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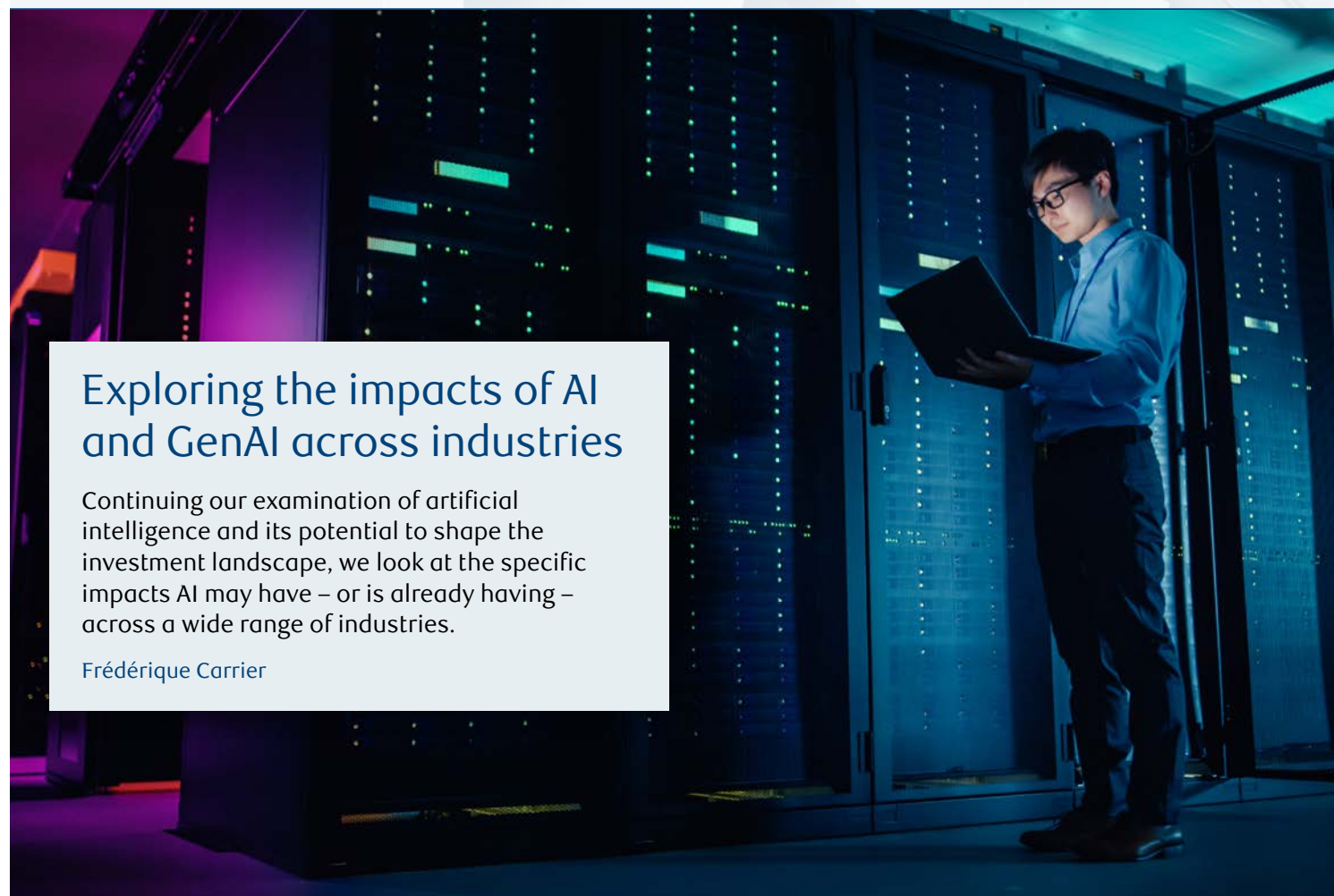
Special report

October 2024

Exploring the impacts of AI and GenAI across industries

Continuing our examination of artificial intelligence and its potential to shape the investment landscape, we look at the specific impacts AI may have – or is already having – across a wide range of industries.

