AUSTRALIAN COMPETITION & CONSUMER COMMISSION

Digital platform services inquiry

Interim report 9: Revisiting general search services

September 2024

Acknowledgement of country

The ACCC acknowledges the traditional owners and custodians of Country throughout Australia and recognises their continuing connection to the land, sea and community. We pay our respects to them and their cultures; and to their Elders past, present and future.

Australian Competition and Consumer Commission
Land of the Ngunnawal people
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ACCC 09/2024
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Executive summary

The emergence of search engines revolutionised the way we look for and find information. In a pre-internet world, we had to rely on physical resources that we could access, either privately or via libraries, or information available from others we knew or could be connected to.

Today the ability to search for information instantly or near instantaneously is a must have for consumers and an accepted part of living in a digital society. Most Australian consumers use a search engine on a daily basis, with search engines acting as a gateway to other websites and content on the internet, transforming how consumers and businesses have discovered and interacted with each other. Search engines have also become a key avenue for advertisers, with search service business models resting on placement of advertising since the rise of search engines in the 1990s.

General search engines have continued to evolve over this period. In the last few years, there have been regulatory and technological changes that directly affect how general search services operate. This Report seeks to revisit and reconsider the ACCC's analysis around general search following the ACCC's examination of these services in its September 2021 Report on Search Defaults and Choice Screens, and recommendations made in its previous reports.

Google has maintained its dominance

Google Search remains a critical gateway for users to find information and for businesses to connect with consumers.

In its September 2021 Report, the ACCC found that Google Search was by far the dominant search engine in Australia, with a market share of 94%.[1] Its nearest competitor, Bing, had market share of 3.9%.[2] The report found that Google's pre-installation and default arrangements likely contributed to Google's dominance in search by foreclosing competitors from accessing users and realising economies of scale and network effects.[3]

In the three years since that report, notwithstanding industry, regulatory and technological changes that could affect general search, Google has maintained its dominance in general search in Australia.

Google has maintained a very high market share in Australia, with 94% of the market currently.[4] Bing represents just 4.7% of the market as at August 2024.[5] Other existing search providers have not materially gained market share and new entrants have achieved limited success in attracting users.

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1 ACCC, Digital Platform Services Inquiry Third Interim Report, 28 October 2021, p 87.

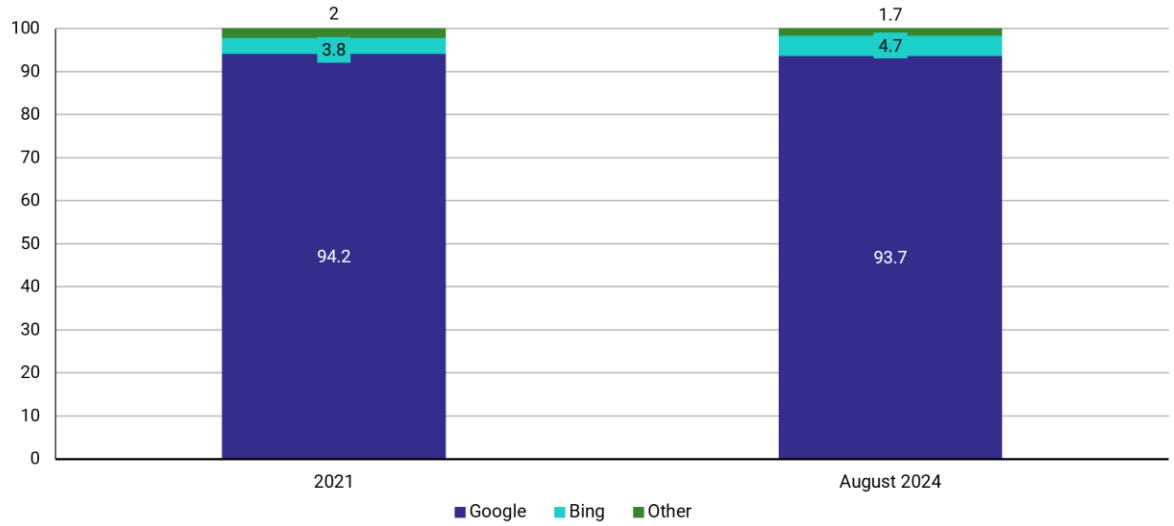
2 ACCC, Digital Platform Services Inquiry Third Interim Report, 28 October 2021, p 87.

3 ACCC, Digital Platform Services Inquiry Third Interim Report, 28 October 2021, p 68.

4 Statcounter, Search Engine Market Share Australia, accessed September 2024. The ACCC notes that this has been rounded up to 94% from 93.67%; 94% has been used throughout the report.

