show that nearly 80% of buyers are willing to pay up to 5% more for a luxury product that is certified as authentic. *

Designed by LVMH, Prada Group and Cartier, the Aura Blockchain Consortium provides direct access to the history of the product purchased and proof of its authenticity at every step of the value chain.

- **Adaptability**

In a post-pandemic world, it is now essential for cosmetics players to review their organization and adapt to a new hybrid world.

For global companies such as L'Oréal or LVMH, Web 3.0 can be a real competitive advantage in the efficiency of their internal organization: onboarding employees on-site and at home on several continents will no longer be an issue.

# Challenges when adopting Web 3.0

As mentioned, Web 3.0 is generating many opportunities for the cosmetics industry but there are challenges associated with the adoption of this technology. A degree of digital and organizational maturity of the company, as well as comprehensive financial and technical capacities, are necessary to effectively implement Web 3.0 in its organization.

Beyond these prerequisites, Web 3.0 also raises questions in its implementation. Even if the notion of Web 3.0 is not fully defined and subject to many interpretations, Web 3.0 can raise a variety of challenges:

- **Adoption**: Web 3.0 technologies are still in the early stages of development and may take some time to be widely adopted in the cosmetics industry. Beyond the cosmetics industry, some consumers are not yet ready for Web 3.0: 66% of respondents are not familiar with the concept of metaverses*
- **Complexity**: Blockchain is complex, and it can be difficult for cosmetics manufacturers to understand and implement with existing systems and technologies.
- **Security**: As with any new technology, there are security risks associated with Web 3, and steps must be taken to protect consumers' privacy and sensitive data.
- **Regulation**: There is currently no clear regulation around Web 3.0 technologies, and it is unclear how they will be regulated in the cosmetics industry. Legislation needs to be put in place quickly to protect all stakeholders.

# How are cosmetics players integrating Web 3.0 into their strategy?

Investments in Web 3.0 have increased in recent years as these new technologies provide a tremendous opportunity for cosmetic companies to showcase and promote their products and engage an increasingly large and diverse community.

Nevertheless, to invest in Web 3.0, it is essential that companies ask the right questions upstream to assess the profitability and relevance of implementing Web 3.0 into their ecosystem.

## Define the strategy and use case

### Which objective do I want to achieve?

Web 3.0 can be used for many strategic challenges. It is therefore key to identify the priority activities that will benefit most from this new technology.

In terms of marketing challenges, Web 3.0 offers added benefits such as targeting Gen Z, enriching the customer experience (CX) with a new touchpoint, modernizing the brand image or consolidating a solid customer relationship.

The key is to make sure that the implementation of Web 3.0 is in line with the strategy you want to implement for your product and its positioning.

### What about ROI?

Like any investment, it is essential to question the ROI of this action. Some brands like Clarins rely on Web 3.0 to promote the release of their new luxury skincare product line, Clarins Precious. Direct financial returns are therefore expected for this type of implementation. Understanding what sort of ROI you are expecting is therefore essential.

### Which use case?

Once you know *why* you are doing it, the question of "how" ensues. Web 3.0 integrates many uses and possibilities for companies. NFT, Virtual Try-on platforms or Metaverse present different opportunities. It is therefore necessary to choose the most relevant application with the initial goal of the project. This solution must also fit into the organization's current ecosystem in terms of organizational, technical, and technological feasibility.

# Blockchain and Personalization

One of the more exciting and yet most opaque elements of Industry 4.0 technology is blockchain. Known as the tech which underpins the cryptocurrency phenomenon, blockchain enables peer-to-peer exchanges of data without a centralized authority (such as a bank).

The transparent and secure nature of blockchain technology is now making it an attractive prospect for industries the world over.

"Connected products are a pillar of our digital transformation," said Lannuzel. "It goes through RFID or NFC technology. And now even using blockchain. These technologies are there to make the link between the physical world, which is the product, and the digital world, which is the data and your smartphone. Regarding blockchain, we are testing two use cases around transparency (concerning) the products, from raw materials to the consumers, and all the logistics information. When you ship products from one country to another, you need to provide a lot of certificates, and putting them in the blockchain is very promising."

Personalized products are also made possible thanks to the more rapid and flexible manufacturing capabilities of Industry 4.0.

**Le Teint Particulier**, under the brand Lancome, is a product which allows customers to have their skin tone measured at the point of sale. Then, a bespoke concealer is manufactured for them right there in the store. The product can be made with a staggering variety of 8,000 shades, 3 coverage levels, and 3 hydration levels in any combination, and the packaging even comes with information including the customer's name and a reference ID for quick and easy reordering.