Frédérique Carrier

Special report

Exploring the impacts of AI and GenAI across industries

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Artificial intelligence—and particularly its newest iteration, generative artificial intelligence, or GenAI—could bring significant changes to the way we live, work and interact with one another. In a recent Global Insight Special Report, "Generative AI: enablers and adopters," we explored GenAI and the ecosystem surrounding it. Now, we take a deeper dive into the specific impacts AI and GenAI are likely to have, or are already having, on a wide range of industries, as well as their potential to create entirely new industries.

This report highlights key findings from a new RBC Capital Markets report, "A cross-sector view of GenAI," part of the RBC Imagine global research initiative focusing on the disruptive forces transforming our world.

Technology businesses

RBC Capital Markets believes software and Internet companies are in the early stages of a disruptive transformation, with GenAI creating enticing opportunities—and at the same time, significantly enhancing the threat of cybercrime.

Software

Software vendors and customers with clear strategies for leveraging GenAI technology could see revenue growth accelerate and margins expand over the next three to five years. Three primary factors are likely to drive these potential benefits, in their view.

1. Improved pricing power

Software companies are releasing standalone GenAI products for an additional cost per user. Customers, in turn, are becoming increasingly willing to pay for solutions that enhance their return on investment.

For example, Microsoft Copilot integrates GenAI technology into the company's suite of products, with pricing plans tailored for individuals, business users, and enterprise deployments. Copilot has also been integrated into GitHub, a Microsoft-owned software service company that helps developers manage and collaborate on source code. In Q2 2024, 1.3 million GitHub Copilot individual subscribers and over 50,000 business subscribers leveraged the technology.

2. Developer productivity enhancement and development cost reduction

The greatest benefits of GenAI for software developers, according to a recent study by McKinsey & Company, are in expediting the manual work

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of coding, jump-starting a first draft of code, and accelerating updates to existing code. The study estimates software developers can complete coding tasks up to twice as quickly by leveraging GenAI. But despite these advances, human examination of the code for bugs and errors remains necessary.
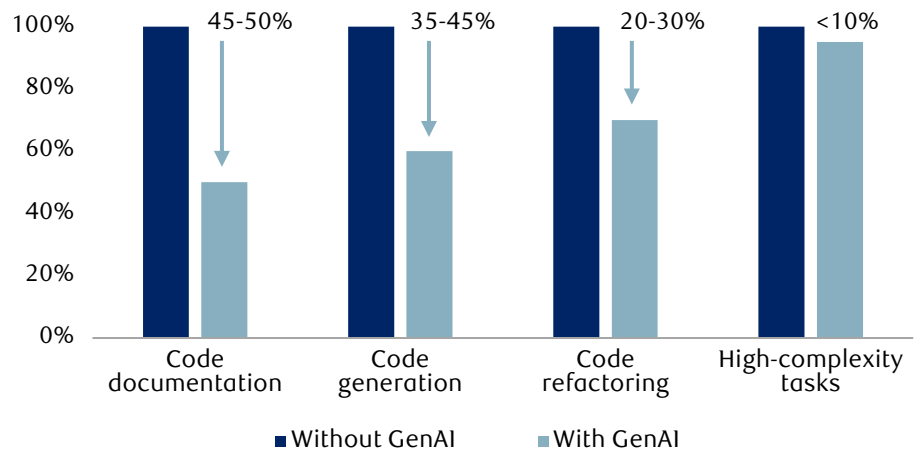
Over time, leveraging GenAI capabilities should result in faster product launches, enhanced features, better flexibility to resolve issues, and ultimately, higher return on investment.

3. Automation of basic tasks in customer service and data collection

RBC Capital Markets believes both software vendors and their customers will be able to automate low-level tasks. This could create opportunities to optimize both the cost structure and the approach to staffing, enabling companies to allocate more human resources to strategic and relationship-building roles—positions which tend to have a greater impact on corporate profitability and competitiveness.

