



Search in an AI world

Navigating the transformation of digital discovery

White paper
November 2025

Executive Summary

The rise of AI-powered search represents the most significant transformation in information discovery since Google revolutionised web search with its PageRank algorithm in 1998. The current shift from keyword-driven queries to conversational AI interactions is fundamentally disrupting how people find information online, and how businesses achieve digital visibility. And it's just the beginning...

Key Findings:

- Generative AI adoption has grown significantly in 2025, with over 35% of Americans now using these tools. Among AI users, approximately 44% consider it their primary search tool. Worldwide, the user base has reached 900 million people, accounting for about 11% of the global population.⁽¹⁾
- Traditional search advertising, a \$200+ billion industry, faces existential disruption as AI provides direct answers without displaying ads.⁽²⁾
- Voice and visual search now account for over 20% of all queries, requiring businesses to optimise beyond text-based content.⁽³⁾
- AI agents are evolving from answering questions to autonomously completing tasks, fundamentally changing customer acquisition channels
- Regulatory frameworks worldwide are rapidly adapting to address AI's impact on competition, transparency, and market dominance.

Strategic Imperatives:

Organisations must begin implementing Generative Search Optimisation (GSO) strategies, focusing on structured data, conversational content, and direct AI platform integrations. Those who adapt quickly will likely increase their digital visibility in a world where AI becomes the primary interface between users and information. Those ignoring these changes simply risk digital invisibility...

This white paper by [CollectiveIntelligence.ai](#) provides a high level framework for understanding and navigating the AI search revolution, as well as actionable recommendations tailored to business size, industry, and resources.

(1) eMarketer, as reported in Digiday (15 July 2025), [AI is driving more traffic, but not offsetting 'zero-click' search](#); McKinsey (16 October 2025), [New front door to the internet: Winning in the age of AI search](#); Resourcera.com analysis (12 September 2025), [Global AI Users \(2025\) Insights on 900 Million Active Users](#)
(2) PYMNTS (5 May 2025), ["Beyond Search: Google Eyes AI Chatbots as New Ad Territory."](#) (3) Kumar, N. & DemandSage. (8 May 2025), ["68 Voice Search Statistics 2025."](#)

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1

Introduction: the end of search as we know it

In January 2025, MIT Technology Review's Editor in Chief Matt Honan declared: "AI means the end of internet search as we've known it."⁽⁴⁾ This statement captures the magnitude of transformation currently reshaping how billions of people find information online.

The catalyst for this disruption was OpenAI's ChatGPT, which reached 100 million users within two months of its November 2022 launch—the fastest adoption of any consumer application in history⁽⁵⁾. This unprecedented growth signaled a fundamental shift in user preferences: from scanning lists of links to engaging in natural conversations with AI. This preference was further strengthened by new AI tools, such as Perplexity or the 'web search' option of ChatGPT, able to access the web and provide up to date sources for their replies.

Today, we stand at an inflection point. Traditional search engines, which have dominated digital discovery for over two decades, face competition from AI assistants that don't just find information—they understand, synthesise, and act on user requests. And traditional search firms like Google are also adapting and changing the way we interface with information. For businesses that have built their digital presence on traditional Search Engine Optimisation (SEO) and search advertising, this transformation demands urgent strategic adaptation.

The implications extend far beyond marketing departments. When AI becomes the primary interface between consumers and information, it reshapes entire business models. Companies that spent decades optimising for Google's traditional search algorithms must now consider how to be recommended by new AI interfaces (be it ChatGPT, Perplexity, Claude or even Google's own AI Overviews results). Brands that invested millions in traditional search advertising must reconsider how to achieve visibility in this new paradigm.

This white paper examines the current state of AI-driven search, analyses emerging patterns and behaviors, explores the regulatory and competitive landscape, and provides actionable strategies for maintaining visibility in this rapidly evolving ecosystem.

(4) Honan, M. (6 Jan 2025), "[AI means the end of internet search as we've known it.](#)" MIT Technology Review.

(5) Reuters. (2 Feb 2023), "[ChatGPT sets record for fastest-growing user base.](#)"

2

The evolution of search: from directories to AI agents

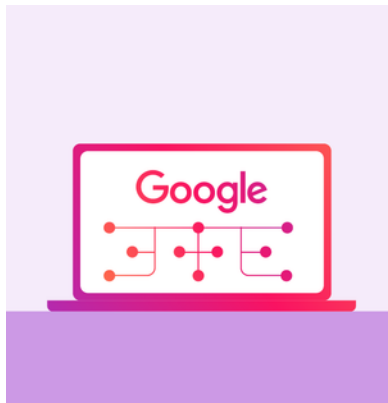
The three ages of search

The history of online search can be understood through three distinct eras, each characterised by different technologies, user behaviors, and business strategies.



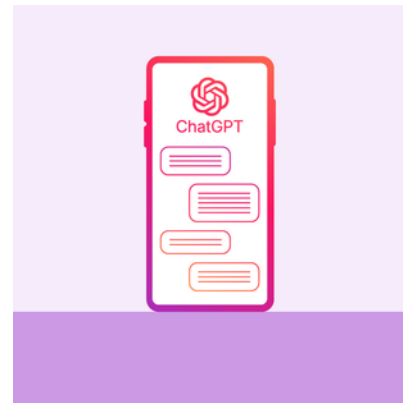
1990s The Directory Era

Services like Yahoo! Directory and DMOZ employed human volunteer editors to categorise websites into hierarchical structures. Users would navigate through categories to find relevant sites. For businesses, success meant getting listed in the right categories through manual submission processes. The primary limitation was scale—human curation couldn't keep pace with the exponential growth of websites⁽⁶⁾.



2000 - 2022 The Algorithmic Era

Google's PageRank algorithm analysed the web's link structure to determine authority and relevance, treating links as votes⁽⁷⁾. This algorithmic approach could scale with the web's growth and democratised visibility—anyone could potentially rank for keywords by understanding the algorithm. This era spawned the Search Engine Optimisation (SEO) industry and Google's AdWords advertising and monetisation model.



2022⁽⁸⁾ - Present The Conversational Era

Large language models enable users to express needs naturally and receive direct answers. The transition accelerated with ChatGPT's demonstration that AI could engage in sophisticated, multi-turn conversations on virtually any topic⁽⁹⁾. Instead of translating thoughts into keywords, users can now have natural dialogues with AI systems that are increasingly able to provide sources for their analysis and fully redacted outputs.

