

WHERE TO PLAY:
GAME-CHANGING
TECHNOLOGIES
FOR **RETAIL**



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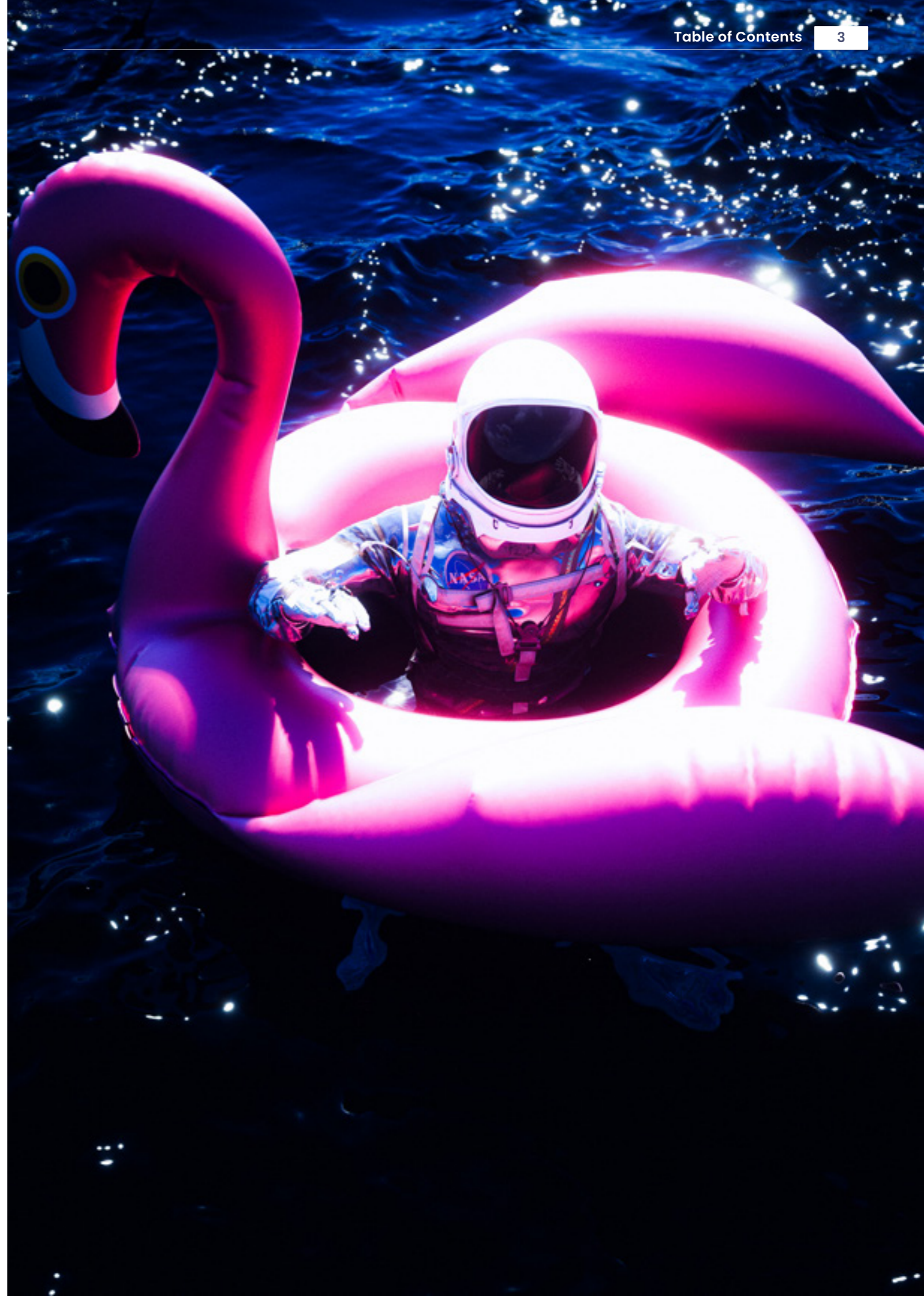
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Introduction

The retail industry is at an inflection point. And while its journey to this point began well before 2020, the pandemic and its cascading effects accelerated change for retailers across categories and regions.

Between mass lockdowns and heightened concerns for health and hygiene, consumers have flocked to e-commerce. Online retail sales are booming while many conventional brick-and-mortar businesses face the persistent threats of bankruptcy and closure.

With retailers racing to engage their customers through digital channels and platforms, consumer choice has expanded massively. Expectations in terms of personalization, convenience, sustainability, value, and speed are at an all-time high, and customer loyalty is up for grabs. Meanwhile, disruptions to global supply chains continue to impede retailers' ability to meet these expectations profitably.

This period of rapid and intense disruption has given retailers a mandate to reimagine their business models and adapt offerings and operations. The decisions retailers make now will influence their success and the industry as a whole for the next five years or more.

Improving the efficacy of these decisions relies on organizations' ability to not only respond to their current environment, but to anticipate those challenges and opportunities that will shape the future of the industry. Through this lens, organizations can identify the trends, technologies, and main players driving change in the market. And importantly, which developments hold the greatest potential impact and strategic relevance.

As the digital transformation of retail charges forward, organizations must shift their focus to developing a signature tech stack supported by the right capabilities and partnerships. With 2020's mass migration online, many retailers have a head start in implementing strategies for omnichannel engagement. But it is the ability to see innovation across all points of the value chain that will serve as a critical differentiator.

This report aims to provide decision-makers in retail with a view of the technologies that hold the greatest potential for impactful innovation in the industry. These game-changing technologies range from emerging to evolving and present several innovative use cases. The information contained within this report is interlinked with the ITONICS Innovation Platform to help you better connect the dots between these drivers of change, anticipate the most rewarding opportunities for the future, and gain strategic advantage.

An Introduction to Technology Scouting

End2end innovation management begins by asking the fundamental question, **Where to Play**. Answering this question relies on several congruent activities and internal capabilities that primarily fall within the discipline of Foresight and Strategy, as advocated by our distinct **ITONICS COFIM** model. Organizations equipped with strong foresight capabilities can align their strategy with future scenarios and build resilience in an increasingly uncertain and competitive landscape.

Essential in **Foresight and Strategy** is an organization's capacity to scan its business environment comprehensively and continuously—environmental scanning. This is the capability to scan the horizon for weak signals that might indicate larger shifts and influence or disrupt the environment. It begins with the collection of vast amounts of data from which patterns are revealed through sensemaking analysis.

Environmental scanning focuses on control objectives that enhance innovation intelligence, thereby enabling the identification of new opportunities for growth, informing strategic priorities, and shaping future goals. These include capability supervision, competitor watch, trend scouting, and technology scouting.



As the focus of this industry report, **technology scouting** is the process of observing technological shifts and developments by collecting pertinent data, contextualizing change to uncover discernable patterns as weak signals, and identifying emerging technologies that hold both impact and relevance.

Actively screening for shifts in technology adoption, R&D, and patents serves as an early-warning system to help organizations anticipate and respond to changes while also minimizing risk.

Applying an industry lens to the process of technology scouting helps organizations direct their focus and resources more optimally.

And by gaining an understanding of the technological developments and adoption trends that may present future opportunities in their industry, they can equip themselves with the innovation intelligence needed to take decisive, strategic action and ultimately gain a competitive advantage.



The Role of Technologies in Innovation

Emerging, evolving, and disruptive technologies serve as solution drivers, helping innovators connect the dots between their current and future states. These are the tools capable of meeting—and sometimes, creating—new needs, desires, and demands.

Technologies enable new business models, products, and services. They have the potential to meaningfully expand an organization's existing portfolio and transform an entire industry.

The Interplay between Technologies and Trends

Technologies and trends are complementary elements that interact with and influence one another. Trends are expressions of new consumer attitudes, expectations, or behaviors—an indication of market pull; whereas technologies are designed either in response to these shifts or as precursors to nascent demands—representing a market push.

Together this push and pull exert force on the market, driving change forward. It is organizations' ability to pre-empt or respond to this change through innovation that determines their success.