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GenAI can reduce the time it takes to complete developer tasks, especially simpler ones

Potential improvement in software development productivity by task category

Task	Improvement
Code documentation	45-50%
Code generation	35-45%
Code refactoring	20-30%
High-complexity tasks	<10%

Legend: ■ Without GenAI ■ With GenAI

Source - McKinsey & Co, "Unleashing developer productivity with generative AI"; RBC Capital Markets

Cybersecurity considerations

Beyond these positive developments, GenAI may also substantially increase the need for security due to increasing data volumes. According to the National Cybersecurity Center (NCC), a U.S. organization focused on cybersecurity policy, AI will almost certainly increase both the volume and the impacts of cyberattacks over the next two years. Though all types of cyberthreat actors are already using AI to varying degrees, AI has lowered the barriers to entry for novice cybercriminals and increased the global ransomware threat, in the NCC's assessment.
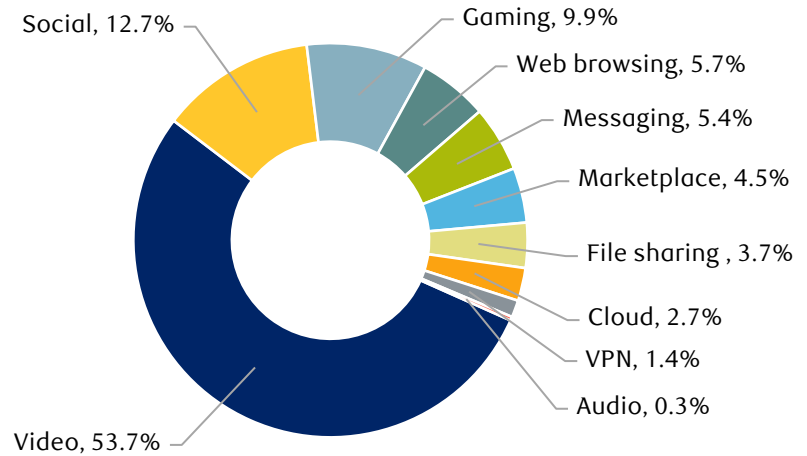
Internet

For Internet companies, GenAI will likely have the biggest end-market impact in the area of digital marketing. GenAI looks set to transform

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Video currently accounts for the lion's share of internet traffic

Social, 12.7%
Gaming, 9.9%
Web browsing, 5.7%
Messaging, 5.4%
Marketplace, 4.5%
File sharing , 3.7%
Cloud, 2.7%
VPN, 1.4%
Audio, 0.3%
Video, 53.7%

Source - RBC Capital Markets, company reports

content creation spanning channels from text to video, while creating tools that support deeper analysis of technical issues.

Personalized platforms will likely emerge and generate completely new types of interactions and experiences thanks to GenAI and other technologies such as virtual reality and augmented reality.

For instance, AI could power a virtual personal shopper that uses augmented reality to show the customer how clothing items would look on them in real time. This personalised platform could analyse the user's online behaviour, past purchases, and style preferences, and use this information to curate a customized shopping experience including promotions based on previous shopping habits.

Deeper interactions with the audience can, in turn, enable Internet companies to extract more value from the data they gather.

Developments to watch for include AI-driven avatar continuity and portability (i.e., having the same avatar in different virtual worlds run by different companies), virtual reality gaming, and personal re-creations and projections (i.e., the ability to generate new, personalised content based on user input, in effect a creative collaboration between humans and AI), among other possibilities.

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Energy, Utilities, and Infrastructure

Energy demand is set to grow at an even faster pace due to the proliferation of data centres that are indispensable for AI and GenAI services.

GenAI requires significantly more computing power than traditional machine learning because GenAI models must be trained on huge data sets and greater processing power is needed to produce human-like responses.

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Data centres, already a vital component of the infrastructure required to support the transition to a digital economy, can be as large as multiple U.S. football fields and host many thousands of servers that process and store information.

Growth in the number and size of these facilities is driving a rapid increase in power consumption. Several industries are poised to benefit from this trend.

Natural gas power generation

As data centre operators prioritize a reliable supply of electricity despite a widespread focus on sustainability and clean energy, incremental gas generation will be needed to satisfy their electrical power needs, in RBC Capital Markets' view. Unlike solar or wind power, gas power plants are able to respond rapidly supply shortages and changes in demand.

Natural gas infrastructure (pipelines, storage, gathering, processing and compression)

To support incremental gas generation, capacity expansions on natural gas pipelines are needed. Capacity expansion can take several forms, including installing more compression stations to increase the volume of gas a pipeline can carry, constructing lateral pipelines, and twinning or looping of existing pipelines.

> Data centre operators prioritize a reliable supply of electricity despite a widespread focus on sustainability and clean energy.

