Capgemini

The cognitive retailer

How 3 retailers leveraged data and AI across merchandise planning, forecasting and distribution

Retailers find themselves in a time of extraordinary disruption and opportunity. By definition, that means that historical data—the buying and behavior patterns on which demand forecasts, assortment and allocation plans are typically built—are of little help in merchandise planning, forecasting and distribution. Perhaps as importantly, data gathered throughout this past year will reflect the industry's highly unusual circumstances, which will impact the accuracy of future plans.

To operate in today's environment and ensure their place in the future, retailers need to not just adapt, but also act—by which we mean shift from a reactive mindset to one that is proactive, predictive and, ultimately, prescriptive. In this paper, we explore how retailers can take control of their future by advancing their digital capabilities, including the use of data, analytics, AI, automation and cognitive computing, in order to better anticipate and respond to trends, shape and influence events, identify exceptions and outliers and leverage timely insights to drive standard decision making.

Creating the cognitive retailer

Retailers face two basic demands:

1. Ensuring they have the items that consumers want in stock at the right level; and
2. Ensuring those items can quickly reach consumers through a variety of highly-localized distribution channels.

This is a complex task at any time, but especially so in the face of disruptions as retailers temporarily close stores, operate with limited hours or reduce services due to health and safety concerns related to global or local events.

"It's no longer just a matter of having the right products on our shelves, it's about delivering an experience to a specific consumer," says **Lindsey Mazza**, **Global Consumer Products and Retail Domains Lead, Capgemini.** "In omnichannel operations, data needs to guide every decision the business makes, from what to stock, to where to hold inventory, to how to fulfill orders. Even functions that are not consumer-facing, like warehousing, must be reexamined in light of this increased need to reach consumers when and where they are. A fully integrated omni-channel operation will improve consumer experience while keeping supply chain costs low."

In this landscape, retailers must leverage data-driven intelligent automation applications, such as artificial intelligence (AI) and machine learning (ML), to modernize their existing planning, merchandising and logistics capabilities.

Initially, these tools help streamline processes and analyze a bigger data set more quickly, thus giving the organization both time to respond to a situation and the ability to do so more effectively. At the most advanced level, the systems can be self-correcting, self-improving and self-optimizing—meaning that the business can automate responses to pre-determined scenarios. Responses can also be a lot quicker as machines can process significantly more data than a person. Finally, the number of scenarios that can be accounted for is considerably higher, resulting in more accurate decisions.

For example, in demand planning, AI and ML can be used to review historical patterns, select best-fit statistical models and draw on a variety of inputs and forward-looking variables, such as promotional grids, sell out data and environmental factors, to create more accurate demand forecasts with less manual effort. As organizations continue to build maturity, they will also be able to support a planning system that is autonomous and touchless—meaning that it can identify disruptions, shortages, transportation delays and any other number of issues and then automatically re-plan to account for that event.

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Lindsey Mazza

Global Consumer Products and Retail Domains Lead, Capgemini

Traditional Planning Inputs		AI-Enabled Forecasting	
Performance Data	**Characteristics**	**Customer and Consumer Data**	**Characteristics**
• Historical sales data (in-store and digital channels) • Existing purchase orders	• Sequential baseline followed by promotional overlays • Significant manual effort • Forecast accuracy often destroyed through inconsistent human intervention and errors • Longer lead times for forecasting	• Historical sales and existing purchase orders • Customer "sell out" data • Biographical and demographic data • Behavioral data (In-store and online) • Environmental sensing (e.g. social media activity, events, weather)	• Multivariate models capable of single step demand forecast creation • Pattern recognition • Consistency and learning • Algorithm-driven • Low human input • Shorter lead times for forecasting

Benchmarking your organization's digital maturity

Most retailers use what's considered descriptive or diagnostic pre- and in-season planning today; planners are aware of what is happening in the moment and why it happened. Depending on how long the insight is relevant, planners are able to respond to trends or events that are relatively long-lasting. While many retailers are exploring the addition of predictive or prescriptive capabilities, they are doing so on a smaller scale, using data sets within select areas of the business but not yet across the entire enterprise.

However, as we've seen with COVID-19, even in events that span weeks or months, the ability to react can be hampered by any number of issues: stock outs, supply chain disruptions, delivery personnel shortages and staff availability to name a few.