Determining Industry Relevance

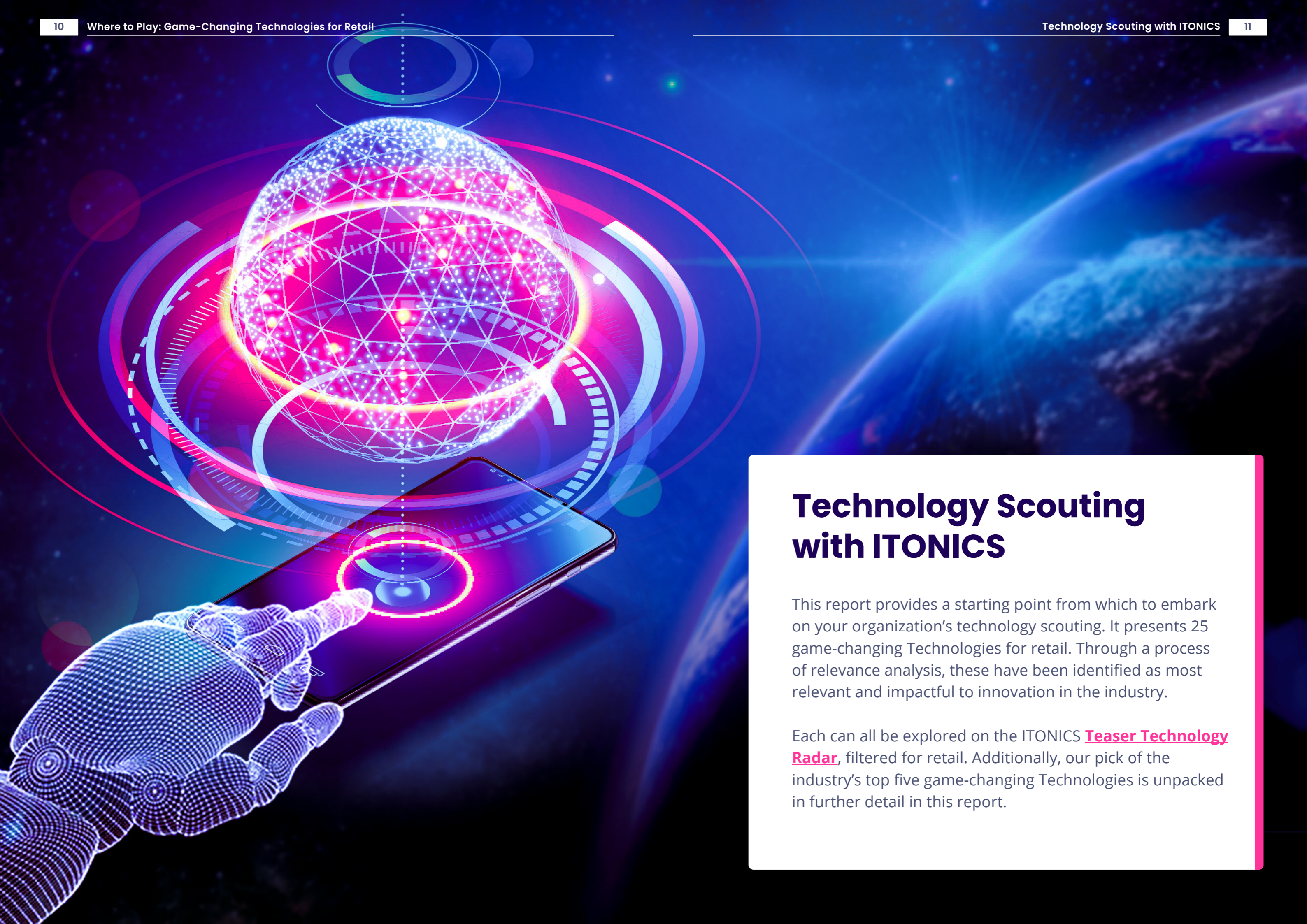
Environmental scanning is a divergent exercise; too narrow an approach and important opportunities can easily be missed. And while all elements in the ITONICS portfolio hold relevance—the degree of relevance differs depending on the industry in which your organization operates.

To help provide this industry lens, ITONICS analysts have performed relevance analysis to identify the Technologies and other elements that are most relevant and likely to be game changers in each respective industry.

Our team of analysts monitored the frequency with which each Technology appeared in a given industry. Instances of real-world applications, R&D, patents, and startup activities were tagged with relevant industries through a process combining manual and automated data classification.

This initial mapping of the ITONICS portfolio served as hypotheses of industry relevance. These hypotheses were further validated and enriched through additional quantitative and qualitative industry research to arrive at nine industry packages.

Each industry package, available in the ITONICS Innovation Platform, displays the Technologies, Trends, and Inspirations that represent the most relevant—that is, impactful, disruptive, and transformative—areas in which to play.



Technology Scouting with ITONICS

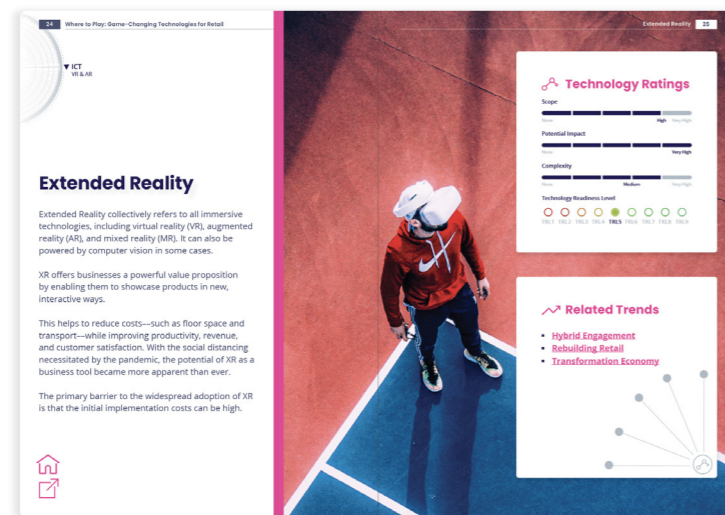
This report provides a starting point from which to embark on your organization's technology scouting. It presents 25 game-changing Technologies for retail. Through a process of relevance analysis, these have been identified as most relevant and impactful to innovation in the industry.

Each can all be explored on the ITONICS [Teaser Technology Radar](#), filtered for retail. Additionally, our pick of the industry's top five game-changing Technologies is unpacked in further detail in this report.

How to Read the Technologies

The **Synopsis** gives a brief overview of the Technology, explaining why it is important, what is required to enable it, how it has evolved, and any current limitations and opportunities.

The **Segmentation** of the Technology is indicated corresponding to the relevant categories that appear on the ITONICS Radar: Chemicals & Materials, Energy & Resources, Engineering, Healthcare & Life Sciences, ICT, and Mobility. Listed below, the **Sub-segmentation** provides a more narrow scope as to the area of technological development.



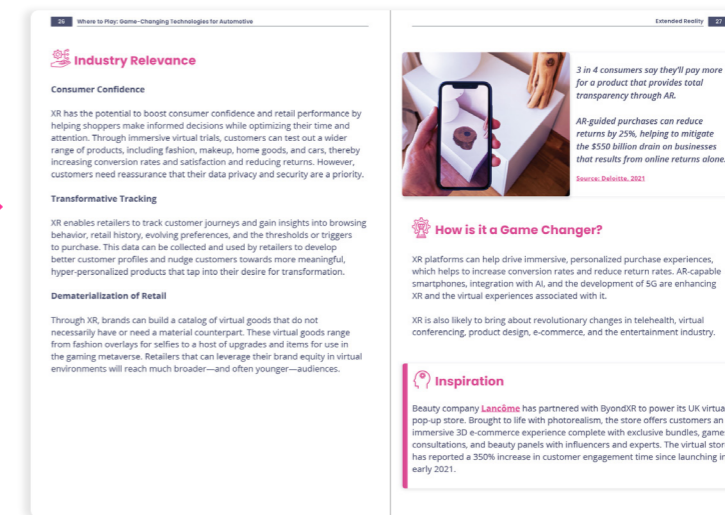
In the **navigation bar**, the icon will bring you back to the Table of Contents page. The button will open up the individual element in the ITONICS **Teaser Technology Radar**. Here you can deep dive into the Implications for Innovation associated with the Technology and view the interconnected elements that influence and impact it, including related Trends, Inspirations, and other Technologies.

The **Technology Ratings** look at the parameters of Scope, Potential Impact, Complexity, and Technology Readiness Level (TRL).

Related Trends show the elements that are influenced by and have an influence on the Technology, its development, and adoption. This network provides greater context as to the interplay between elements and points to possible opportunities.

Industry Relevance unpacks the industry-specific applications and potential use-cases that are most prominent with regard to the Technology. Each point looks at the strategic advantage gained through adoption of the Technology and the considerations for its future development.

How is this a Game Changer? elaborates on how the Technology may contribute to or influence possible future scenarios. The relationship between the Technology and nascent demands is explored through a future-oriented lens.