(6) Sullivan, D. (27 Feb 2021), "[20 Years of SEO: a brief history of Search Engine Optimisation.](#)" Search Engine Land.

(7) Brin, S. & Page, L. (Apr 1998), "[The Anatomy of a Large-Scale Hypertextual Web Search Engine.](#)" Computer Networks and ISDN Systems.

(8) ChatGPT 3 became available to the public in Jun 2020 and widespread usage started with ChatGPT3.5 in Nov 2022.

(9) Brown, T. et al. (22 Jul 2020), "[Language Models are Few-Shot Learners.](#)" OpenAI.

The current search landscape

Today's search ecosystem has fragmented into multiple parallel systems, each serving different user needs and preferences. This fragmentation represents both a challenge and an opportunity for businesses seeking visibility.

To quote a recent post from Andreessen Horowitz⁽¹⁰⁾ "As the format of the answers changes, so does the way we search. AI-native search is becoming fragmented across platforms like Instagram, Amazon, and Siri, each powered by different models and user intents. Queries are longer (23 words, on average, vs. 4 in traditional search), sessions are deeper (averaging 6 minutes), and responses vary by context and source. Unlike traditional search, LLMs remember, reason, and respond with personalized, multi-source synthesis. This fundamentally changes how content is discovered and how it needs to be optimized."

| | | | |
|-----------------------------------|---|--|---|
| Traditional search engines | Google is rapidly integrating AI via Search Generative Experience ⁽¹¹⁾ to defend its ~90% market share | Bing reached 100+ million daily active users after ChatGPT integration ⁽¹²⁾ | Both attempting to preserve advertising models while meeting conversational expectations |
| Standalone AI assistants | ChatGPT leads with 400+ million weekly active users ⁽¹³⁾ | Competitors like Claude, Perplexity carve specialised niches | AI assistants currently operate without traditional advertising, relying on subscriptions |
| Voice assistants | 20% of global population actively uses voice search ⁽¹⁴⁾ | 154 million Americans use voice assistants for daily tasks ⁽¹⁵⁾ | 76% of voice searches are very local (e.g. nearby restaurant, etc.) ⁽¹⁶⁾ |
| Visual search | Google Lens processes 20+ billion searches monthly ⁽¹⁷⁾ | Pinterest handles 570 million monthly visual searches ⁽¹⁸⁾ | Transforms physical world into searchable interface |
| Social discovery | Nearly 40% of Gen Z use TikTok/Instagram for local discovery ⁽¹⁹⁾ | Algorithm-driven discovery replaces active search | Peer perspectives are prioritised over authoritative sources |

This fragmentation of search across multiple platforms and modalities means businesses can no longer rely on a single online strategy for visibility. Success requires understanding how each platform operates, what users expect from each context, and how to maintain consistent visibility across an increasingly complex discovery ecosystem.

In particular firms will need to better understand the search patterns and behaviours of their target segments to make themselves easily discoverable. The organisations that thrive will be those that view this complexity not as a burden but as an opportunity to connect with users wherever and however they prefer to search.

(10) Zach Cohen, Seema Amble (28 May 2025), "How Generative Engine Optimization (GEO) Rewrites the Rules of Search", Andreessen Horowitz.

(11) StatCounter (2025), "Search Engine Market Share Worldwide." Accessed in July 2025.

(12) Cuthbertson, A. (9 Mar 2023), "Bing passes 100 million users as ChatGPT helps close gap to Google." The Independent.

(13) Reuters, OpenAI, (20 Feb 2025), "OpenAI's weekly active users surpass 400 million ChatGPT User Statistics." OpenAI Blog.

(14) Kumar, N. (8 May 2025), "Voice Search Statistics 2025." DemandSage.

(15) eMarketer. (14 Apr 2025), "Voice assistants: How they are evolving and what they offer marketing and commerce Voice Assistant Users in the US."

(16) Paget, S, BrightLocal (29 Jan 2025), "Local Consumer Review Survey 2025."

(17) Goode, L. (3 Oct 2024), "Google's Visual Search Can Now Answer Even More Complex Questions." WIRED.

(18) Pinterest,. (8 May 2025), "Quarterly Results Q1 2025 Visual Search Statistics." Pinterest Business.

(19) Perez, S. Prabhakar, R. (12 Jul 2022), "Google exec suggests Instagram and TikTok are eating into Google's core products, Search and Maps." TechGoogle Blog.

3

Disruption of traditional search models

From links to answers: a fundamental shift

Traditional search matched keywords to documents, leaving users to synthesise information. AI fundamentally alters this relationship in several ways.

Context understanding vs. keyword matching

AI systems understand intent and context at a deeper level. When a user asks, "What's a good laptop for a college student majoring in graphic design with a budget around \$1,500?" AI understands this as a multi-constraint optimisation problem rather than just matching keywords⁽²⁰⁾.

Information synthesis vs. retrieval

Rather than presenting links, AI systems actively compile information from multiple sources to create unified answers. This "answer engine" approach means users receive coherent information without visiting websites. This shifts from knowledge having to be actively acquired to knowledge generated by an AI being simply consumed. This may be convenient for users but threatening to traditional web marketing channels.

Conversational flow

AI maintains context across interactions, allowing natural follow-up questions. This creates a guided discovery experience impossible with traditional search, where each query stands alone⁽²¹⁾. The focus for search providers is shifting from optimising algorithms that deliver the best response with minimal input, to designing a rich and engaging search dialogue.

The end of advertising as we know it

Google's parent company Alphabet generated \$350 billion in revenue in 2024, with the majority (c. 57%) from search advertising⁽²²⁾. This model depends on users viewing search results pages where ads can be displayed. When AI provides direct answers, this entire model faces existential threats.

AI assistants currently operate without awareness of traditional advertising, fundamentally reshaping the current ad-based search business model. Unlike human users, AI agents evaluate information based solely on relevance and accuracy, immune to ads/promotions.

Emerging monetisation models

New pricing models are emerging as new AI products become available. Below are a few monetisation examples that could become prevalent in the search market.

| Monetisation model | Example |
|-----------------------|--|
| Subscription Services | ChatGPT Plus (\$20/month), Claude Pro (\$20/month) demonstrate viable demand ⁽²³⁾ |
| Commission-Based | AI earns fees for completed transactions |
| Contextual Promotions | Ads embedded within conversational flows |
| API Access Fees | Businesses pay for real-time integration (i.e. OpenAI prices per 1 million tokens) |
| Ecosystem Model | AI is provided as part of a wider bundle/ecosystem of services, e.g. part of a subscription bundle or using prompt data to target advertising elsewhere in the ecosystem |

(20) Mitra, B. & Craswell, N. (May 2024), "Neural Models for Information Retrieval." Now Publishers.