"This has been enabled by smart manufacturing and all the new technologies because it uses AI to develop an algorithm that goes from one skin color measurement to a formula that must choose between 22,000 combinations," said Lannuzel. "It's also a challenge in terms of operations because you need to be able to produce a cosmetic product in a point of sale where the environment is not quite the same as a factory. That's what I call extreme agility where you do one product which is personalized to one consumer. That's part of smart manufacturing."

## Final Thoughts

Industry 4.0 is here and changing the manufacturing game for everyone. With huge names such as L'Oreal producing so many exciting innovations, it looks like the future of manufacturing will be bright.

GROUPE CLARINS

Worldwide presence

ARTICLE - 07.03.23

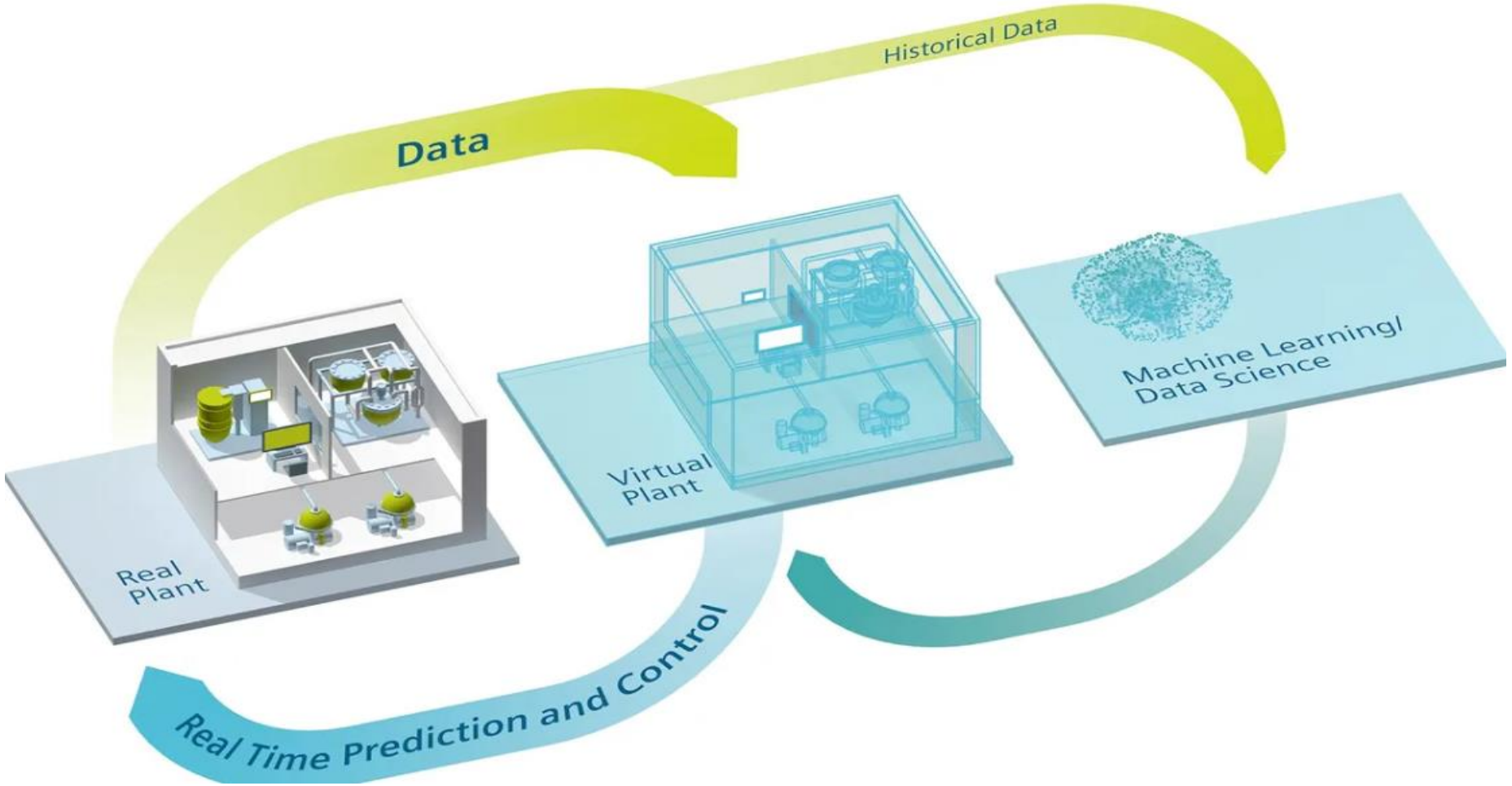
# Beauty and the blockchain: Clarins enters the Web3

Clarins, the number one prestige skin care brand in Europe*, announces the release of its first collection of 325 NFTs and immersive AR experiences, co-created with two influential digital artists.