5 Statcounter, Search Engine Market Share Australia, accessed September 2024.

Google share of Australian search, 2021 and August 2024



Google has also maintained its position as the major default search engine for browsers. A combination of vertical integration with Google's Chrome browser, and commercial arrangements it has with Apple's Safari browser means Google Search is the default for more than 91% of mobile browsers and 77% of desktop browsers in Australia as at August 2024.[6]

The potential competition concerns inherent in these default agreements have been the focus of regulators, including in the US and here in Australia; with the ACCC's investigation ongoing.

The combination of these factors indicate that Google remains the dominant search engine in Australia, with the same arrangements, combined with vertical integration, that enables Google to foreclose important search entry points for its rivals.

Generative AI and general search

One major recent development that has the potential to disrupt general search is the rapid rise in use of generative AI; that is, algorithms trained to learn patterns and structure from datasets and that generate new content in response to a prompt from a user.

Though generative AI technology has been in existence for decades, its use in consumer-focused products – and, in particular, in general search – has rapidly increased since the introduction of OpenAI's ChatGPT in November 2022.[7]

In general search, generative AI enables different features, including AI-generated summaries, conversational search interfaces and AI-assisted ranking of results. Generative AI provides opportunities for new ways of providing search to consumers, and for new entrants to find innovative ways into the market.

New entrants, as well as established digital platforms such as Google and Microsoft, have introduced generative search type functions or integrated AI functions into their existing search services.

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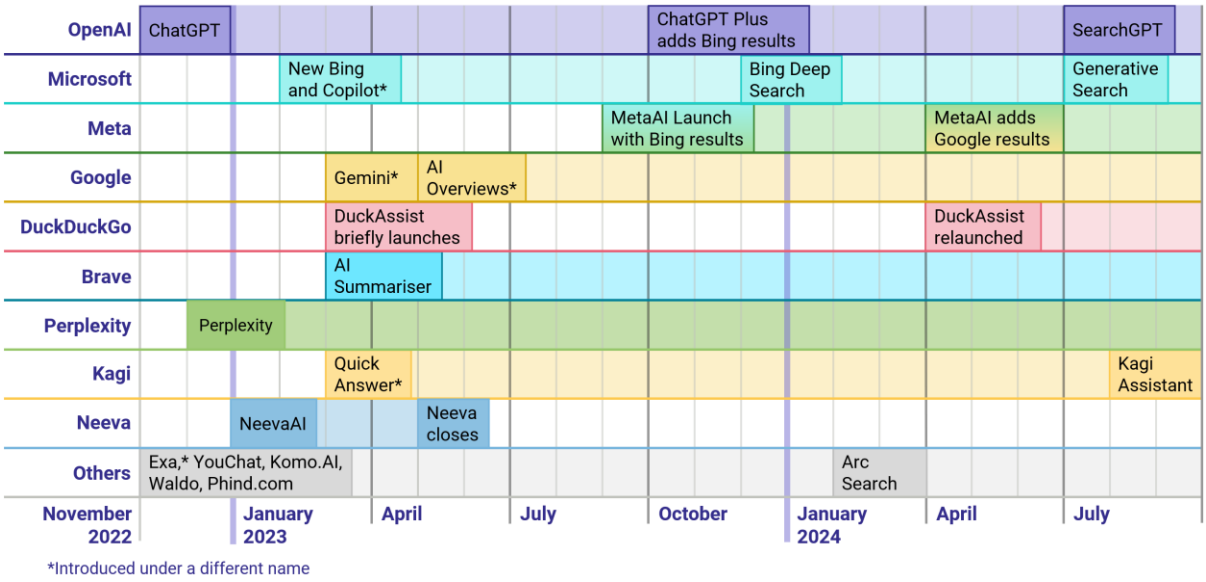
6 Statcounter, Mobile browser market share Australia, accessed September 2024; Statcounter, Desktop browser market share Australia, accessed September 2024.

7 C Gordon, ChatGPT Is The Fastest Growing App In The History Of Web Applications, *Forbes*, updated 3 February 2023, accessed 17 September 2024.

Key recent developments in AI-powered search



*Introduced under a different name

Whilst generative AI based search is in its comparative infancy, there have been some notable entrants. This includes Perplexity, which is marketed as an 'answer engine', using third-party foundation models and its own web index to produce conversational search results;[8] and SearchGPT, a temporary prototype of new AI search features from OpenAI, which was launched on a limited basis in July 2024.[9]

While search engines are still primarily monetised via advertising, generative AI may drive changes to search business models.

Though AI has the potential to disrupt traditional search services – and despite speculation that it would – the impacts, so far, appear to be limited.

In addition to each having their own relatively large web indexes (used to provide general search services), Google and Microsoft have also developed (and continue to develop) partnerships with other key participants in the generative AI supply chain.