> *"This environment has highlighted the level of responsiveness that organizations need, and the extent to which that responsiveness must be applied throughout every area of the business."*

Joyce Chew
Smart Retail Planner Delivery Consultant, Capgemini.

While many retailers managed to adjust operations in response to COVID-19—be it in the form of new sales channels, delivery methods or management of inventory—the changes may not be sustainable.

"In the quest to serve quickly, organizations may create a solution that prioritizes speed over long-term success," notes **Chew.** "In order to create that foundational responsiveness, retailers need to design with intent, thinking through how each function—from planning, to assortment, to logistics, to delivery—is connected and unified. The goal is for the business to shift in tandem, not manage disruptions in isolation."

In order to advance on the digital maturity curve, retail organizations must first understand where they are—and determine what foundational capabilities must be enhanced in order to move forward. While every organization's needs are unique, we have developed the following benchmark tool that uses four main criteria to help organizations assess their existing capabilities.

Assessing your organization's digital maturity

Function	Capability	Examples
1. Planning	Does your organization automate routine and repetitive aspects of the planning process?	• Does your organization regularly spend significant time allocating the balance of your inventory at the end of a selling season? • Do you think that your processes are scalable and sustainable? • What percentage of your planning process is completed through manual processes?
2. Supply chain	Is your supply chain responsive to the wants and needs of customers today, meeting their expectations for speed and convenience?	• Can you adjust your assortment to meet the needs of the current environment quickly? • Can your organization focus on core assortment to keep up with demand (e.g. identify basic t-shirt colors or a specific scent in dishwashing liquid vs. having a full range of colors or scents)?
3. Inventory	Do you have a single view of your inventory and a unified supply chain?	• Are you able to fulfill your customer orders from the closest location possible, whether that be a warehouse or a store?
4. Customer Experience	Can you "surprise and delight" customers not by fulfilling a need but anticipating one?	• Can your digital channels propose items to cross-sell or up-sell based on identified patterns for similar customers? • In applicable markets, does your curbside pickup offer contain a geo-location feature in the customer app that signals the fulfillment team to prepare an order when the customer is en route?

Insight in action

Have you had a "brown underwear moment"?