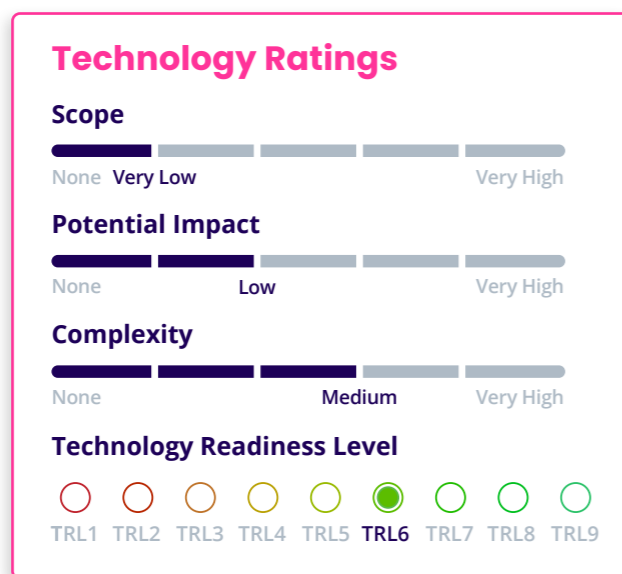


Inspirations provide evidence of how organizations are applying the Technology in the real world. They serve as springboards for ideation, helping innovators look beyond their category, connect information in new ways, and nurture fresh thinking.

ITONICS Ratings

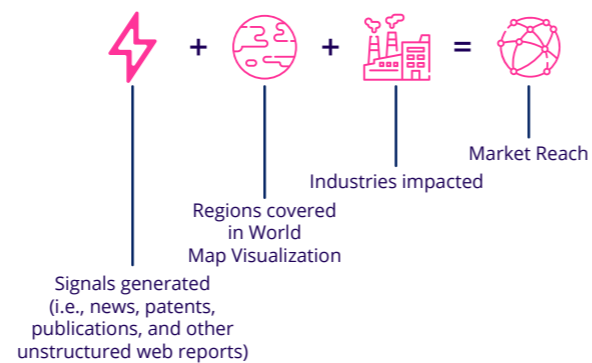
The evaluation of trends or technologies is one of the most important activities in innovation management. The goal is to predict future changes in your industry and whether they are relevant to your organization.

ITONICS Trends and Technologies are presented with ratings that help foresight teams focus their attention and identify relevance based on their unique set of strategic objectives.



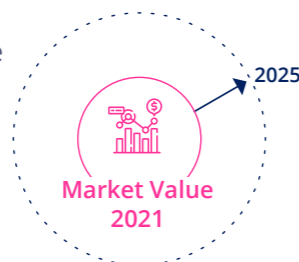
Scope: How far-reaching is the potential influence of this element on this market?

ITONICS Insights tool uses keywords to retrieve data across three dimensions and derive an aggregated mean value to indicate the market reach of each Technology.



Potential Impact: How high is the potential impact of this element on the market?

Market growth data for each Technology is collected from a minimum of 5 verifiable sources, aggregated and extrapolated to 2025.



Scale: Projected market value in 2025 (USD billion):

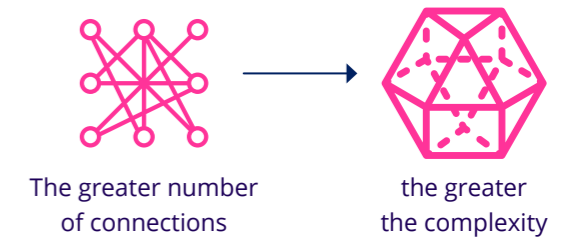
- Very Low: >10 bil.
- Low: 10-50 bil.
- Medium: 50-500 bil.
- High: 500-1,000 bil.
- Very High: >1,000 bil.

Our team of analysts uses advanced query and **ITONICS Insights** to garner the relevant information alongside our research and statistically derive the ratings from quantifiable historical and present data.

Each Technology is rated on Scope, Potential Impact, Complexity, and Technology Readiness Level (TRL) to provide targeted and tailored analysis at your fingertips.

Complexity: How high is the complexity of this element?

A complexity score is derived based on the number of connections each Technology forms with other elements.



Technology Readiness Level (TRL): How mature is this element in the market?

Each Technology is mapped by its Technology Readiness Level (TRL) to determine its relative maturity.

PHASE	TRL	DEFINITION
RESEARCH	1	Basic principles observed
	2	Concept formulated
	3	Experimental proof of concept
DEVELOPMENT	4	Validated in lab
	5	Validated in relevant environment
	6	Demonstrated in relevant environment
DEPLOYMENT	7	System prototype demonstrated in operational environment
	8	System complete and qualified
	9	Actual system proven in operational environment

Exploring the ITONICS Radar

Having the right tools to manage innovations, technologies, projects, and opportunities is vital to act on your organization's innovation strategy in an increasingly uncertain and dynamic world. After all, what you can't manage, you cannot change.

Get started by exploring the ITONICS [Teaser Technology Radar](#) and [Teaser Trend Radar](#) displaying the elements that are most relevant

to your industry. Here you will find a read-only overview of each Technology and Trend.

Beyond what's available in the Teaser, the full content in the ITONICS Innovation Platform provides deeper insight into each Technology. It allows users to interact with and configure different elements to derive greater meaning and prompt informed decision-making.

The ITONICS Innovation Platform provides access to:

- The full portfolio of **175+ Trends and Technologies**, each with detailed explanations of how they have developed, where they are currently having an impact, and how they could evolve into the future.
- **7,000+ Inspirations**, continually updated to illustrate how Trends and Technologies are being activated and brought to life by innovators, businesses, and consumers.
- The ability to set **Internal Ratings** such as Business Relevance, Strategic Fit, Internal Know-How, and Need for Action. Undertaken as a collaborative evaluation exercise within your organization, these ratings help build the consensus and commitment needed in the innovation journey.

- Interactive **Network Graph** visualizations that display first- and second-level relations for a selected element. New relations that hold strategic relevance to your organization can also be added to any network graph.
- Various **Tags** attributed to each element to help users focus their searches. A **Tag Filter** function allows advanced searching by tags and gives suggestions for related tags. To view the Trends, Technologies, and Inspirations that are most relevant to retail, use **Advanced Filtering** and select the **Saved Filter: Retail Industry**.

For full access to this content and functionality, register an account on ITONICS Cloud for free today.

REGISTER

The screenshot displays the ITONICS Innovation Platform interface. On the left, a grid of 1259 elements is shown, each with a thumbnail, title, and brief description. Examples include 'Smart Clothing Technology', 'World Bank, IMF launch high-level advisory group on sustainable and inclusive...', 'UgoVirtual debuts new 3D and AR Elements to enhance engagement', and 'Tide partners with NASA to create detergent for astronauts'. The interface includes filters for 'Tag: ANY', 'ir retail', and 'ir retail'. On the right, an 'Advanced Filtering' sidebar is open, showing 'Saved Filters' with 'Retail' selected. Below, it asks 'What element types do you want to show?' with 'Trend', 'Technology', and 'Inspiration' options. It also asks 'What do you want to filter by?' with 'Tags' options. The sidebar shows 'Trend' expanded with 'ir retail' selected, 'Technology' expanded with 'ir retail' selected, and 'Inspiration' expanded with 'ir retail' selected.

Forces Shaping the Future of Retail

Context of Change

Defining the objectives and scope of environmental scanning activities like technology scouting requires a clear understanding of the context of change in your industry. Context provides a foundation for identifying and assessing the driving forces shaping the future. It points to evidence of where we see change happening in social, technological, economic, environmental, and political spheres and where the change will expand to next. It is the landscape upon which trends and technologies play out; the ability to navigate this landscape is the ability to adequately prepare for possible futures.

Forces Shaping the Future

Around the globe, several driving forces are impacting the retail industry. The pandemic and its lockdowns disrupted conventional brick-and-mortar businesses while exposing vulnerabilities in global supply chains. Consumers moved en masse to e-commerce for its ability to deliver greater choice, convenience, and value in a contact-free shopping experience.

Adoption of end-to-end digital business models and command of data analytics are quickly emerging as the requisites of success. At the same time, retail brands are under increased pressure to infuse sustainability throughout their value chain and enable conscious consumerism.

Here we'll discuss some of the forces shaping the future of the retail industry.

ACCELERATED DISRUPTION

will force retailers to reimagine the role of the shopfront.

The threat to conventional brick-and-mortar retail has been building for some years due to the disruptive nature of e-commerce. However, the pandemic has accelerated the permanent digital reform of the retail landscape and forced retailers to reimagine the true merit and potential of the shopfront. As a result, customer experiences (CX) that are immersive, low-touch, and digitally integrated with e-commerce have emerged as the ultimate priority and a key differentiator. These initiatives will consolidate technologies such as automation, robotics, AI, IoT, and extended reality to elevate CX and bridge in-store and online environments.

CONSUMER CHOICE

will progressively move retail from a B2C to a C2B model.