Natural gas infrastructure growth in the U.S. has lagged natural gas demand growth over the past decade, pushing up pipeline utilization rates to unsustainable levels. Kinder Morgan, which transports roughly 40 percent of natural gas in the U.S., reported that its average pipeline utilization rate was 87 percent in 2023, with pipelines sometimes running at 100 percent capacity.

These infrastructure needs could provide attractive long-term growth opportunities for pipeline companies. We think incumbent providers with expansion capabilities and existing rights-of-way are best positioned to benefit, as new-build pipe projects are often restricted by complex planning approval processes.

Industrials

Several industrial sectors are likely to benefit from GenAI adoption, including both industries that support the growth of AI and those that stand to benefit directly from AI capabilities.

Electrical solutions: liquid cooling

New and larger data centres house an ever greater number of servers in densely spaced racks—specialized structures that hold multiple processing units, storage devices, and related equipment. In operation, these racks generate large amounts of heat that can reduce server performance and damage sensitive components. As rack densities and power demands increase, interest in liquid cooling solutions is growing.

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At least $100 billion of investments in data centre projects have been announced in North America since January 2023.

New solutions at scale require power in the mid-20 kilowatt (kW) range for each server rack, with some densities already above that level, well beyond the eight to 10 kW common in data centres today. In the 30 kW per rack range—where NVIDIA is already operating test environments—liquid cooling emerges as the more viable and cost-effective solution compared to traditional air cooling systems.

The focus on environmental sustainability by governments regulating the growth of data centres is also contributing to the increased adoption of liquid cooling solutions, which are more effective and use less energy.

Anecdotally, nVent, an electrical solutions company, believes that only five percent of data centres currently use liquid cooling, a technology whose use is growing three times faster than that of legacy air cooling.

At least $100 billion of investments in data centre projects have been announced in North America since January 2023, according to RBC Capital Markets, which notes that many will employ designs that accommodate liquid cooling technologies. Among these is a new $800 million data centre from Facebook parent Meta Platforms that will use liquid cooling to support AI workloads. RBC Capital Markets estimates the total addressable market for liquid cooling solutions is in the range of $2.5 to $4.0 billion, with a potential compound annual growth rate of 30 percent or more over the next five years.

Aerospace and defence

Artificial intelligence is being leveraged to expand capabilities within defence, including drone swarms and target recognition. The U.S. Air Force is developing uncrewed systems to advance its air superiority; of particular significance is the use of drones as "wingmen" in support of manned fighter aircraft. Incorporating AI into uncrewed systems is scalable and can increase battlefield survivability, while offering capabilities comparable to those of manned aircraft but with significantly lower costs. AI has also been instrumental in the development of loitering munition systems, or suicide drones, which identify a target and attack by crashing into it.

In commercial aerospace, AI is currently being used for a wide variety of functions, including intelligent factory automation, predictive aircraft maintenance, quality control, and supply chain optimization.

Automobiles and auto parts

Artificial intelligence will likely play an increasingly important role in both advanced assisted driving systems and fully autonomous vehicles.

In advanced assisted driving systems, a driver must supervise and drive even if support features are engaged, for instance if the driver's feet are not on the pedals. Support features include steering, braking and acceleration, and cruise control. Within these support systems, machine learning can be useful in dealing with obstacles like debris in the roadway, vulnerable road users such as pedestrians or cyclists, and blind spots.

By contrast, in fully autonomous vehicles, human drivers have no involvement whatsoever. Current applications include General Motors

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GenAI has potential applications in improving outcomes for both patients and health care providers.

Company's Cruise and Alphabet's Waymo. RBC Capital Markets expects global market penetration of AV to be just two percent in 2030, but applications for commercial trucking could appear as soon as 2025–2026.

Autonomous vehicles would likely use GenAI to:

- predict the movements of pedestrians and other vehicles, anticipate hazards, and adjust the vehicle's driving style;

- find efficient routes;

- determine when to accelerate, decelerate, change lanes, or stop;

- enable the use of voice recognition as the vehicle interacts with passengers.

Financials

Artificial intelligence is a key theme across all segments of the financial industry. In wealth management, GenAI has several potential benefits in terms of augmenting financial advisors' expertise, boosting productivity, and enhancing client service.