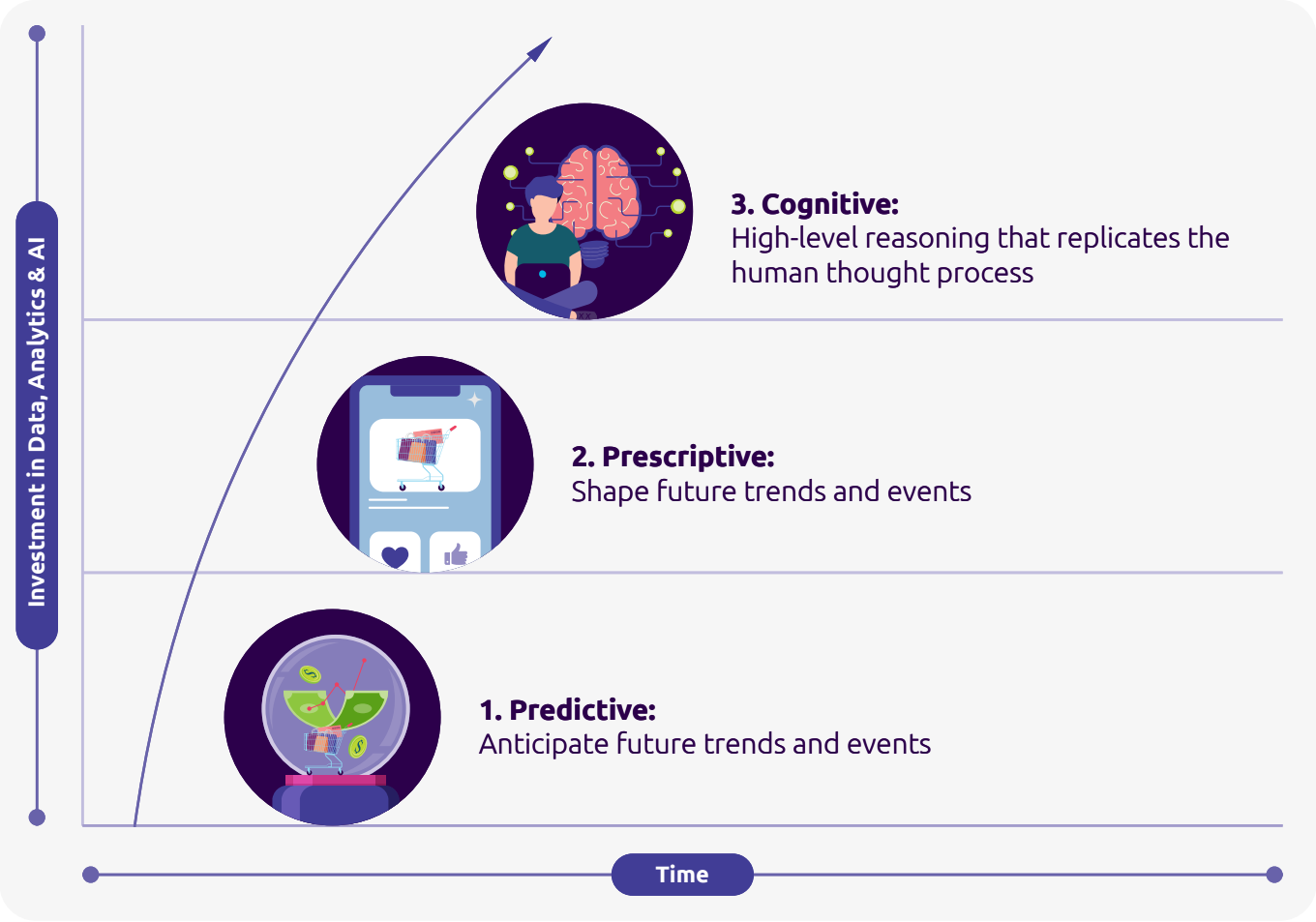
A Capgemini retail supply chain consultant was surprised that sales of a brown cotton lingerie set skyrocketed. However, data analysis revealed that nearly all (95%) of the demand was coming from one country: Russia. The takeaway? Russians love brown underwear! The brand can certainly apply this insight to future demand forecasts… but what if the retailer were able to identify a similar sales pattern sooner and make adjustments in real-time, perhaps even routing stock from under-performing regions to key Russian markets?

Insight in action

When merchandising store locations take regional preferences into account

In the UK, washing machines and tumble dryers are sold as part of the kitchen range. Elsewhere in Europe, these appliances are typically used in the bathroom. This raises obvious implications for retailers about store layout, staging and advertisements, as well as possible allocation questions due to size and space constraints. Even experienced retailers must consider how customer preferences and needs will change from one region to the next.

Predictive > Prescriptive > Cognitive: 3 stages of digital maturity



1. Predictive:

Anticipating future trends and events

As organizations compile a more robust data set from which to draw, organizations approach the Predictive phase. In this stage, it is possible for the retailer to anticipate trends and events—and how they will affect the business—based on data and analytics.

"As the algorithms improve and as more data is entered into the system, the business will be able to see patterns that signal future events," **says Mazza.** "Once again, with this information, organizations have the ability to respond, fending off challenges or seizing opportunities."

For example, this past summer as consumers tired of being indoors and were reluctant to take long trips away from home, local travel increased as did the sale of outdoor recreational equipment in the U.S. However, many retailers were caught off-guard by the sudden demand since planning and merchandising decisions were based on historical sales data.

But with the power of AI, these companies could have considered a wider set of inputs, such as: social media keywords for camping, hiking or outdoors; weather reports indicating that temperatures would be unseasonably warm; a downturn in air travel; and even disruptions to school and work schedules.

Taken together, these inputs could have helped retailers realize that seasonal demand would far exceed that of the previous year. Based on these insights, organizations would then have a chance to respond by adding more stock, moving inventory around based on regional demand or creating promotions or offers in key markets.

Case Study:

Developing a next generation replenishment algorithm for grocery

Capgemini worked with one European grocer to develop a data-driven replenishment algorithm that could predict transaction forecasts across stores. Leveraging machine learning, the retailer was able to segment stores, determine relevant features, calculate event effects and clean the data in order to create a next generation algorithm. The tool also considered external variables, such as weather forecasts and local events to ensure optimal performance.