E-commerce has enabled the rise of increasingly discerning consumers who demand more for less and are willing to do their research before making a purchase. They have the ability to control nearly all aspects of their purchase journey, choosing from a host of omnichannel conveniences like on-demand delivery, curbside service, and free returns. Rather than being sold to or channeled towards certain purchases, consumers have the power to dictate their terms when it comes to CX and value—which is especially important for price-sensitive consumers who have experienced changes to their disposable income.

III SUPPLY CHAIN RESILIENCY

will be a requisite for profitable growth in the future.

The COVID-19 pandemic continues to impact global retail supply chains as major manufacturing countries across the Asia-Pacific region experience factory shutdowns, and ocean freight prices are at record highs. As a result, retail brands are pouring resources into fortifying their supply chains. Strategies range from reshoring and distributed manufacturing to optimized workflows that prioritize technologies like AI/ML platforms, IoT, and robotic process automation (RPA). The sustainability of supply chains is also a growing imperative, with consumers demanding good corporate citizenship, transparency, and the ability to trace goods to origin.

IV DATA SECURITY AND PRIVACY

will rewrite retail's advertising playbook.

The dominance of e-commerce currently relies heavily on advertising technology (adtech) and the ability to track online users as they move from site to site using third-party cookies. However, even while consumers enjoy the benefits of data sharing—such as omnichannel engagement and personalization—they are demanding an end to involuntary data surveillance. With more countries enacting data privacy regulations and an impending end to third-party cookie tracking, retailers will need to rethink their programmatic advertising strategies. This means emphasizing contextual targeting, first-party data, and more creative, diverse ad content.

V THE SUSTAINABILITY IMPERATIVE

will transform consumer behavior and business models.

With greater consciousness of environmental and social issues, retail is forced to respond to the sustainability imperative. The effects of mass consumerism and exploitative business models like fast fashion are evident, and as a result, consumers are spending their money more intentionally. This translates to a greater focus on local retail, supply chain transparency, shared value, and circular practices like product resale, repair, and rental or subscription models. Brands are under increased scrutiny to embody the values associated with sustainability—to go beyond mere messaging and take real, meaningful action that resonates throughout the value chain.

VI DATA PROWESS

will shape the future leaders in retail.

The ability to collect, analyze, and act on relevant data is essential for retailers to remain competitive as their industry faces widespread disruption. Building data analytics capabilities allows retailers to predict and react to changes more efficiently and effectively—from delivering greater personalization and omnichannel engagement to anticipating fluctuations in demand and improving inventory management. As retail business models progressively shift towards digital-first platform ecosystems, those retailers that can seamlessly embed data analytics throughout their end-to-end value chain, from planning and production to customer touchpoints, will gain strategic advantage.



Use this context to help better understand the strategic importance and innovation opportunities associated with the game-changing technologies identified for the retail industry.

Game-Changing Technologies for Retail

Technology Navigation

Through a process of qualitative and quantitative industry research, our team of analysts conducted relevance analysis in order to identify the Technologies within our portfolio that are **most relevant and influential in the retail industry**.

Game-Changing Technologies for Retail

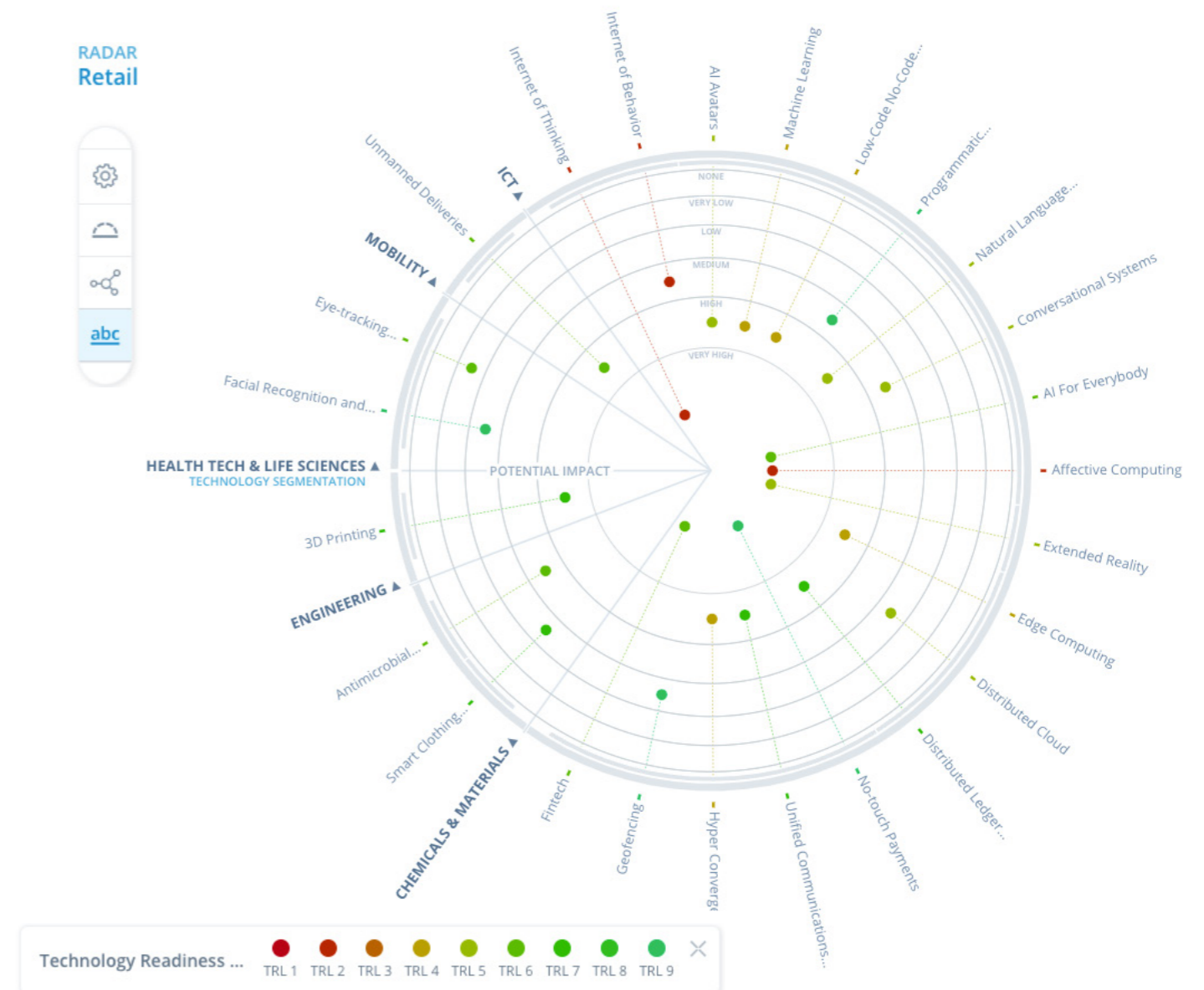
Explore the selection of Technologies at play in the retail industry.

Click on the Technology below to view it in the ITONICS

Teaser Technology Radar:

- [3D Printing](#)
- [Affective Computing](#)
- [AI Avatars](#)
- [AI for Everybody](#)
- [Antimicrobial Packaging](#)
- [Conversational Systems*](#)
- [Distributed Cloud](#)
- [Distributed Ledger Technology](#)
- [Edge Computing](#)
- [Extended Reality*](#)
- [Eye-tracking Technology](#)
- [Facial Recognition and Biometrics](#)
- [Fintech](#)
- [Geofencing*](#)
- [Hyper Converged Infrastructure](#)
- [Internet of Behavior](#)
- [Internet of Thinking](#)
- [Low-Code No-Code Platforms](#)
- [Machine Learning](#)
- [Natural Language Processing](#)
- [No-touch Payments](#)
- [Programmatic Advertising*](#)
- [Smart Clothing Technology](#)
- [Unified Communications Services](#)
- [Unmanned Deliveries*](#)

*These Technologies make up ITONICS' pick of the retail industry's top 5 game-changing Technologies. These are unpacked in further detail in this report.



ITONICS Top 5 Game-Changing Technologies for Retail

Click below to read more about the industry potential of these Technologies and examples of how organizations are applying them as solutions:

1. [Extended Reality](#)
2. [Geofencing](#)
3. [Conversational Systems](#)
4. [Programmatic Advertising](#)
5. [Unmanned Deliveries](#)

Extended Reality

Extended Reality collectively refers to all immersive technologies, including virtual reality (VR), augmented reality (AR), and mixed reality (MR). It can also be powered by computer vision in some cases.

XR offers businesses a powerful value proposition by enabling them to showcase products in new, interactive ways.

This helps to reduce costs—such as floor space and transport—while improving productivity, revenue, and customer satisfaction. With the social distancing necessitated by the pandemic, the potential of XR as a business tool became more apparent than ever.