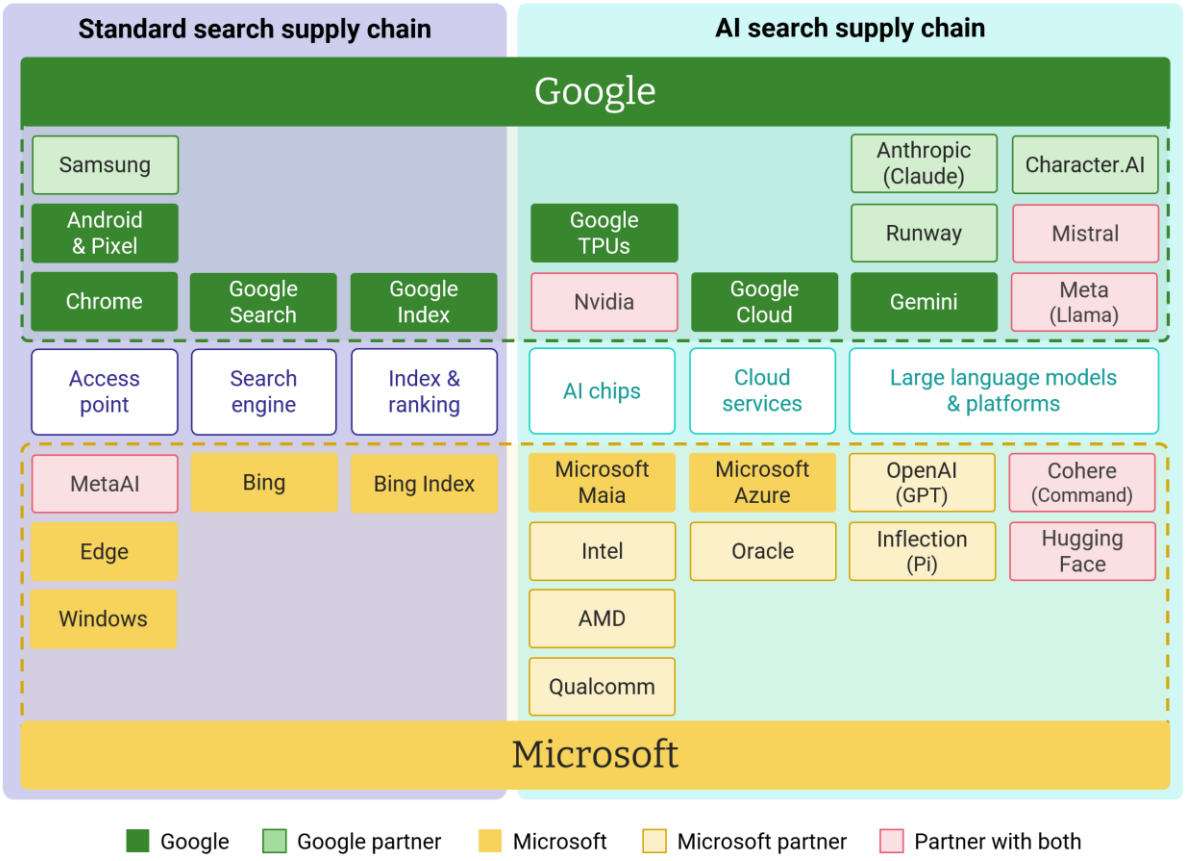
The supply of the key inputs required to develop foundation models are constrained, and large technology firms, including Google, Microsoft and OpenAI, typically have superior access to these inputs.[10] As shown below, Google and Microsoft are both present in at multiple key points along the AI search supply chain.

8 Perplexity, Introducing PPLX Online LLMs, 29 November 2023, accessed 17 September 2024.

9 OpenAI, SearchGPT Prototype, 25 July 2024, accessed 17 September 2024.

10 Competition and Markets Authority, AI Foundation Models: Update Paper, 11 April 2024, pp 6-7.

The AI search supply chain, and Google and Microsoft's presence throughout the chain



It is too early to say with any certainty what effect generative AI will have on the competitive dynamics in generative search in Australia. However, Google and Microsoft's participation in several layers of the generative AI supply chain, as well as their established positions in general search, mean they are each well placed to leverage generative AI into their own search offerings.

General search's quality

This Report also identifies and considers a range of factors that affect the quality of search services. Search engines are an important part of the information environment for consumers, shaping how they access and engage with information. As a type of service which is generally supplied to consumers for zero monetary price, quality is a key aspect of general search services. The quality of digital platform services, and the incentives for digital platform service providers to compete on aspects of quality, have been the subject of much public discussion.[11]

As noted in the ACCC's Report on Search Defaults and Choice Screens, the ability to search for information and access content online quickly and easily is integral to Australians. Search engines have incentives to provide consumers with the answers they need quickly; however, competitive dynamics and competing incentives, as well as some industry trends (including the increase in AI) will affect the quality of general search.