(21) Vaswani, A. et al. (12 Jun 2017). "Attention Is All You Need." Cornell University.

(22) Alphabet Inc. (Apr 2025). "Annual Report 2024."

(23) OpenAI and Anthropic (Jul 2025). "ChatGPT and Claude Pricing."

While traditional advertising may become less relevant to the search process, new forms of advertising may become embedded in how search results are presented to users by AI bots (with banners relevant to the conversation, or direct links in the AI-generated conversations).

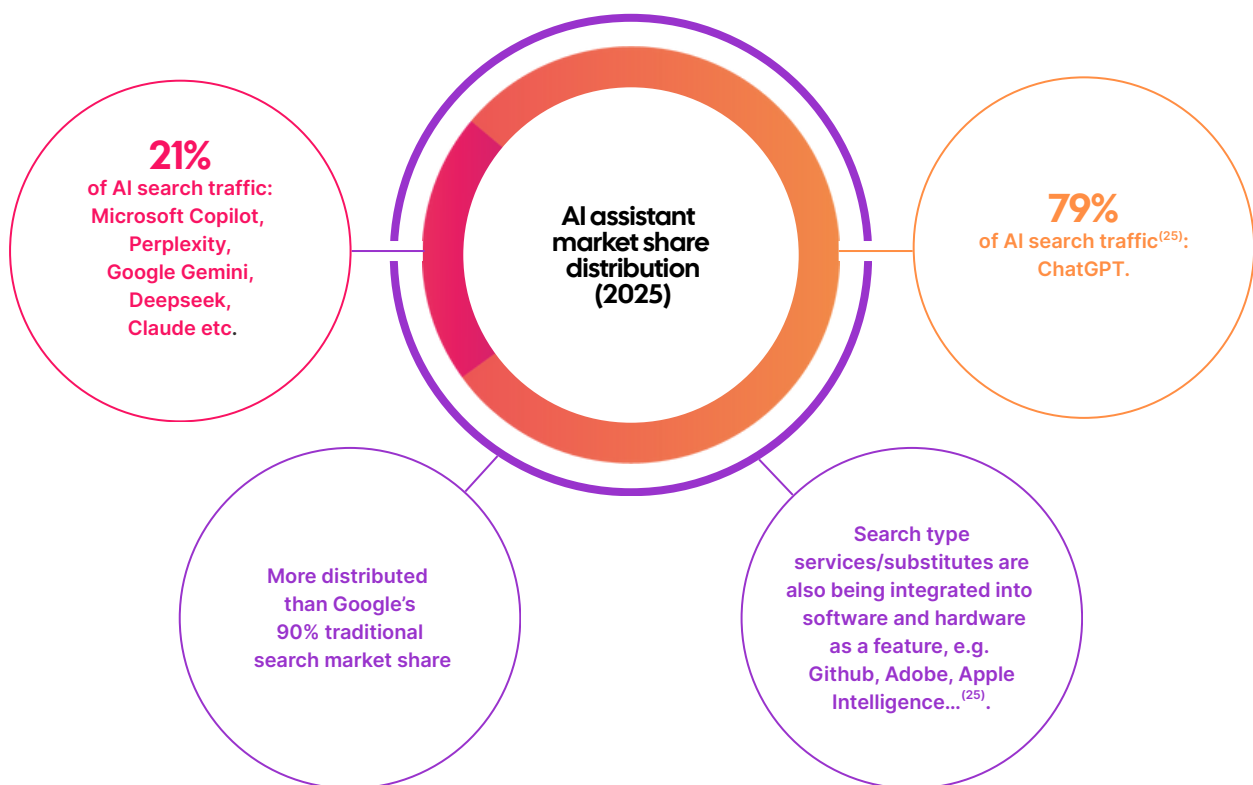
Competitive dynamics

Traditional search providers competed primarily on relevance and speed. Google became the market leader by building the best ranking algorithm and the fastest, most comprehensive index. But a shift from the “attention economy” characterised by fleeting interactions across social media platforms to the AI driven “intimacy economy” with its deep and personalised relationships, is under way⁽²⁴⁾. AI search now competes on different dimensions: conversational ability, reasoning capability, personality and tone, specialised knowledge, and integration capabilities. These factors create opportunities for differentiation that didn't exist in traditional search. Perplexity, for example, has carved out a niche by providing AI answers with clear and verifiable source citations with links.

The AI search market now shows unprecedented diversity compared to traditional search:

Barriers to entry are also fundamentally different. Building a traditional search engine requires crawling billions of web pages, building massive indices, and operating global infrastructure—investments measured in billions of dollars. Building an AI search assistant requires access to a large language model (increasingly available via API or open source), a conversational interface, and potentially some real-time data sources. While training cutting-edge models remains expensive, the cost of deploying AI search experiences has dropped dramatically, enabling new entrants.

This isn't just about technology but about reimagining what search means. Is it finding information? Getting answers? Completing tasks? Having a thought partner? Different companies are betting on different visions, and the winner may be determined not by who has the best technology but by who best understands what users actually want from an AI-powered information interface.



Key differentiators

Conversational ability and reasoning capability

Specialised knowledge domains

Integration with existing services

Trust and transparency features

(24) Bozdağ A. (Dec 2024), “The AI-mediated intimacy economy: a paradigm shift in digital interactions”
 (25) Statcounter, “AI Chatbot Market Share Worldwide”, Accessed on 18 July 2025.

4

Emerging search behaviors and discovery patterns

Four new search behaviours have recently emerged, including voice search, visual search, social discovery and AI agents powered search & discovery.



Voice search: The conversational revolution

Voice search represents one of the most significant behavioral shifts in how people seek information. No longer confined to simple commands like “call mom” or “set a timer,” voice search has evolved into a sophisticated interface for complex queries. Approximately 20% of the global population actively uses voice search, with 154 million Americans relying on voice assistants for daily tasks ranging from weather updates to product purchases. This widespread adoption has created new patterns and expectations that businesses must understand and address⁽²⁶⁾. Voice search language patterns differ fundamentally from typed queries. When typing, users have been trained by decades of keyword-based search to strip their queries down to essential terms. Someone looking for Italian restaurants might type “Italian restaurant downtown Chicago.” Speaking to a voice assistant, that same person is more likely to ask, “What’s a good Italian restaurant downtown that’s open right now?” The query is longer, more conversational, and includes implicit context like temporal requirements and quality judgments. These conversational patterns reveal important insights about user intent. Voice searches tend to be more action-oriented, with users often ready to make immediate decisions. Research indicates that 76% of voice searches have local intent, with users seeking businesses, services, or information relevant to their immediate geography⁽²⁷⁾. The “winner-takes-all” dynamic of voice search creates unprecedented competitive pressure. When a user asks Alexa for “the best pizza place nearby,” they typically receive a single recommendation, not a list of options to evaluate.