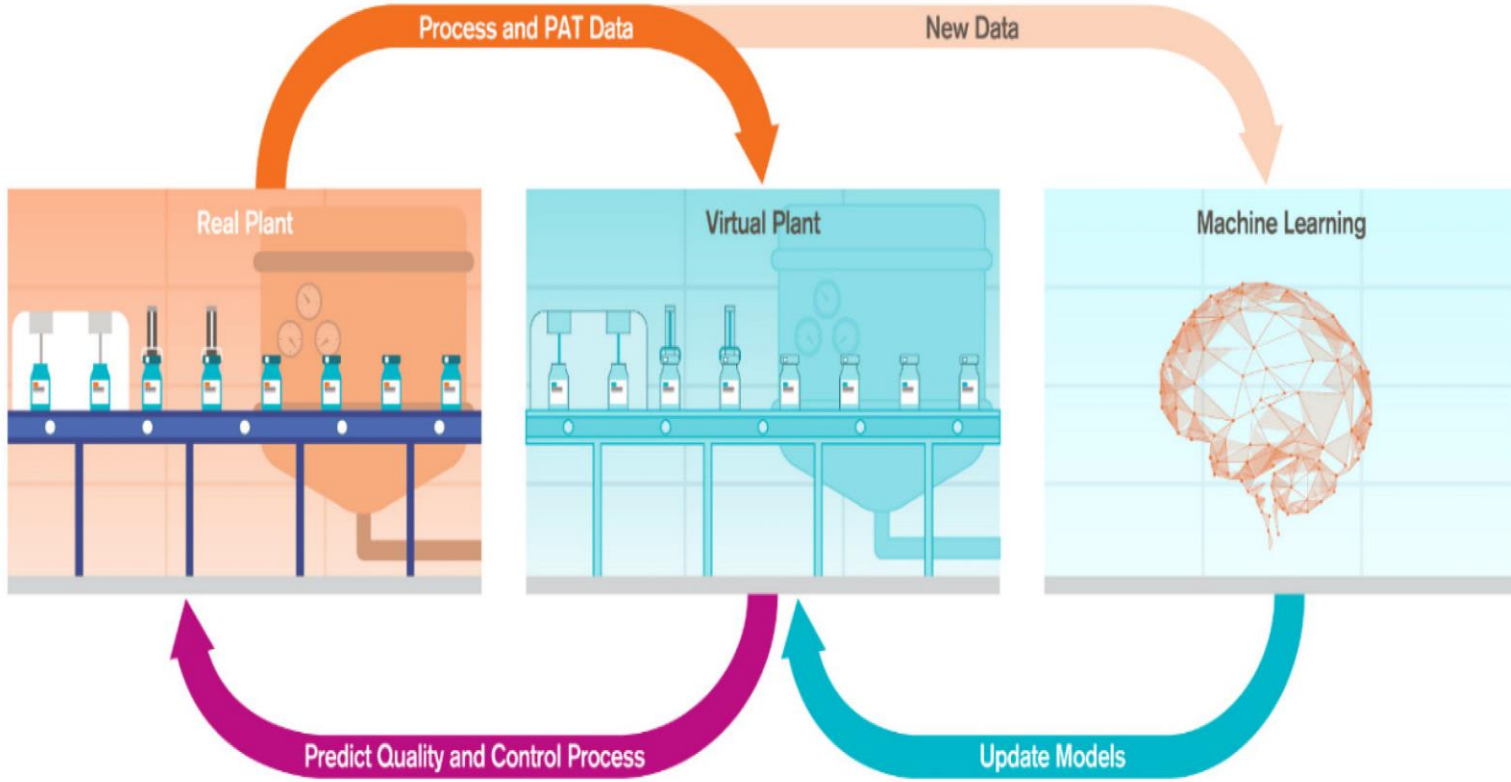
The main inspiration is the newly launched Clarins Precious, Clarins' first luxury skin care line, and it is the first time a beauty brand has collaborated with two female digital artists working at the frontier of Web3. The NFT collection follows the creation of Clarins T.R.U.S.T. in 2022, a blockchain-based traceability platform designed to give clients an all-access view of the journey each Clarins product makes. Clarins' unique approach to blockchain shows how this new technology can be used to instill brand purpose into real-life and real-time situations in a practical and meaningful way.