Built with flexibility in mind, the model is equipped with a prediction mode for daily use and a calibration mode to refit the model. The tool leverages a cloud platform, SQL DB's, and open-source programming languages, underscoring its adaptability as the data set grows or as the retailer adds new features and functionalities.

Outcomes

- Model leverages 1.6 million rows of historical data to predict 27,944 transaction forecasts daily per store
- Reduced more than 1 million features and interaction terms to just 44 for final calibration
- Analyzed more than 5 million yearly event-store combinations to determine uplift
- Model calibration takes less than 10 hours while utilizing 16 CPU cores at 100% capacity

Core trends: Safety and sustainability

When predicting future trends, retailers must also consider present-day consumer sentiment. In today's environment, we see two major influences shaping consumers' purchases: safety and sustainability.

"Health is top of mind for consumers," says **Mazza.** "Shoppers are gravitating towards brands that they know and trust, or those who demonstrate a commitment to their well-being."

At the same time, purchases are also being swayed by environmental issues. People are paying more attention to material sourcing and gravitating towards purchases that create less of a carbon footprint or last longer.

For big box retailers, this suggests the need for a variety of brands—from the highly-trusted household names to new or niche brands that represent local or sustainable practices, or a combination thereof.

2. Prescriptive:

Shaping future trends and events

Organizations with high digital maturity are able to understand, anticipate and respond to trends and also shape them. We consider this ability the hallmark of the Prescriptive phase.

In keeping with our outdoor equipment example, retailers at the Prescriptive phase could "beat the trend" so to speak—essentially reaching out to highly targeted audience segments with promotions and offers to jumpstart the customer journey. With the right insights, the retailer could also develop content that would strengthen the customer relationship, such as downloadable maps of nearby national parks or biking trails.

Finally, retailers can also take this information and consider how to best address the market need. For example, stock of tents and other large items were limited this past summer, which meant that even if retailers sold every item, their revenues would be capped based on their inventory limits.

"In these cases, it's important to think outside the box—or in this case, tent. We saw some quick-thinking retailers launch a rental or sharing model, which allowed them to serve a wider group of customers with limited inventory," said **Mazza.** "Meanwhile, customers who may be new to the outdoor world could try camping without investing in a big-ticket item."

At the same time, retailers who pursue such strategies must continue to be guided by that north star metric of health and safety. In this case, the retailer needed to ensure proper cleaning and disinfection of the equipment and actively communicate that process to the customer.

Case Study:

Improving pricing accuracy and sustainability through prescriptive capabilities

One major European grocer wanted to make real-time price changes in order to liquidate fresh product stock near expiration and reduce waste. Capgemini worked with this client to create a tool for central and massive price changes in all stores across all products. The tool updates PoS and scales in real-time, while a mobile app manages prices in the store.

As a next phase of the program the client is considering the deployment of a dynamic pricing model that will offer even greater speed in decision-making, ensuring the client can optimize its pricing strategy minute-by-minute with minimal human intervention.

Outcomes

- Improved quality and stock levels
- Increase sales
- Expedite more than 20,000 price changes per day