This fundamentally changes the value proposition of search ranking. Being second in traditional search results still generates significant traffic; being second in voice search often means complete invisibility. This dynamic has pushed businesses to optimise aggressively for featured snippets and position zero—the direct answer boxes that voice assistants often read from. For suppliers, establishing a position of trust will be a key value differentiator, and could commend a premium for any product placement, or recommendation.



Visual search: The camera as search box

Visual search technology has transformed smartphones into universal product scanners and information retrievers. Google Lens alone processes over 20 billion searches monthly, a figure that would have seemed fantastical just five years ago⁽²⁸⁾. This explosive growth reflects a fundamental truth: a picture is worth a thousand words. This visual search trend is likely to consolidate as new products such as Meta glasses (RayBans) enter the market⁽²⁹⁾. The use cases for visual search extend far beyond simple object identification. Travelers use it to translate menus and signs in foreign languages. Shoppers photograph items in stores to find better prices online. Students capture complex equations to obtain step-by-step solutions. Gardeners identify plants and diagnose diseases. Fashion enthusiasts find where to buy outfits they see on the street. Each use case represents a search that might have been difficult or impossible to express in words. Pinterest has emerged as an unexpected leader in visual search, with almost 600 million monthly visual searches on its platform. The company’s approach differs from Google’s universal search ambitions, focusing specifically on lifestyle categories like fashion, home decor, and food.

(26) Kumar, N. (8 May 2025). “Voice Search Statistics.” DemandSage.

(27) Shum, A., Seoprofy (7 Jun 2025). “76 Local SEO Statistics for 2025.”

(28) Google, (Nov 2024). “How well do you know Google Search?” Think with Google.

(29) While these glasses are not technically smartphones, they enable some form of visual search or hybrid search since keywords need to be used to trigger a search on what the wearer is looking at.

This specialisation has allowed Pinterest to build features like “Shop the Look,” where users can buy items directly from visual search results, creating a seamless path from inspiration to purchase.

For businesses, visual search optimisation requires rethinking fundamental assumptions about content. Traditional SEO focused on text—keywords, meta descriptions, headers. Visual search optimisation focuses on images themselves: quality, clarity, context, and metadata. A product photograph needs to clearly show the item from multiple angles, in realistic settings, with enough detail for AI to identify specific features. Image filenames, alt text, and surrounding context help search engines understand what the image contains and when to surface it.

The convergence of visual search with augmented reality creates even more profound opportunities. IKEA’s app lets customers visualise furniture in their own spaces before purchasing. Sephora’s virtual try-on features let customers see how makeup products will look on their own faces. These applications blur the line between search and experience, creating new customer journeys that bypass traditional discovery methods entirely.



Social discovery: platform-specific search

The rise of social platforms as search engines also represents a generational shift.

Perhaps no trend better illustrates the fragmentation of search than the rise of social platforms as primary discovery engines. Google’s own executives have acknowledged that nearly 40% of young people turn to TikTok or Instagram when looking for lunch spots, completely bypassing traditional search⁽³⁰⁾. This shift represents more than a generational preference—it’s a fundamental reimagining of what search means and how it should work⁽³¹⁾.

Social discovery inverts traditional search dynamics. Instead of users actively seeking specific information, algorithms predict what might interest them based on behavior patterns. Users don’t search for recipes; recipes find them in their feeds. They don’t look for travel destinations; stunning vacation videos appear organically. This passive discovery model has proven remarkably effective at surfacing relevant content, often introducing users to options they wouldn’t have known to search for. The trust dynamics of social discovery also differ dramatically from traditional search. Google’s PageRank algorithm essentially crowdsourced authority to the web itself—important sites linked to other important sites. Social platforms crowdsource differently, through engagement metrics and social proof.

A restaurant recommended by someone you follow, shown through actual video footage of the food and ambiance, carries different weight than a link on a search results page. This peer-to-peer trust model has proven particularly powerful for lifestyle categories where subjective experience matters more than objective facts. For businesses, social discovery requires fundamentally different strategies than SEO. Success depends not on keywords and backlinks but on creating content that generates engagement. A restaurant can’t simply optimise its website for “best Italian food Chicago” and expect visibility. Instead, it needs visually compelling content that makes people stop scrolling, partnerships with local influencers who can authentically recommend the experience, and active community management that turns customers into advocates.



Marketplace and platform integrations

The agent behaviors described above don’t emerge by accident, they’re increasingly shaped by strategic API and data partnerships between AI platforms and commerce providers. This approach has accelerated dramatically in recent weeks, signaling a major shift toward “agentic commerce” where AI doesn’t just recommend products but completes transactions on behalf of users.

In a landmark announcement on October 14, 2025, Walmart partnered with OpenAI to enable customers to shop directly through ChatGPT using “Instant Checkout”⁽³²⁾. This integration allows Walmart and Sam’s Club members to plan meals, restock household essentials, and discover new products through natural conversation—simply by chatting and clicking “buy,” with Walmart handling the entire transaction. Doug McMillon, Walmart’s CEO, described this as transformational: “For many years now, e-commerce shopping experiences have consisted of a search bar and a long list of item responses. That is about to change. There is a native AI experience coming that is multimedia, personalized, and contextual.”⁽³³⁾

Walmart’s entry builds on OpenAI’s September 29, 2025 launch of Instant Checkout, which initially debuted with Etsy and is expanding to over one million Shopify merchants—including major brands like Glossier, SKIMS, Spanx, and Vuori⁽³⁴⁾. This model was proven effective when earlier travel partnerships demonstrated the concept: Expedia and Kayak launched ChatGPT integrations that allowed users to plan and book travel using their inventory directly through chat, and Expedia subsequently embedded a ChatGPT-powered travel planner within its own app.

(30) Perez, S. Prabhakar, R. (12 Jul 2022), “Google exec suggests Instagram and TikTok are eating into Google’s core products, Search and Maps.” TechGoogle Blog.

(31) Search Engine Land (24 Mar 2025). “Social search is Gen Z’s Google: Are you visible where it matters?”