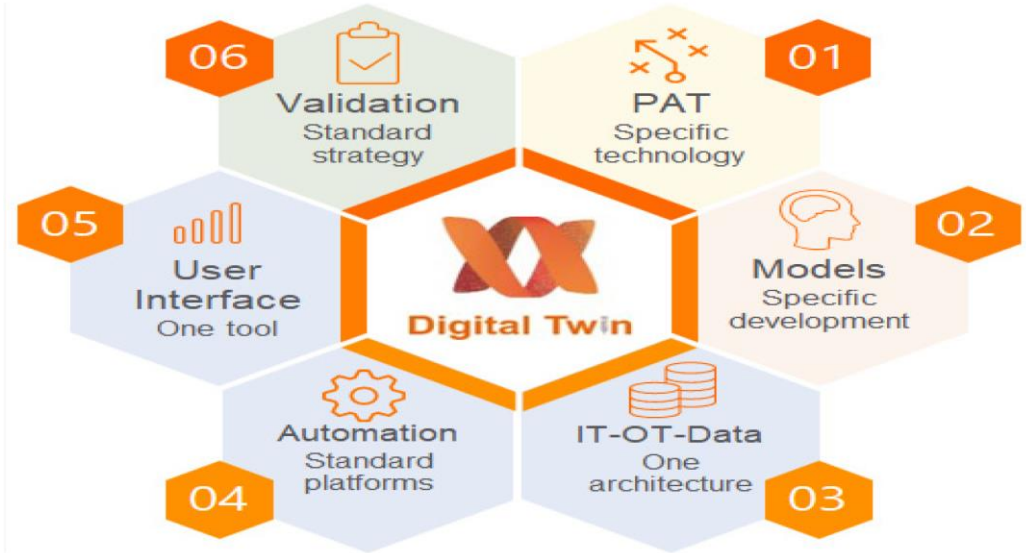
With its compelling story and natural exclusivity, Clarins Precious was predestined to become the brand's gateway into the metaverse. Presenting a new vision of luxury that is rare, powerful and committed to responsible beauty**, Clarins Precious was developed to preserve and stimulate the skin's own youthful resources using Clarins' rare and exclusive moonlight flower cryo-extract.

# Digital Twins In Cosmetic Industry



# Digital Twins In Cosmetic Industry




## Zozio and Actility join forces to revolutionize the cosmetics industry with tank tracking

*Press Release – March 2022 – Paris, France*

In a context where the cosmetics market is booming across the world, with an increasing need for more efficient management of resources, Zozio, a recognized player in Industry 4.0, and Abeeway, the market leader in traceability devices, Actility's subsidiary, are joining forces to offer a **unique tracking and tracing solution**, aiming at **optimizing the flow of assets and reducing costs.**

The Partners realized a first successful project in the cosmetics industry, but the solution is **agile and adjustable to all industries** in need of **tracking of various industrial assets**. Abeeway's expertise in low-power geolocation systems, coupled with Zozio's flow management service, made the project a real success!

# Creating digital twins to optimize assets flow and inventory

In order to overcome a **lack of visibility in the factory**, Zozio offers a solution – a digital twin of industrial logistics – that supports the operator in his daily work. To be precise, it's an industrial equipment control platform. Coupled with an IoT geolocation system and **business software (WMS/ERP), the platform provides access to important information** for the operator**. It allows us to visualize, understand, analyze and optimize production processes**.

Now with Abeeway & Actility, Zozio made a successful deployment with one of the biggest French luxury brands. The brand, which name will be revealed at later stages of the project, is using the integrated Zozio-Abeeway solution **to track high-end perfume tanks on production sites.**

A similar use case has been already implemented by its client L'Oréal, a world leader in beauty. And thanks to the solution of Zozio, employees have **immediate access to data on the status, location and history of tank movements from the ergonomic platform.**

**The benefits for customers are numerous:** they recover field data in real time, control and optimize their logistic flows, follow the state and the certification of their tanks and detect the immobilization of these at their subcontractors.  Therefore, there are increased performance, **reduction in raw material losses and in number of tanks, more eco-responsible production.**

# The global solution for flow optimization

L'Oréal's Cosmétique Active Production industrial sites have called on Zozio, the Paris-based start-up, with the objective of **optimizing flows** within and in transit between its Vichy and La Roche-Posay plants. In its quest for **operational excellence** and in response to environmental challenges, L'Oréal chose Zozio to improve the logistics of its fixed and mobile tanks.

In order to meet the needs of Cosmétique Active Production, Zozio has implemented its solution to collect, visualize and analyze field data connected to the plant software data.

With all key information on a single **ergonomic platform**, the customer benefits from

- A **reduction** in raw material losses
- End-to-end traceability with the management of mobile and fixed tanks
- An **eco-responsible production** thanks to the reduction of the number of tanks and a better management of the resources
- An **increase** in **performance**

# How does the solution work?

Zozio's team installs an IoT system, based on Ultra Wideband geolocation technology, in a few hours to retrieve information about the actual flow of industrial equipment.

The system then retrieves information from plant management software (ERP, WMS, etc.) to enrich its platform with information needed by the end user.

Thus, the platform gives employees a **global vision** of the **production**. With this clear vision, Zozio allows to **optimize stocks and flows in real time**.

Beauty 4.0