The primary barrier to the widespread adoption of XR is that the initial implementation costs can be high.



Technology Ratings

Scope



Potential Impact



Complexity

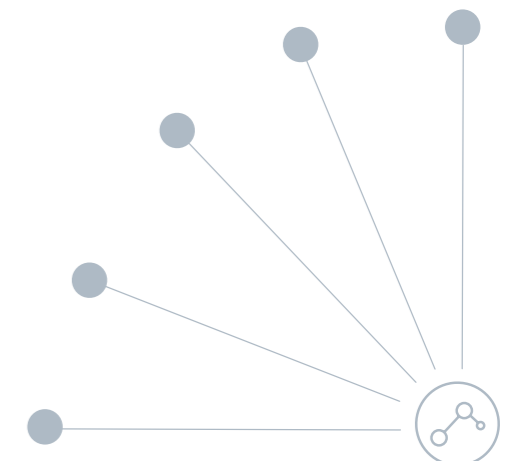


Technology Readiness Level



Related Trends

- [Hybrid Engagement](#)
- [Rebuilding Retail](#)
- [Transformation Economy](#)



Industry Relevance

Consumer Confidence

XR has the potential to boost consumer confidence and retail performance by helping shoppers make informed decisions while optimizing their time and attention. Through immersive virtual trials, customers can test out a wider range of products, including fashion, makeup, home goods, and cars, thereby increasing conversion rates and satisfaction and reducing returns. However, customers need reassurance that their data privacy and security are a priority.

Transformative Tracking

XR enables retailers to track customer journeys and gain insights into browsing behavior, retail history, evolving preferences, and the thresholds or triggers to purchase. This data can be collected and used by retailers to develop better customer profiles and nudge customers towards more meaningful, hyper-personalized products that tap into their desire for transformation.

Dematerialization of Retail

Through XR, brands can build a catalog of virtual goods that do not necessarily have or need a material counterpart. These virtual goods range from fashion overlays for selfies to a host of upgrades and items for use in the gaming metaverse. Retailers that can leverage their brand equity in virtual environments will reach much broader—and often younger—audiences.



3 in 4 consumers say they'll pay more for a product that provides total transparency through AR.

AR-guided purchases can reduce returns by 25%, helping to mitigate the \$550 billion drain on businesses that results from online returns alone.

Source: [Deloitte, 2021](#)

How is it a Game Changer?

XR platforms can help drive immersive, personalized purchase experiences, which helps to increase conversion rates and reduce return rates. AR-capable smartphones, integration with AI, and the development of 5G are enhancing XR and the virtual experiences associated with it.

XR is also likely to bring about revolutionary changes in telehealth, virtual conferencing, product design, e-commerce, and the entertainment industry.

Inspiration

Beauty company **Lancôme** has partnered with ByondXR to power its UK virtual pop-up store. Brought to life with photorealism, the store offers customers an immersive 3D e-commerce experience complete with exclusive bundles, games, consultations, and beauty panels with influencers and experts. The virtual store has reported a 350% increase in customer engagement time since launching in early 2021.

Geofencing

Geofencing technology refers to a feature in software programs that use GPS (global positioning system) and RFID (radio frequency identification) to establish a virtual geographic boundary. Entering or exiting this specific area can then trigger various pre-programmed responses or actions.

Geofencing can be configured to prompt push notifications on mobile devices, send text messages, alerts, deliver location-based marketing data, and also monitor activity in secure areas.

However, there are privacy and security concerns about sharing location data via geofencing. This has prompted many governments to enact consumer protection laws that regulate the use of location-based advertising.



Technology Ratings

Scope



Potential Impact



Complexity

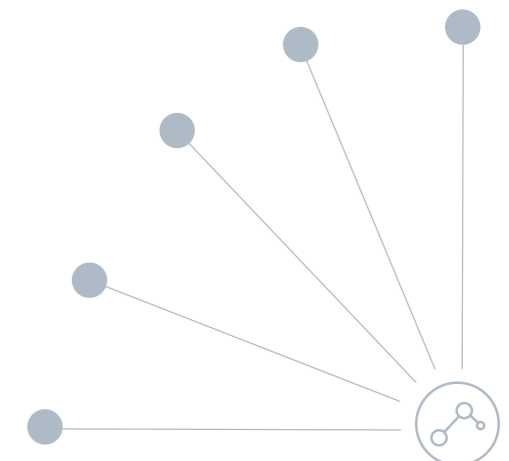


Technology Readiness Level



Related Trends

- [Low Touch Living](#)
- [Rebuilding Retail](#)
- [Me Commerce](#)



Industry Relevance

Real-time Customer Insights

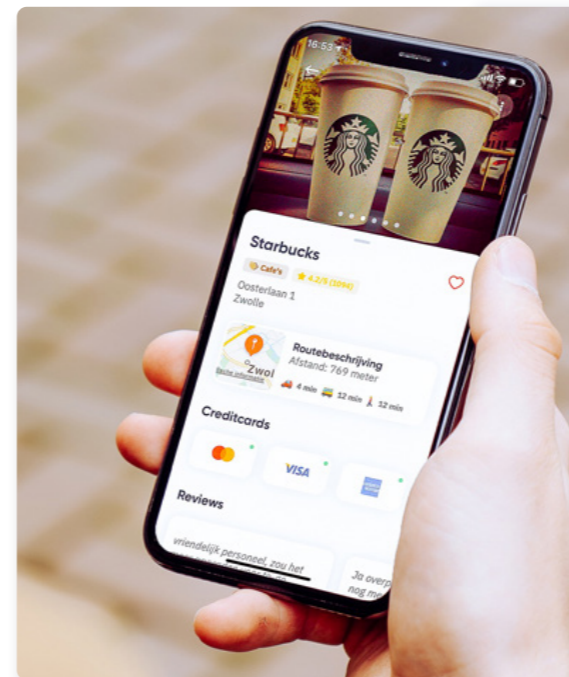
Geofencing enables retailers to gain real-time insights into their customers' shopping behavior. Understanding preferences, participation in certain activities, and arrival time makes it easier to curate personalized ads, nudge certain purchases, and provide effective service instantaneously. However, geofencing devices and equipment can be very costly, creating a barrier for smaller businesses.

Optimizing Supply Chain Management

The use of geofencing supported by intelligent planning systems can help optimize supply chain management. Geofencing enables tracing, tracking, and securing information of goods during warehousing and shipment. This enables preemptive identification and mitigation of supply chain weaknesses or blockages, thereby enhancing the overall management of inventory, time, and resources.

Targeted Marketing Campaigns

Geofencing yields a higher return on investment in advertising. This is achieved through geofenced data that retailers can utilize in targeting consumers who are more likely to interact and engage with their products. Therefore, marketers can design campaigns more accurately and effectively. However, the effectiveness of the campaign will depend on the volume and accuracy of the derived data.



“While retailers can no longer be as dependent on cookies and mobile advertising IDs in their marketing efforts, they can leverage location-enhanced data to gain that same in-depth knowledge of consumers’ activities and behaviors to help drive foot traffic and sales.”

— David Finkelstein, Co-Founder and CEO of BDEX

Source: [Forbes, 2021](#)



How is it a Game Changer?

While geofencing is not a new technology, it has the potential to revolutionize mobile advertising strategies for companies. By leveraging the location of devices connected to the internet, geofencing enables brands to create customized ads designed around customers' immediate circumstances.

When a potential customer enters or exits the virtual boundaries, companies can target them with personalized messages, discount offers, and promotions, providing an enhanced, omnichannel digital marketing experience. Furthermore, companies gain an opportunity to build brand loyalty by assuring customers that their data will not be misused or sold.



Inspiration

US-based fabric and craft retailer [Joann](#) has undergone an omnichannel transformation in response to the pandemic. This includes leveraging geofencing technology to power its low-touch curbside pickup option which automatically notifies Joann employees when a customer has arrived to collect their order.

Conversational Systems

Conversational systems are intelligent technologies that can engage in two-way communication with humans by deciphering text and speech.

Conversational systems are enabling businesses to automate a significant portion of their consumer interactions by handling text and voice-based queries in numerous languages.

Companies are using conversational systems to drive more engaging consumer interactions and develop more personalized products based on detailed consumer segmentation data.

This technology is still limited in that it struggles to interpret the precise emotion and tone of human input. Additionally, proponents of this technology need to address the public's growing reluctance to share personal information with conversational systems.