(32) Techcrunch (14 Oct 2025), You’ll soon be able to shop Walmart from ChatGPT.

(33) Walmart press release (14 Oct 2025) Walmart Partners with OpenAI to Create AI-First Shopping Experiences.

(34) CNBC.COM (Sep 29 2025) Etsy pops 16% as OpenAI announces ChatGPT Instant Checkout for the shopping site.

The Thumbtack integration mentioned earlier in the context of ChatGPT Operator represents another example of this trend—enabling the AI to hire home-service professionals autonomously.

Beyond marketplace integrations, content and data partnerships provide visibility through a different mechanism. Companies like Reddit (via its Data API) and Stack Overflow (through OverflowAPI) have partnered with OpenAI to bring their high-value, community-generated content into AI training and real-time retrieval. These partnerships serve dual purposes: they improve the quality and freshness of AI answers while creating new referral traffic back to the partner platforms. For businesses with unique datasets, expert communities, or specialized content, such arrangements can ensure their information remains central to AI responses in their domain.

To maximize flexibility and reach across different AI platforms, forward-thinking companies are adopting open integration standards. OpenAI's Agentic Commerce Protocol (ACP), co-developed with Stripe and open-sourced in September 2025, provides a standardized way for AI assistants to discover and call external APIs and tools⁽³⁵⁾. Similarly, Anthropic's Model Context Protocol (MCP) offers another standardized framework for tool integration. By exposing services through these protocols, businesses can make their integrations portable—ensuring they work not just with one AI assistant but across multiple platforms as the ecosystem matures. For businesses, these partnerships represent perhaps the most direct route to visibility in AI-mediated commerce. Rather than optimizing content to be cited or hoping to appear in search results, companies can establish themselves as preferred providers within specific categories—becoming the answer, not just appearing in the answer.



AI agents: from search to service

The evolution from search to autonomous agents represents the most profound shift in user behaviour. Early examples like OpenAI's ChatGPT Operator and now ChatGPT Agent demonstrate capabilities that would have seemed like science fiction just months ago. Users can ask the agent to “book a table for four at a nice Italian restaurant this Friday at 7 PM,” and the system will search for options, check availability, and complete the reservation—all without the user seeing a single search result, or advertising banner⁽³⁶⁾.

These Computer-Using Agents (CUAs) can interact with websites exactly as humans do, controlling the mouse and keyboard to navigate interfaces, fill forms, and complete transactions.

They can recover from errors, handle some CAPTCHAs without direct user assistance, and even comparison-shop across multiple sites. The implications for search and commerce are staggering. Why would a user spend time comparing flight options when an agent can check every airline, consider their preferences, and book the best option automatically?

Early observations of agent behavior reveal fascinating patterns. ChatGPT's Operator shows preferences for certain platforms: DoorDash for food delivery, Instacart for groceries, OpenTable for restaurant reservations⁽³⁷⁾. Different agents exhibit different search strategies, creating new competitive dynamics. When asked about stock prices, Claude navigates to Yahoo Finance while ChatGPT performs a Bing search⁽³⁸⁾. Whether these preferences stem from technical partnerships, training data biases, or emergent behaviors is not always clear, but they highlight a crucial reality: as agents mediate more transactions, their preferences will shape markets in profound ways.

These divergent approaches mean businesses must optimise not just for different search engines but for different AI decision-making patterns. A company might rank first on Google but never be considered by an AI agent that preferentially uses a competitor's data source. As discussed below, ensuring awareness may require a multi-pronged strategy aimed at various layers of the AI stack, including the training data.

The trust requirements for agent-mediated search far exceed those of traditional search. When users delegate purchasing decisions to AI, they need confidence that the agent is acting in their best interest, not influenced by hidden commercial relationships. This creates opportunities for businesses that can establish themselves as trustworthy, reliable options that agents can confidently recommend. It also raises critical questions about transparency, bias, and the potential for market manipulation that regulators are only beginning to address.

(35) [OpenAI.com](#) (Sep 29 2025) [Buy it in ChatPGT: Instant Checkout and the Agentic Commerce Protocol.](#)

(36) OpenAI (23 Jan 2025), [“Introducing ChatGPT Operator.”](#) and (18 Jul 2025) [“Introducing ChatGPT Agent.”](#)

(37) Altman, S. (Jan 2025). [“ChatGPT Operator Demo.”](#)

(38) Mollick, E. (30 Jun 2025). [«Agent Preferences in AI Search.»](#) Twitter/X.

5

The future of search: autonomous agents

Architecture of tomorrow's search ecosystem

The future of search will likely be shaped by a fundamental tension between open and closed AI ecosystems.

Cloud-based commercial agents (closed ecosystem). Developed by large tech firms, these systems represent the centralised approach to AI search.

These commercial agents benefit from massive computational resources, proprietary training data, and deep integrations with existing services.

Google's Gemini can seamlessly access YouTube videos, Maps data, and Gmail contents to provide personalised responses. Microsoft's Copilot integrates with Office documents and LinkedIn profiles⁽³⁹⁾. These closed ecosystems offer powerful capabilities but raise concerns about privacy, transparency and vendor lock-in.

Open-source/decentralised agents (open ecosystem). These community-driven alternatives offer distinct advantages that appeal to specific user segments.

Privacy-conscious users can run models locally, ensuring their queries never leave their devices. Businesses can customise models for specialised domains without sharing proprietary data with competitors. The transparency of the algorithms also allow developers to modify and extend their capabilities without waiting for a central platform to implement features. Projects like Meta's LLaMA and DeepSeek's R1 demonstrate that powerful models can exist outside big tech control⁽⁴⁰⁾.

Even OpenAI has announced the launch of an open model for the summer of 2025⁽⁴¹⁾. Hardware costs are falling rapidly—Nvidia's \$3,000 "personal AI supercomputer" shows local AI hardware becoming accessible this year⁽⁴²⁾. Such systems still require a significant level of IT literacy for set up however.

Beyond advertising: new economic models

The shift away from traditional advertising models in AI search is forcing a fundamental reimagining of how information discovery can be monetised. Several models are emerging, each with distinct implications for businesses and users.

1. Contextual commerce

Contextual commerce represents the most direct evolution of current models. As AI agents become more transactional, handling everything from restaurant reservations to flight bookings, commission-based models become viable. When an AI assistant books a hotel room, the hotel might pay a referral fee similar to current online travel agency commissions. Unlike current display advertising, these payments align directly with value creation—businesses pay only for transactions, not mere visibility.