3. Cognitive:

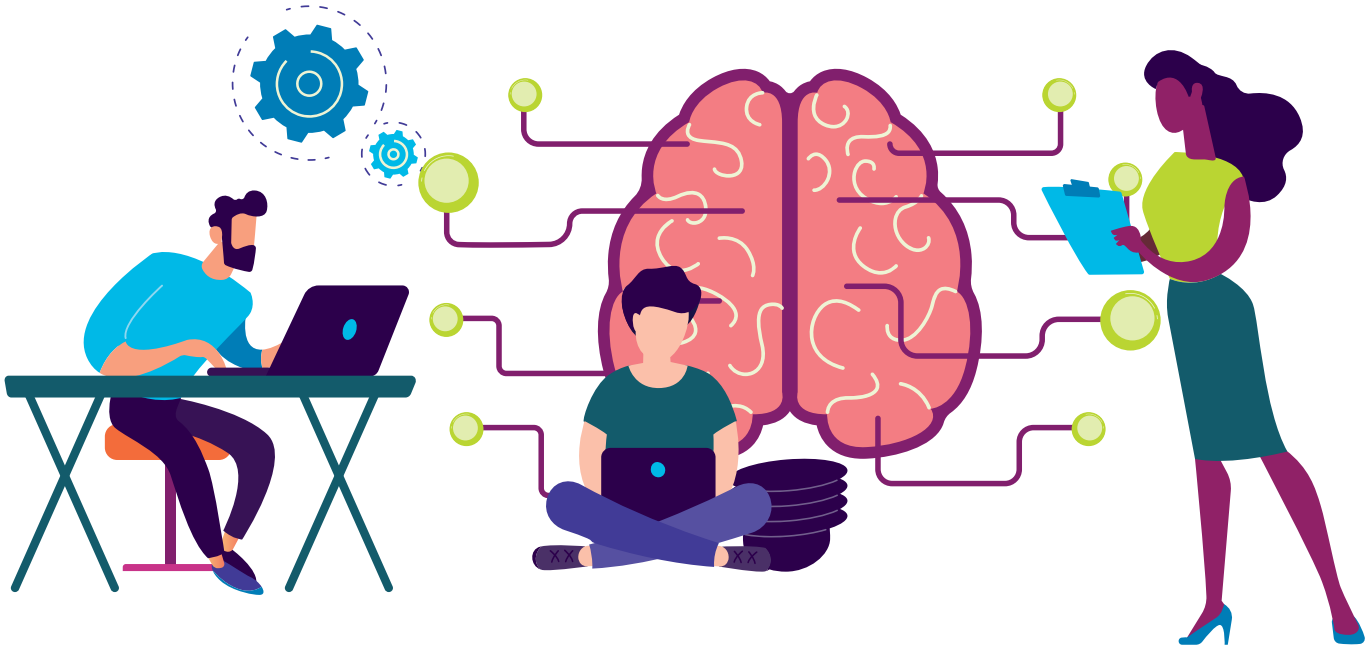
High-level reasoning that replicates the human thought process

Cognitive is the most advanced stage in our digital maturity curve.

Though cognitive is sometimes used interchangeably with AI in scientific terms, the difference between the two is quite distinct. The main difference is that AI is an augmentation tool meant to support human decision-making; cognitive computing, on the other hand, is an advanced technology that mimics the human thought process. The most prominent example of cognitive technology today is chatbots or other customer service channels, which are programmed to reason as humans do to respond to customer questions and issues.

"In the Predictive and Prescriptive phases, AI is a tool that helps people make better decisions, faster and with improved outcomes," explains **Mike McCullough**, **Supply Chain Lead, Capgemini Invent North America.** "Cognitive computing, is a capability that is almost akin to human reasoning that can alleviate some routine and repetitive tasks. The two technologies are similar in theory, but different in practice."

Looking beyond AI-based chat features, cognitive capabilities can be used for a variety of retail planning capabilities. Leading retailers are using automation to mimic decision making on stock intake, suggesting assortment extensions and edits and determining commercial benefits of expedited transport options.



Case Study:

Streamlining end-of-season markdowns for allocation

For one global retailer, end-of-season merchandise must be allocated four weeks in advance to ensure that inventory is in store and not "stuck" in a warehouse, which results in product waste and holding costs. This end of life process was cumbersome with staff needing to manually update every single style in the replenishment system. Further, due to the high volume of updates (over 500 lines/day), there was also a relatively high rate of inaccuracy and the need for corrections.

Capgemini worked with this client to automate this process. A bot, which leverages robotic process automation, combs through each style line in the database and determines if the end of season method should be applied. In the case of an update, the bot also determines which store selection needs to be updated as well.

Outcomes

- Reduced work session time from 7.7 hours/week for employees to 45 minutes by the bot—a 91% reduction
- Reduction of inventory
- Improved price realization per season
- Total savings of 5,338 hours/year through partial automation of the end-of-season allocation process

The advanced technology solutions that build digital maturity

Machine learning (ML):

A set of computational methods and techniques at the core of cognitive and AI.

Artificial intelligence (AI):

Cognitive computing systems with completely intuitive interfaces for human users.

Cognitive computing: Using computational methods to:

- Draw inferences from existing data
- Draw conclusions using an internal knowledge base
- Learn from past decisions by updating the knowledge base

Becoming cognitive: Building incremental value while accelerating the data strategy

Retailers that want to advance their data strategy should keep in mind that digital maturity is a journey they should jumpstart now.