Technology Ratings

Scope



Potential Impact



Complexity

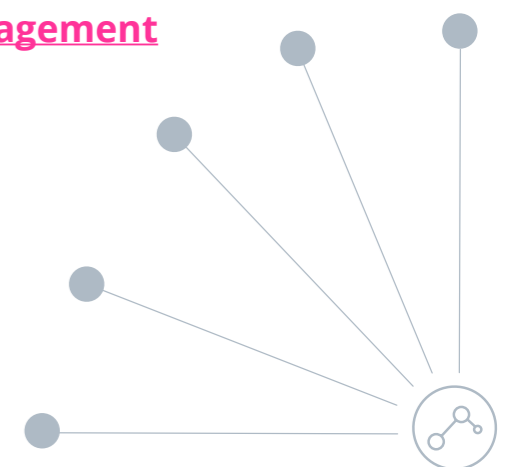


Technology Readiness Level



Related Trends

- [Low Touch Living](#)
- [Me Commerce](#)
- [Inclusive by Design](#)
- [Hybrid Engagement](#)



Industry Relevance

Rise of the Customer Service Chatbot

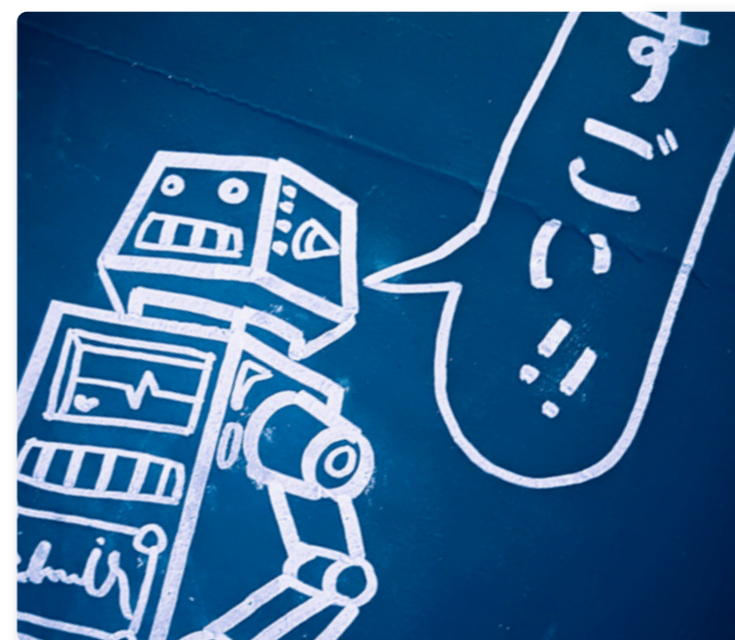
AI-based chatbots hold immense potential for enhancing customer service delivery and reducing operational costs in retail. In addition to 24/7, multilingual support, chatbots can provide personalized answers to questions beyond the standard FAQs, manage complaints, and assist with orders. These conversational systems can also support live agents with accurate, immediate information.

Monitor Customer Sentiment

While conversational systems cannot read emotion in the same way as a human, they can reveal patterns in sentiment, objectively and on a large scale. Systems with affective AI and natural language processing (NLP) can monitor customer interactions, analyze word usage, and generate an assessment of overall customer satisfaction without pushing customer surveys.

Personal E-Shopper

Retailers can use conversational AI to scale the personalized shopper experience, thereby differentiating themselves in the e-commerce market while driving brand loyalty. These virtual sales associates can be programmed to deliver highly specialized knowledge and experiential engagement, from serving as a technical product expert offering recommendations or step-by-step guidance to an exclusive concierge service.



More than **70%** of chatbot conversations will be with retail chatbots by **2023**.

Source: [Juniper Research, 2020](#)



How is it a Game Changer?

Operating in conjunction with other technologies such as NLP, Conversational Systems have the potential to disrupt a variety of sectors by redefining the way businesses interact with their customers. Conversational Systems of the future are likely to be more effective at self-learning and improving efficacy over time. Domain-specific Conversational Systems are likely to be developed to cater to specific industries. Similarly, solutions capable of capturing potential leads and making personal recommendations could transform sales processes.



Inspiration

Skincare startup [HelloAva](#) launches a chatbot that asks customers a series of questions, similar to what a dermatologist may ask, to determine their skin type and needs. After categorizing the customer as one of 30 different skin types, the chatbot recommends specific skincare products. HelloAva has partnered with a subset of beauty brands in order to build its own inventory and checkout experience.

Programmatic Advertising

Programmatic Advertising refers to algorithmic software that optimizes and automates the digital advertising process. Using algorithms to handle the sale and the placement of digital adverts enables transactions to occur within a fraction of a second.

This technology acts as a type of computerized auction between publishers and advertisers and provides both parties with real-time data regarding advert placements and consumer engagement.

Programmatic Advertising allows for higher adaptivity and a more accurate consumer research marketing strategy. Current limitations of this technology include insufficient transparency regarding Programmatic Advertising costs and advert placements made based on fraudulent traffic.



Technology Ratings

Scope



Potential Impact



Complexity

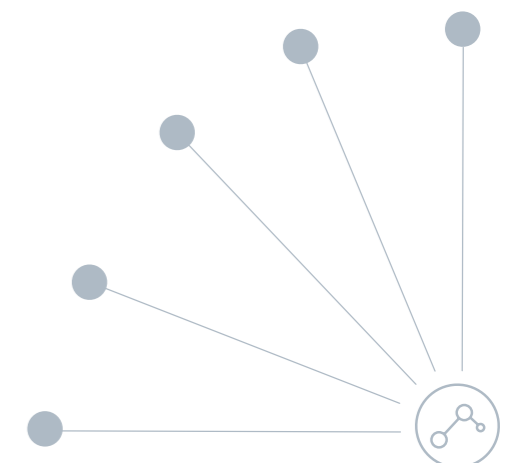


Technology Readiness Level



Related Trends

- [Me Commerce](#)
- [Quality Content Channels](#)



Industry Relevance

Optimizing Ad Spend

Programmatic advertising allows brands to use real-time bidding (RTB) or decisioned media to purchase the ad impressions that will drive the greatest awareness and engagement with their target audience. With RTB, brands can set parameters for their digital media campaign along with the price they're willing to pay based on the value they're seeking.

Contextualized Advertising

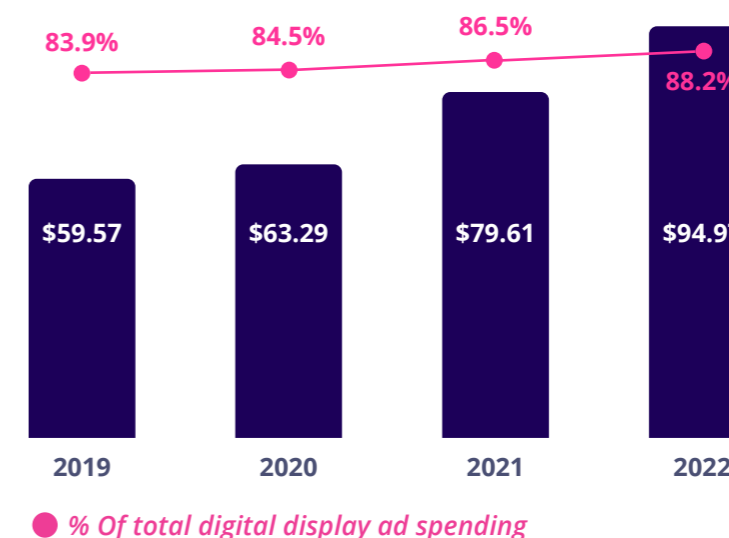
The growing popularity of wearable devices and sensor technology creates opportunities and a key expansion area for programmatic advertising. With real-time geolocation data comprising health metrics, mood, and behavior, retailers can tailor advertising to be context-specific, appealing to the ideal customer at just the right time. However, retailers must address mounting data security and privacy concerns.

A/B Testing

Programmatic advertising extends flexibility to the advertising process. Retailers can use A/B testing and experimentation to refine their programmatic campaigns continually and immediately. This involves trialing different banner formats, channels, ad content, and daily spend. By analyzing the results of each variation, retailers can maximize the value of every ad.

US Programmatic Digital Display Ad Spending 2019–2022, billions

Programmatic advertising in the US is projected to account for over 88% of digital ad spending by 2022.



Source: eMarketer, 2020



How is it a Game Changer?

Programmatic advertising is growing in share of total digital ad spending each year. This technology is revolutionizing customer data platforms and customer relationship management. By using algorithms and AI, Programmatic Advertising will enable businesses to simultaneously access ad space on thousands of websites. In the future, expect advances in Programmatic Advertising software to incorporate identity resolutions that do not rely on third-party cookies to ascertain online user profiles.



Inspiration

Online retailer **Asos** is monetizing its media space and first-party data through programmatic advertising. With e-commerce surging and brands looking to reduce their reliance on third-party cookie tracking, Asos has built a team of programmatic execs to manage campaigns with strategic partner brands.