The implementation challenges are significant. Traditional affiliate programs rely on tracking cookies and attribution windows that don't translate to agent-mediated transactions. New technical standards are needed to track referrals, handle disputes, and ensure fair compensation. Questions of disclosure become critical: users need to know if their AI assistant has commercial relationships that might influence recommendations.

2. Subscription models

Subscription models offer a cleaner value proposition: users pay directly for (hopefully) unbiased, ad-free AI assistance. OpenAI's ChatGPT Plus and Anthropic's Claude Pro at \$20/month demonstrate viable demand for premium AI service. For users, the appeal is clear: no ads, no commercial bias, and often access to more powerful models or additional features. For suppliers, subscription models provide predictable revenue and align incentives around user satisfaction rather than engagement metrics.

The challenge with subscriptions is reach. Free, ad-supported services will always have larger user bases than paid alternatives.

(39) Microsoft. (Jul 2025). "[Microsoft Copilot Overview](#)."

(40) DeepSeek. (Jul 2025). "[DeepSeek-R1 Technical Report](#)."

(41) Zeff M., (10 Jun 2025), "[OpenAI's open model is delayed](#)," TechCrunch. (42) NVIDIA. (2025). "[Project DIGITS Announcement](#)."

This creates a two-tier system where businesses might need different strategies for reaching free-tier versus paid-tier users. It also raises equity concerns: will access to unbiased information become a luxury good available only to those who can afford subscriptions? As before, transparency is also key: whether subscriptions will ensure unbiased access to information will depend upon the underlying business model and governance of the providers.

3. Microtransactions

Microtransaction models represent perhaps the most radical departure from current economics. Instead of monthly subscriptions or per-click advertising, users might pay tiny amounts for specific queries or information access. Need an AI to analyse a complex legal document? Pay \$0.50. Want real-time financial data for your query? Add \$0.10. This granular pricing is also more efficient since users pay precisely for the value they receive.

The technical infrastructure for microtransactions has long been a limiting factor, but blockchain technology and payment innovations are making small-value transactions increasingly viable. More challenging are the user experience implications.

Users will likely accept some friction in their search experience to approve payments at the beginning. Once better understood and trusted users are likely to let these agents transact autonomously within certain pre-agreed expense limits.

4. Data as currency

Users may decide to actively exchange personal information to receive increasingly tailored and improved results from AI systems. This trade-off involves a degree of data sharing to achieve personalised experiences. AI systems will soon be able to continuously refine their understanding of user preferences and needs through ongoing interaction (as “context windows” / memory of interactions increases). This iterative learning process will enable systems to provide increasingly accurate and relevant outputs over time.

The pursuit of highly personalised AI experiences inevitably creates tension with individual privacy concerns. Users must weigh the benefits of tailored services against the extent of data sharing and potential privacy implications. As personalised AI becomes more prevalent, it is anticipated that regulatory bodies will intensify their scrutiny of data collection, usage, and privacy practices associated with these technologies. Compliance and ethical considerations will be of growing importance.

Implications of new business models (illustrative)

| Model | Contextual Commerce: <i>e.g. businesses pay referral fees when users buy from links recommended by AI tools</i> | Subscription: <i>e.g. users pay a monthly or annual subscription to use AI tool</i> | Microtransactions: <i>e.g. users pay a one off small charge for using a small number of tokens</i> | Data as Currency: <i>e.g. users share their personal data which can be used to improve AI models</i> |
|-------------------|--|--|---|--|
| Platform Operator | Paid by businesses for each sale/transaction rather than an advertising model | Value comes from having the best product not the best ad selling network | Competitive pressure as users are free to find the best value for money in each AI niche | Can be leveraged more with a strong ecosystem or with good channels to 3 rd party data users. Privacy and trust will be paramount however |
| User | Less visibility of commercial relationships within search | Greater trust in product, but less access for some users due to costs | Increased friction from fees but potentially greater flexibility, relatively low cost while maintaining trust in the integrity of results | Privacy concerns however good access and the potential to use other value added services |
| Advertiser | 'Winner takes all' nature may reduce access to customers | Loss of a marketing channel, particularly for smaller businesses | Potential for revenue share arrangements rather than advertising, e.g. AI model mixed with a 3 rd party information service | Can leverage data to add value to their marketing and products. However, they may not have access to the data if trust is an issue |

Trust as the new currency

Blockchain technology and payment innovations are making small-value transactions increasingly viable. More challenging are the user experience implications. Will users accept friction in their search experience to approve payments? Can AI agents be trusted to make micropayment decisions autonomously?

Transparency emerges as a critical requirement for maintaining user trust. Users need to understand not just what their agent recommends, but why. This goes beyond current requirements for marking sponsored content. AI agents need to explain their reasoning, disclose their information sources, and reveal any commercial relationships that might influence recommendations. Some platforms are experimenting with 'explanation modes' where users can interrogate agent decisions—exploring exactly how and why particular factors led to a given recommendation⁽⁴³⁾.

The challenge is balancing transparency with usability. Detailed explanations of every decision would overwhelm users and defeat the purpose of delegation. The solution likely involves layered transparency: simple disclosures for routine decisions, with the ability to drill down into detailed explanations when users want them. This mirrors how humans delegate to trusted advisors—we don't need to understand every detail, but we need confidence in the process and the ability to verify when desired. Academic research in explainable AI underscores that users prefer progressive, request-based explanations—accessed only when they ask—rather than receiving all internal logic upfront⁽⁴⁴⁾. As one researcher noted, "Trust will likely become a competitive differentiator among AI platforms"⁽⁴⁵⁾. Users may prefer agents that provide transparency and control, over those with marginally better capabilities.

(43) Fernandez A., (28 May 2025), "[Explainable AI in 2025: Navigating Trust and Agency in a Dynamic Landscape.](#)", Nitor.

(44) Jang S., Lee H., Kim Y., Lee D., Shin J., Nam J. (Sep 2024) "[When, What, and how should generative artificial intelligence explain to Users?](#)", Elsevier, Telematics and Informatics Volume 93, September 2024, 102175.

(45) Russell, S. (2024). "Human Compatible: AI and the Problem of Control." Penguin Books.