GenAI tools can enable advisors to engage in more customized and more frequent communication with clients by streamlining the production of advice documentation, pre-populating client emails, or tailoring client meeting preparation notes. By freeing up time spent on written communications, advisors can have more time to undertake verbal communication and face-to-face interactions with clients.

Health Care

GenAI has potential applications in improving outcomes for both patients and health care providers. The examples below highlight opportunities for AI along the various stages of the patient journey.

- **Self-triage:** AI can help individuals decide whether professional medical help is required by checking symptoms and guiding the individual to the proper care setting;

- **Patient intake:** after an in-person appointment is scheduled, AI can help streamline the patient intake process by replacing the "clipboard" approach traditionally used in waiting rooms.

- **Streamlining clinical documentation:** Canadian general practitioners spend some 40 percent of their working hours on administrative tasks such as writing sick notes and filling out insurance forms for patients according to a survey by the Ontario College of Family Physicians. Similar percentages are observed in other geographies. Using AI can reduce this burden, freeing up time to care for patients.

- **Targeted drug marketing:** AI can be used to deliver relevant content such as financial assistance opportunities to providers at the point of prescription on behalf of pharmaceutical companies. For example, if

Artificial intelligence is finding applications in optimizing the global supply chains that underpin consumer products businesses.

a provider is considering prescribing a drug, but the patient can only afford another, less effective one, any discount programs available to improve affordability of the most effective drug would be highly relevant for the patient.

- **Medical imaging:** After an initial visit, a provider may also order a scan. AI can be used to help identify anomalies and potential areas of concern, leading to more precise diagnoses, lower costs, and faster turnaround times.

- **Clinical decision support:** After receiving the results of different lab tests or pathology reports, the physician can then move forward with a diagnosis and/or refer the patient to a specialist. AI can help by gathering data and connecting physicians to peers for collaboration with the goal of selecting the optimal care pathway that best aligns costs and outcomes.

- **Data consolidation:** if surgery is required, AI can consolidate imaging data, surgical videos, and patient risk factors, and deliver actionable insights.

- **Ongoing patient engagement and remote patient monitoring: Once** treatment has begun, AI can gather data from and engage with patients, either by helping them manage chronic conditions or remain engaged by reminding them to take certain medications or attend a certain appointment.

Similarly, in the Medical Supplies and Devices industry, GenAI has the potential to drive efficiency and innovation, which in turn should bring down costs and deliver better patient outcomes.

Consumer products

GenAI applications can enhance the personalization of product offerings by leveraging consumer data, as well as improving supply chain management.

The Beauty Genius app, developed by multinational beauty products company L'Oréal Paris, shows the potential of GenAI to personalize consumer experiences. The app creates diagnostics and product recommendations to consumers overwhelmed by choice. L'Oréal estimates Beauty Genius can increase the sales conversation rate at a typical beauty products counter to 73 percent from 11 percent. The app also brings in additional consumer data, which can inform future innovation plans.

Artificial intelligence is finding applications in optimizing the global supply chains that underpin consumer products businesses. Procter & Gamble incorporated AI into an initiative aimed at building an end-to-end synchronized, sustainable, and resilient supply chain, and the company estimates that the supply chain improvements have yielded up to $1.5 billion in savings annually. The company is now using AI to unlock incremental savings in critical areas such as transportation, where it sees an opportunity of over $300 million in annual savings by minimizing idle time for drivers, optimizing truck loads, and establishing dynamic routing.

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A technological tsunami?

In our assessment, the development of AI technologies including the adoption of GenAI is poised to become a disruptive megatrend and transform many businesses. However, it may take many years to understand the full potential of these technologies, as the impacts could take some time to unfold. Moreover, the adoption of GenAI may be held back by challenges such as ensuring accurate responses to user input and eliminating the "hallucinations" that occur when the responses produced deviate from reality, as well as by the need to keep users' data private. And because GenAI is an expensive technology, using it to replace human workers in entry-level positions may not always make financial sense.

History shows that investors tend to overestimate the short-term benefits of promising new technologies, but underestimate their long-term impacts. We believe this is true of artificial intelligence today. As GenAI is rolled out across a wide range of industries, it will be important for investors to keep abreast of new developments in order to understand how this potentially transformational technology is driving changes in the investment landscape.

Research resources

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