▼ **MOBILITY**
AUTONOMOUS VEHICLE SYSTEMS

Unmanned Deliveries

Unmanned Deliveries refer to the use of autonomous vehicles, drones, or robots to support ground delivery services. This state-of-the-art technology disrupts the supply chain ecosystem with faster delivery, greater cost-effectiveness, improved sustainability, and increased accessibility in hard-to-reach regions.

Implemented in large manufacturing units, it optimizes internal distribution processes (intralogistics). Machine learning, GPS, sensors, and cameras enable this technology to navigate their environment, making the flow of goods more efficient.

Although there is already wide-scale adoption, legal challenges persist. Data security and privacy issues are prevalent, and the fear of accidents involving delivery robots and pedestrians continues to draw attention.



Technology Ratings

Scope



Potential Impact



Complexity

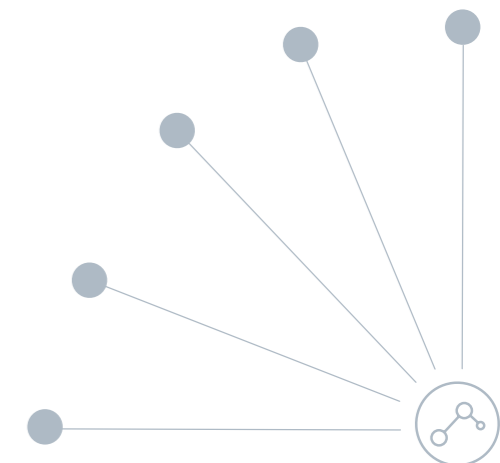


Technology Readiness Level



Related Trends

- [Value Driven Delivery](#)
- [Low Touch Living](#)
- [Green and Lean](#)





Industry Relevance

Seamless Last-Mile Delivery

Unmanned deliveries can revolutionize last-mile delivery—which is the most expensive and time-consuming part of the delivery journey. Automating this stage significantly reduces the human resource and capital inputs like drivers and vehicles, resulting in cost savings for retailers and making same-day service scaleable. It is also a viable solution for connecting underserved communities and remote areas

Meeting Delivery Demand

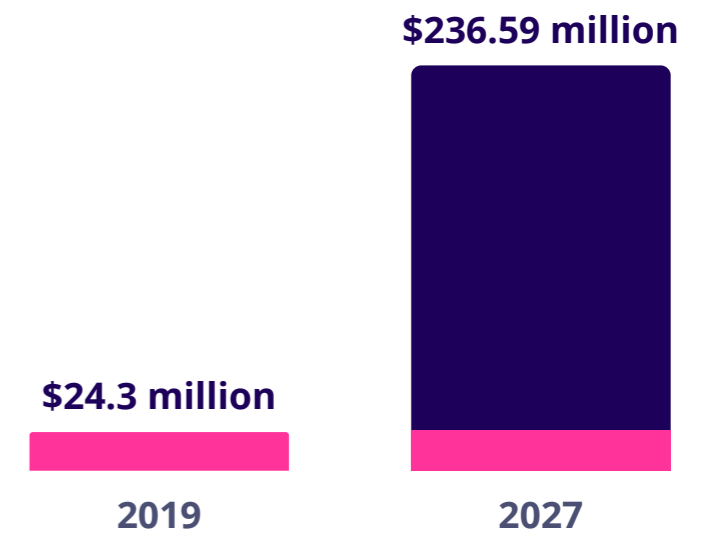
As e-commerce continues to surge, retailers and delivery services are faced with an unprecedented demand for parcel shipping. Beyond consumers' desire for convenient, same-day delivery at little to no extra cost, there is also a growing call for transparency and sustainability. Unmanned deliveries—inherently connected and often electric—are better positioned to meet these demands than conventional services.

Contending with Regulations

Retailers must comply with prevailing regulations which can vary greatly between countries and cities. Currently, most legislative frameworks lag behind the technology but progress is being made in both the US and EU in terms of regulatory dispensations for unmanned delivery vehicles and drones occupying public roads and airspace. Alongside these regulatory changes, cities will need to implement functional urban parcel delivery systems.

Autonomous Delivery Robots Market

Autonomous delivery robots, which are estimated to reduce delivery costs by 80% to 90% as well as save time, are projected to reach a market value of \$236 million by 2027—a CAGR of 34% from 2020 to 2027.



Source: Research and Markets, 2021



How is it a Game Changer?

The surge in e-commerce and growing consumer expectation of seamless last-mile delivery will pave the way for unmanned deliveries. With more governments approving the use of unmanned delivery systems and regulations evolving to accommodate this new future, more sectors will invest in the development and adoption of this technology.

Its use in intralogistics will help optimize manufacturing processes and internal distribution, while the healthcare industry will benefit from the seamless delivery of medical supplies to telehealth patients or to remote areas.



Inspiration

California-based robotics company **Nuro** is making strides on the regulatory and technology front with its fully-autonomous, electric delivery vehicles. With permission to operate on public roads, and several lucrative partnerships with leading e-commerce companies in the works, Nuro is investing in infrastructure to build tens of thousands of its delivery robots.

Conclusion

Closing Remarks

Many of the forces at play in the retail industry have been building over the past several years. Pressure is mounting for non-digital business models, the e-commerce landscape is growing increasingly competitive, and the rising cost of doing business continues to erode retail margins. The COVID-19 crisis has accelerated the pace of these forces and amplified their disruptive and transformative impact on the industry.

While 2020's e-commerce boom may have permanently reshaped the retail landscape, in-person shopping is expected to rebound gradually as more consumers feel comfortable venturing beyond their homes. As an effective tool for revitalizing brick-and-mortar stores, **Geofencing** allows retailers to capture the right audience at just the right time, customizing messaging and promotions based on customer insights. This sort of contextual, location-based targeting is increasingly important in **Programmatic Advertising** as limitations arise in the use of third-party cookies.

The sensory and experiential elements associated with the physical retail space remain compelling to many, but there are new and heightened expectations around convenience, personalization, and omnichannel engagement. Meeting these expectations and providing differentiated value may mean merging the best of both in-store and online retail with **Extended Reality** technologies. Improvements in **Conversational Systems** also help drive hybrid and low-touch engagement delivered via customer service chatbots and virtual sales associates.

A central part of retail's digital transformation is optimizing supply chain operations. This sees retailers pivoting investments to technologies like AI/ML platforms, IoT, robotic process automation, and **Unmanned Deliveries**. Harnessing these technologies enables an end-to-end digitalized, traceable, and resilient supply chain while generating significant long-term cost savings for retailers.

Within this context of change, we provide a set of questions for organizations in retail to consider in the hope of nurturing fresh thinking about the future they wish to be a part of, and play an active role in helping to create.

- What if consumers are given the ability to trace their retail goods along the entire value chain?
- What if the transformation economy and metaverse combine to generate traction in the dematerialization of retail?
- What if retailers can introduce circularity into their value chains by anticipating and designing for consumer end-of-use behavior?
- What if the physical store permanently evolves into an experiential venue, showroom, and e-commerce fulfillment center?
- What if the phasing out of third-party cookies compels retailers to demonstrate tangible value in exchange for consumers' data?
- What if automation and conversational systems enable more retailers to offer customers personalization and convenience at scale?

There are countless questions to be asked about what the future holds for retail. Finding possible answers to these questions requires a systematic approach and a structured innovation strategy.

The Way Forward

Create a future competitive advantage tomorrow by defining your strategic direction today.

Making better decisions for tomorrow relies on an organization's ability to collect, understand, and act on innovation intelligence—the multitude of building blocks that make up an organization's innovation process.

Scouting the trends, technologies, startups, and other forces of change that are shaping your industry is a crucial first step in this process. But turning this information into innovation intelligence, and subsequently into action, requires additional steps and capabilities that fall within Foresight and Strategy.

Taking Trends & Technologies to Opportunities



1. Discover ITONICS Trends



2. Build Internal Consensus



3. Develop Pictures of the Future

1. Discover ITONICS Trends

Supplement the insights gained in this industry-relevant technology report with an immersion into the trend landscape.

Get started by exploring the ITONICS [Teaser Trend Radar](#) displaying the elements that are most relevant to your industry.

For a full view of the trend landscape, our [Where to Play 2021+ Trend Report](#) contains the complete ITONICS Trend portfolio, presenting 90+ Trends with real-life inspirations and rich analysis.



DOWNLOAD NOW

2. Build Internal Consensus

In establishing **Where to Play**, it is essential to gain consensus and raise alignment within your organization. This can be achieved through a process of collaborative evaluation. Invite internal stakeholders and experts to participate in rating elements—trends, technologies, scenarios, opportunities, etc.—based on unique industry- and company-specific parameters.