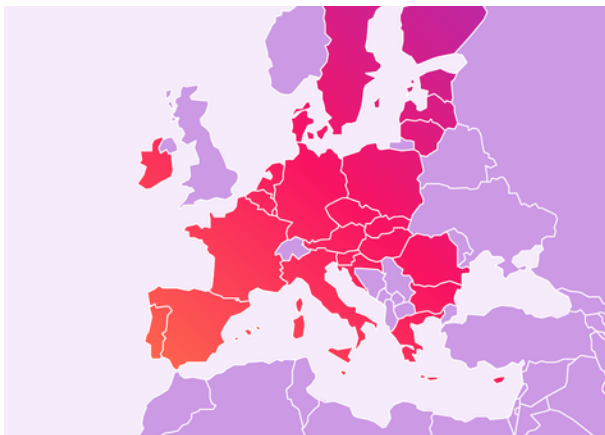
6

Regulatory and ethical landscape

Global regulatory approaches

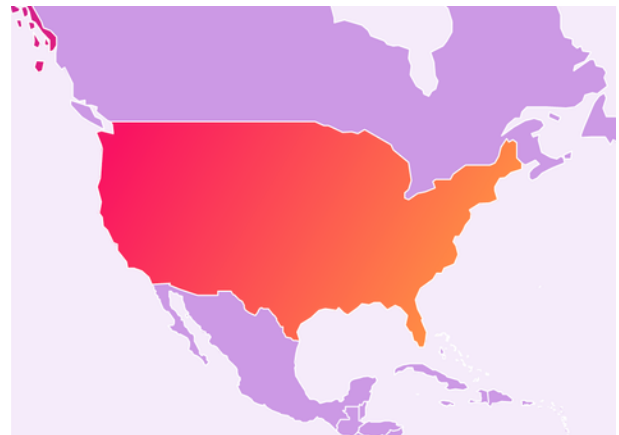
Governments worldwide are grappling with how to regulate AI search systems that don't fit neatly into existing frameworks. The broad approaches of the EU, US, UK and China are outlined in the table below.

A number of regulatory philosophies are emerging: a rule based ex ante model in Europe, a mainly litigation driver approach led by DoJ/FTC in the US, a forward looking principled based model in the UK and a centralised tightly government controlled framework in China.



European Union (DMA/DSA & AI act)

- Prohibition of self-preferencing in results⁽⁴⁶⁾
- Requirements to share data with business users⁽⁴⁷⁾ & interoperability mandates for third-party services
- Greater transparency of algorithms & content moderation + protections against illegal & harmful content, ad transparency, anti-dark patterns, protections for minors⁽⁴⁸⁾
- The AI Act adds risk-based requirements for transparency and bias prevention⁽⁴⁹⁾



United States

- DOJ argues remedies should «nip a potential Google AI monopoly in the bud»⁽⁵⁰⁾
- Proposed requirements for Google to license search data to competitors
- FTC monitors AI bias and consumer protection issues⁽⁵¹⁾
- State-level privacy laws impact AI data usage

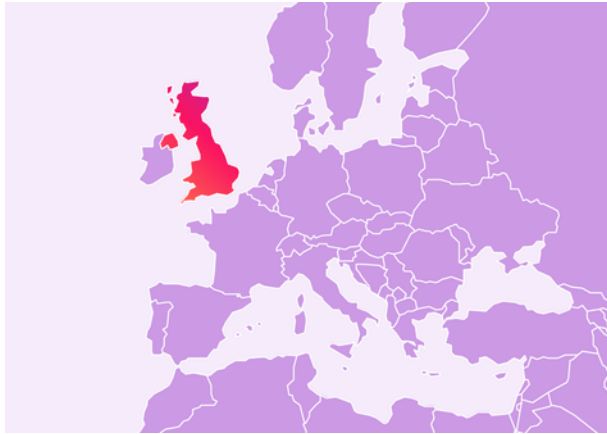
(46) European Commission (2023), "Digital Markets Act."

(47) European Commission (2023), "DMA Obligations for Gatekeepers."

(48) European Commission (2023), "The Digital Services Act." (49) European Parliament (2024), "AI Act: Final Text."

(50) Diaz, J. (29 Apr 2025), "Why Google's search engine trial is about AI." NPR.

(51) FTC (3 Jan 2025), "AI and the Risk of Consumer Harm."



United Kingdom

- Digital Markets, Competition and Consumers Act enables targeted intervention⁽⁵²⁾
- CMA investigating Google's search services for anti-competitive practices⁽⁵³⁾
- Focus on "forward-looking" regulation considering AI impact



China

- Generative AI Measures require government registration⁽⁵⁴⁾
- Content must align with "core socialist values"
- Real-time monitoring and content labeling mandated
- Domestic champions promoted while maintaining control

Key compliance themes

Across these diverse approaches, several common themes emerge that businesses must understand and address. Transparency requirements appear in virtually every regulatory framework, though their specific implementations vary.

At minimum, businesses should expect to disclose when content is AI-generated, explain how their AI systems make decisions (at least at a high level), provide clear information about data collection and usage, and maintain audit trails for significant automated decisions. Many of these requirements are already obligations increasingly codified across EU regulatory regimes (AI Act Art. 50; transparency and traceability mandates; DSA algorithmic and moderation reporting).

| | | | | |
|------------------------------------|--|---|---|--------------------------------------|
| Transparency requirements | AI-generated content must be labeled | Decision-making processes need explanation | Data collection and usage disclosure | Audit trails for automated decisions |
| Data access and competition | Preventing monopolisation of training data | Potential forced sharing of search/click data | API access requirements for competitors | Interoperability standards |
| Content moderation | Preventing generation of harmful content | Quick removal of problematic outputs | Appeals processes for affected parties | Cooperation with law enforcement |

(52) UK Parliament, (2024), "Digital Markets, Competition and Consumers Act."

(53) CMA (14 Jan 2025), "SMS investigation into Google's search services"

(54) Wu, Y. (27 Jul 2023), "China's Interim Measures for Generative AI Services." China Briefing.

Ethical considerations

While regulatory compliance provides a baseline, ethical AI search requires going beyond minimum legal requirements. The power to shape what information billions of people

see creates profound responsibilities that forward-thinking organisations are beginning to address. Algorithmic bias represents one of the most challenging ethical issues, followed by environmental impact and digital equity.