"AI systems are based on algorithms that learn as more data and events are added, which means that they become more powerful over time," says **Chew.** "This is why it's so critical for retailers to start their journey now—because building digital maturity takes time. Delays now could mean obsolescence later."

But while maturity cannot be achieved overnight, results can. Organizations that begin their journey can expect to see incremental gains at the outset of their program. And, because the digital solutions will become more precise and accurate over time, the impact will grow.

A focus on adoption of AI technologies by users is a critical step that cannot be overlooked. **Holly Nurse, Management Consultant, Capgemini Invent** explains: "Bringing real value through AI means incorporating both the art and the science, the knowledge and decision-making of the planner/merchandiser and the cognitive technology to provide insights, capturing outliers and trend spikes."

Programs highlighting the importance of the user succeed in gaining trust and securing adoption of AI methods, driving business benefit. The journey to AI isn't a person one day and a computer the next, but a partnership allowing strategic decision-making by our talented retail teams, enhanced by valuable insights.

"The ability to predict and shape trends is a capability that organizations need to build through the constant gathering and continuous analysis of data," says **Mazza.** "In the meantime, the investment will pay for itself as the business is able to redefine core areas of merchandise planning, forecasting and distribution in a way that optimizes inventory, staff and other resources."

The Solution: Smart Retail Planner from Capgemini

Capgemini's Smart Retail Planner is a holistic approach to addressing the two most pressing needs facing retailers via automating the full value chain: ensuring they have the right stock on hand and that they can quickly distribute it to customers across a variety of channels.

Leveraging our deep content expertise in retail merchandising and supply chain transformation, insights and analytics, and artificial intelligence, Capgemini partners with some of the world's leading retailers to help them adapt to the evolving landscape, deepen their understanding of their customers' behaviors, and optimize their merchandising and supply chain functions, using data and analytics in a scalable, cloud environment.

Capgemini's Smart Retail Planner enables:

- Automated planning capabilities across the value chain
- Fully integrated omni-channel operations
- Insights-driven local assortment planning
- Optimized pricing
- Operational analytics
- AI-enriched forecasting
- Lights-out demand planning, replenishment and allocation using machine learning and automation
- Connected ecosystems

Capgemini's Smart Retail Planner is based on a proprietary approach that allows retailers to jumpstart results in as little as eight weeks and create a pathway to becoming a cognitive omnichannel retailer.

To learn more about how your organization can accelerate its journey to cognitive, reach out to our authors today.

The impact of data and AI in retail

Top-line growth
- 1–3% incremental revenue increase
- 1–5% reduction in cost per incremental unit.

Efficiency/cost reduction
- 2–5% sales associate productivity gain
- 10-30% obsolescence reduction.

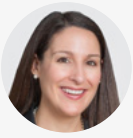
Margin enhancement
- 5–15% margin increase
- 3–5% markdown reduction.

Working capital
- 5–35% overall reduction in network inventory
- 9–42% promoted volume forecast accuracy improvement
- Reductions in changeovers, rush shipments, and raw material write-offs.

Capgemini's Smart Retail Planner helps organizations jumpstart their journey to becoming a cognitive omnichannel retailer. Our fully integrated omnichannel strategy enables organizations to:

- Deliver advanced customer service
- Keep supply chain costs as low as possible
- Improve performance through accurate demand planning
- Optimize inventory to support all omnichannel requirements, including store selling and shipping, click and collect, curbside pickup, online deliveries, drop ships and flexible returns

About the Authors



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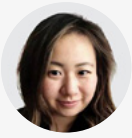

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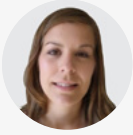

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About Capgemini

Capgemini is a global leader in consulting, digital transformation, technology, and engineering services. The Group is at the forefront of innovation to address the entire breadth of clients' opportunities in the evolving world of cloud, digital and platforms. Building on its strong 50-year heritage and deep industry-specific expertise, Capgemini enables organizations to realize their business ambitions through an array of services from strategy to operations. A responsible and multicultural company of 265,000 people in nearly 50 countries, Capgemini's purpose is to unleash human energy through technology for an inclusive and sustainable future. With Altran, the Group reported 2019 combined global revenues of €17 billion.

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