When undertaken in the environmental scanning stage, an internal rating exercise helps empower teams with the consensus needed to ensure strategic relevance, strengthen buy-in, and act decisively.

ITONICS has provided the following internal rating criteria for organizations to consider for trends and technologies:

Technologies

- Technology Attractiveness: How high is the potential value of the technology?
- Internal Know-How: How much internal know-how does your business possess with regard to this element?
- Need for Action: How important is it that your organization take action with regard to this element?

Trends

- Business Relevance: How relevant is this element to your business?
- Strategic Fit: How well does this element fit into your organization's overall strategy?
- Need for Action: How important is it that your organization take action with regard to this element?

The ratings above are pre-set in the ITONICS Showroom. However, organizations can tailor rating criteria to align with their own set of needs and workflows.

3. Develop Pictures of the Future

It's not enough to identify the trends, technologies, disruptive startups, and other drivers of change that are relevant to your industry and organization. To develop an innovation strategy that remains effective beyond the time horizon of key drivers, organizations need to develop realistic and plausible pictures of the future in which these various drivers will unfold. This is done through a process of **scenario planning** and is the basis for discovering future opportunities upon which to act.

Scenario planning is a strategic tool commonly used by key decision-makers, innovation leads, and strategists to find focused foresight, grounded in dependable analysis. This equips them to anticipate exposures appropriately, evaluate innovation opportunities, and inform proactive responses.

What is a scenario?

In the context of business planning and strategy, a scenario is a postulated sequence or combination of events projected to take place that could hold relevance to an organization's future state.

Developing plausible, actionable scenarios requires a systematic approach and organizational participation. It builds on the internal rating exercise, which serves to identify those trends and technologies that hold the greatest strategic relevance and potential. From here, your organization must derive the underlying drivers that are influencing its business environment and extrapolate the different trajectories each driver could take.

Plotting these trajectories against one another and engaging your team's collective and creative input reveals multiple scenario narratives. While each narrative represents a possible future for which your organization may need to prepare, internal consistency and strategic objectives point to those scenarios that should be prioritized.

Your team should prioritize the scenarios they feel hold the most strategic relevance by asking the following two questions:

- Is this a future we hope to play an integral role in creating and shaping?
- Is this a future we hope to mitigate and avoid through thoughtful tactics?

The selected scenarios form a foundational springboard from which your organization can best derive and define clear opportunities—i.e., possible solutions or responses to the various scenario narratives. Use the **ITONICS Roadmap** to plot critical scenario events and develop a timeline of innovation activities required to explore the various opportunities ahead of the horizon in which they are set to occur.

In this way, scenario planning provides organizations with the information required to act on opportunities timeously—as well as the evidence needed to develop appropriate capabilities and assets, actively shape our world, and influence outcomes as they steer towards the future.

To further your innovation journey, all the Trends, Technologies, and Inspirations selected as most relevant to retail can be found on the ITONICS Innovation Platform using the saved filter: **Retail Industry**.

The ITONICS solution supports end2end innovation management, from environmental scanning and trend and technology management to building internal consensus and roadmapping.

REGISTER



About ITONICS

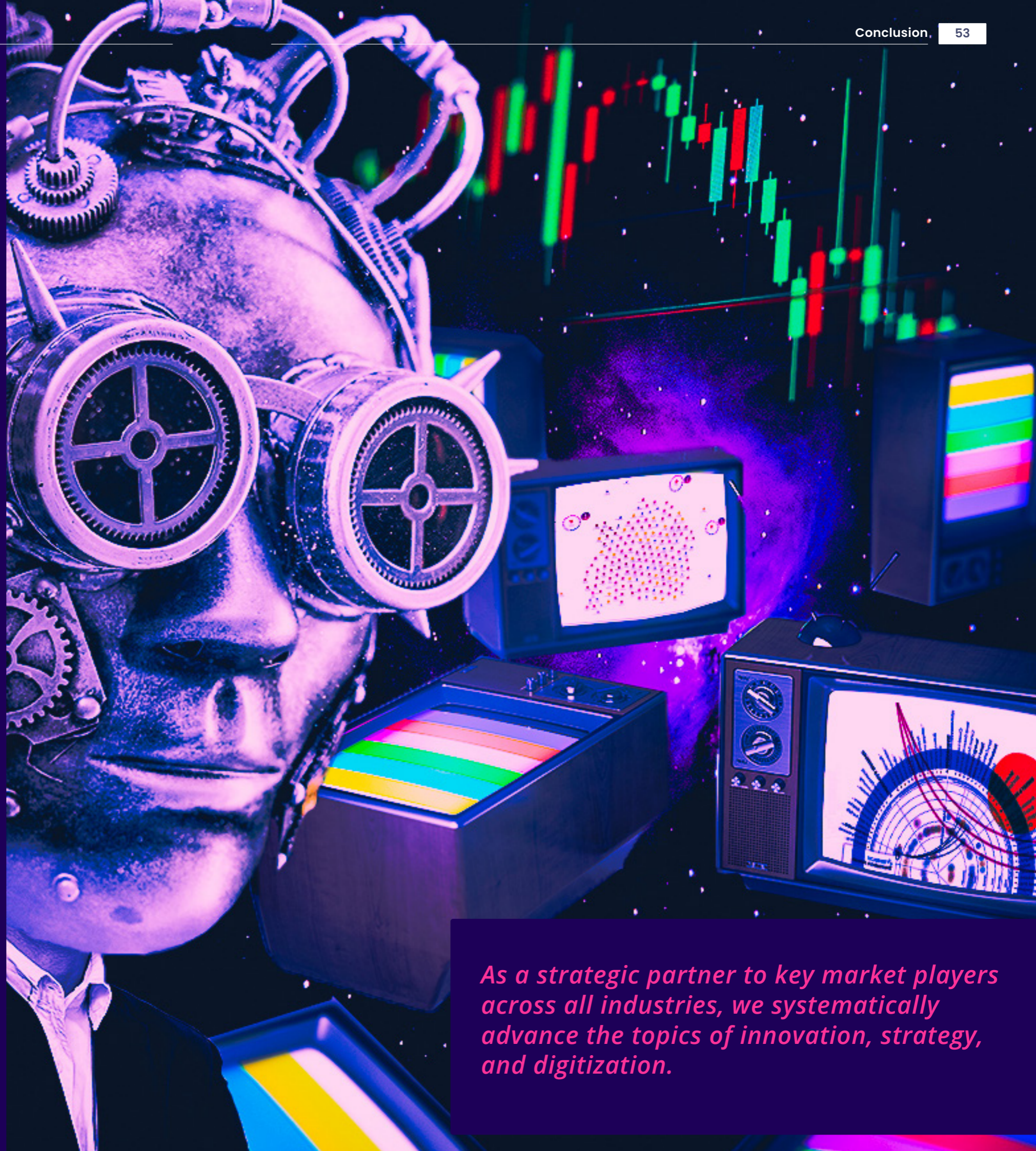
We build AI-powered SaaS to innovate, grow, and disrupt.

Our data-driven software platform helps organizations around the globe to identify emerging technologies, trends, and market potentials and translate them into powerful growth strategies.

Supported by artificial intelligence, companies can manage their entire innovation process in a modular software suite to efficiently achieve their business goals and remain future-proof.

Working with global teams to innovate new products, services, and business models, ITONICS professional services inspire, guide, and accompany organizations on their innovation journey. With more than 115 experts on four continents, we support innovation leaders such as adidas, AUDI, CISCO, Intel, Johnson & Johnson, and SAP.

As a strategic partner to key market players across all industries, we systematically advance the topics of innovation, strategy, and digitalization.



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What's Next

Turn Innovation Intelligence into Action

Your digital toolbox for game-changing innovation

- Industry-specific Trend and Emerging Technology Radars
- Strategic Roadmaps that guide you into the future
- Lean Portfolios to manage ideas, technologies, projects, and opportunities

Free access to inspiring insights & content updates

- Access to 6 million+ signals to uncover insights at large scale
- 90+ Trends, 85+ Emerging Technologies updated annually
- 7,000+ freshly curated inspirations maintained

Dependable thought leadership & advisory services

- Free innovation maturity assessment
- Exclusive access to COFIM Masterclass content
- Access to our international innovation community

You can find us around the globe



ITONICS is a leading SaaS provider of systematic innovation management. The ITONICS Innovation OS combined with a systematic framework to steer innovation efforts helps companies to identify emerging technologies, trends, and market potential and to translate them into customized growth strategies.

With more than 150 experts worldwide, we support innovation leaders such as adidas, AUDI, BMW, CISCO, Intel, Johnson & Johnson, and KPMG.

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