Beyond compliance, organisations should address

Algorithmic bias & inaccuracies

AI trained on historical data can perpetuate biases

Regular auditing for discriminatory patterns needed

Inclusive training data and diverse teams essential

Environmental impact

AI training and operation consume significant energy

Sustainable practices becoming competitive differentiator

Carbon offsetting and renewable energy commitments

Digital equity

Risk of creating two-tier system (paid vs. free)

Access to quality information as fundamental right

Need for public benefit alternatives

Regulating search in the age of AI

Given the rapid evolution of AI and its disruptive potential, regulation must be forward-looking and focused on fostering innovation. The upcoming changes by no means imply that firms dominating traditional search should be spared regulatory oversight. However, when looking at the regulatory framework for search, it seems important to focus on the following regulatory principles:

Focus on future competition

Regulation should prioritise fostering innovation and competition on the merits in fast growing AI-driven search, rather than simply focusing on traditional search and ad models. It is clear that as the market evolves to AI-mediated web access, Gemini may not enjoy the same market position as Google search. In that context it will be important to ensure that competition to become an AI agent of choice is not undermined by anticompetitive bundling or tying practices.

Avoiding backward-looking frameworks

While addressing anti-competitive practices is important, regulation must avoid tethering itself to legacy systems that AI is likely to quickly render obsolete. The goal should be to ensure a level playing field for future markets, not just to replace existing incumbents with new entrants in outdated business models. The worst possible policy outcome would be to regulate behaviour and focus regulatory attention in a rapidly declining business at the expense of ensuring disruption and competition is available and delivering pro-consumer outcomes in the emerging landscape.

Mitigating barriers to AI development

Regulators should monitor actions that could hamper the emergence of AI competitors, such as restrictive data practices or exclusionary agreements, which could stifle innovation. The challenge will be to let innovations in search flourish, while ensuring that these new functionalities do not prevent new innovative entrants from participating and do not reduce the visibility of firms relying on search.

Addressing ethical and transparency issues

ensuring users understand how responses to their queries are being developed (and whether any commercial relationship may have influenced conversations) and that answers may be inaccurate and/or incomplete to ensure critical thinking and cross-referencing remain important attributes of knowledge acquisition.

7

Moving from SEO to GSO

Understanding Generative Search Optimisation (GSO)

The transition from Search Engine Optimisation (SEO) to Generative Search Optimisation (GSO) represents more than a tactical evolution—it's a fundamental reimagining of how businesses achieve digital visibility.

Where SEO focused on ranking in search results to earn clicks, GSO aims to ensure businesses are accurately represented in AI-generated responses.

This shift requires new mental models, approaches, and success metrics⁽⁵⁵⁾. GSO rewards clarity, accuracy, and comprehensive information that AI systems can trust⁽⁵⁶⁾.



(55) Ebrom, L. (29 Apr 2025), "Generative search optimization in 2025." LaFleur Marketing.

(56) Smith A., (6 Jun 2025). "Generative Search Optimisation (GSO) What is it and what can you action?", UpThereEverywhere

A practical guide for implementation

While the present white paper is not meant to cover detailed technical implementation of GSO strategies the [CollectiveIntelligence.ai](#) team is currently working on a short companion guide based on case studies and interviews, to help people implement GSO best practices and secure online visibility.

Questions to be addressed include

| | |
|----------------------|--|
| <hr/> 1 <hr/> | Making your business visible with structured data excellence <ul style="list-style-type: none">• What are the essential schema.org types for GSO?• How can businesses ensure completeness & accuracy in their schema & K-graphs? <hr/> |
| <hr/> 2 <hr/> | Content That AI Systems Trust and Use: Conversational content design <ul style="list-style-type: none">• How can content be designed to answer natural language queries from AI systems?• What makes content “conversational” from a machine’s perspective? <hr/> |
| <hr/> 3 <hr/> | Authority building (E-E-A-T) <ul style="list-style-type: none">• How to demonstrate Expertise, Experience, Authoritativeness & Trustworthiness?• What kind of author credentials and source citations are necessary? <hr/> |
| <hr/> 4 <hr/> | Technical implementation essentials <ul style="list-style-type: none">• What are the technical essentials for GSO (e.g. JSON-LD, APIs, multi-format...)?• How should businesses structure and serve real-time data for AI agents? <hr/> |
| <hr/> 5 <hr/> | Measuring GSO success & optimising <ul style="list-style-type: none">• How can businesses track AI-generated mentions and citation quality?• What metrics indicate effective competitive positioning in AI outputs? <hr/> |
| <hr/> 6 <hr/> | Sector-Specific GSO strategies <ul style="list-style-type: none">• For local businesses: How to maximise visibility in “near me” voice searches & NAP consistency• For e-commerce businesses: how to optimise product data structure for AI shopping experiences, use APIs and Q&A to increase visibility?• For B2B services: how to showcase thought leadership, expertise for AI discovery? <hr/> |
| <hr/> 7 <hr/> | The case for “protected discovery” <ul style="list-style-type: none">• How can content providers protect their content while remaining discoverable?• How to manage the right level of access for the right content? <hr/> |
| <hr/> 8 <hr/> | Implementation roadmap and timeline <ul style="list-style-type: none">• What are the phased steps—from audit to optimisation—of a successful GSO rollout?• What internal resources & timelines are realistic depending on business size? <hr/> |

8

Conclusion and future outlook

The transformation is now

We stand at a pivotal moment in information discovery. The shift from traditional search to AI-mediated discovery isn't a future possibility—it's today's reality. Over 70% of Americans now use AI tools for search⁽⁵⁷⁾, AI agents complete autonomous transactions, and regulatory frameworks are rapidly taking shape globally. This is fundamental business transformation, not merely technical evolution. Organisations will need to recognise this to thrive. Those that don't risk digital invisibility.

The window won't stay open long

As Satya Nadella observed, AI "is going to reshape pretty much every software category."⁽⁵⁸⁾ Search is just the beginning—a preview of the wave that will revolutionize all information exchange. The window for establishing strong positions in AI-driven discovery remains open but narrows daily. Every day brings new users to AI platforms, new capabilities to AI systems, and new competitors who understand the stakes.

Preparing for transformative AI

The question facing every individual, organisation and institution is not whether to adapt to AI-driven search, but how quickly it can adapt to thrive in the era of transformative AI.

Governments, regulators and policy makers are also at a crossroad and have to create the conditions for the emergence of sustainable AI products and services. This will likely require keeping a keen eye on how business models are evolving, ensuring maximum transparency for users and taking a forward-looking view of competition. These are both exciting and challenging times for individuals, organisations and institutions involved in these transformations and while there is still much uncertainty about future market developments one thing is certain...

The time for action is now.

If you'd like to get involved, please drop us a line at contact@collectiveintelligence.ai

(57) Goodwin, D. (6 Feb 2025). "AI search is gaining traction, but it isn't replacing Google: Survey." Search Engine Land.
(58) Firth-Butterfield K., WEF, (8 Feb 2023), "8 things you need to know about AI this month."

Disclaimer

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