[11] C Doctorow, 'Enshittification' is coming for absolutely everything, *Financial Times*, 8 February 2024, accessed 17 September 2024.

Search quality is a challenging measure to define; with many different inputs that might feed into what a good quality search result looks like, and users not always being able to identify what actually makes a high quality search experience, or easily perceive changes in quality over time. Partly this is because, while at the same time there is a growing body of research considering aspects of search quality, search providers also continue to invest in improving the quality of their services.

However, questions have been raised about the degree to which search engines satisfy the information needs of their users by providing them with useful high-quality and relevant information.[12]

How search results are ranked on a search engine results page is a key overarching factor that contributes to the quality of those results, and is central to considerations of search quality. This is because the positioning of a result has a significant impact on whether it will be selected by a user. A 2023 study suggested that the visibility of results outside the top 10 results is very limited.[13] The prevalence of other features of a search engine results page, such as a features snippet, can also affect the likelihood that a result is chosen by a user.

This Report identifies a number of features and metrics to see how they feed into a user's search experience, and which may affect whether or not they see the result most relevant to them. These features, which may impact on search quality, are:

- the placement and prominence of ads in a results page
- website optimisation (website owners making changes to their pages to try and improve their ranking by search engine algorithms)
- personalisation of results (via consumer data)
- the diversity of results presented to consumers, and the prominence of smaller websites.

This Report also looks at the impact of the apparent increase of AI-generated material on search results and the integration of generative AI technologies into search engines. Increasing use of AI content may make it difficult for consumers to have trust and confidence in search results.

Each of these factors affect, or have the potential to affect, what consumers see when they use search engines, and some features have changed over time. For example: Paid search advertising involves an advertiser purchasing ad placement within the search engine results page.[14] Search providers dependent on advertising for revenue appear to have been incentivised to change their search interfaces over time in ways that have made ads both more prominent, and less distinguishable from non-sponsored content.

Similarly, website owners can seek to 'optimise' their sites for a search engine's ranking algorithms, which may not align with the most relevant results for a given search. Optimisation may detrimentally influence the quality of search results, if website operators are incentivised to alter their websites in ways that materially change their understandability and usability, or to feature prominently in search results irrespective of their websites'

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12 See, for example, A Rubin, Google who? Gen Z is searching on TikTok, YouTube instead, *Axios*, updated 13 April 2024, accessed 17 September 2024; and a study focusing on product reviews, J Bevendorff et al, Is Google Getting Worse? A Longitudinal Investigation of SEO Spam in Search Engines, *Advances in Information Retrieval: 46th European Conference on Information Retrieval*, March 2024, pp 56-71.; E Moore, Whatever happened to Google Search?, *Financial Times*, 6 January 2023, accessed 17 September 2024.

13 B Dean, We Analyzed 4 Million Google Search Results. Here's What We Learned About Organic CTR , Backlinko, 28 May 2023, accessed 17 September 2024.

14 CMA, Online platforms and digital advertising, Market study final report, 1 July 2020, p 158.

relevance to user queries, despite efforts by search engines to limit the effectiveness of these practices.

Personalised search has been incorporated into consumer facing products for many years. While the extent to which search services personalise each search query's results is somewhat unclear, it appears that general search services mostly rely on two types of information to personalise search results: location of the user and, potentially to a much lesser extent, recent search history.

The Report finds that some emerging competitors in both standard search and generative AI based search are experimenting with new ways to enable consumers to personalise their search experience.

The presence, and desirability, of results diversity is an important but more complex consideration. In many cases users are often best served by a single result, or by a small set of results, in response to their query; however, users can benefit from receiving a diverse set of results for some types of searches. The trend towards results that provide the answer on the results page, or do not require users to go to another website, also has implications on the diversity of material presented to users.

Given that Australians routinely use general search services, changes in the quality of general search services have the potential to considerably affect their daily lives, even if these impacts, whether positive or negative, are not always easily discerned. There is more work to be done to understand whether markers of search quality are changing over time and across different search engines. This applies particularly in the context of emerging technologies.

General search in September 2024

General search has continued to evolve and develop since its inception more than 25 years ago, with changes occurring as to how search engines formulate their results, how information is presented to consumers and how ads are placed. The rise of generative AI has the potential to further accelerate the pace of these changes. This Report builds on the ACCC's earlier work in relation to digital platforms; and considers whether recent changes affect recommendations made in our previous reports.

Based on our analysis in this Report, the answer is no. Google has maintained its dominance in general search, with little substantive change to its market share, or to its commercial arrangements that advantage Google Search as the default on the vast majority of Australian devices.

The ACCC considers that the recommendations made in the ACCC's September 2021 Report on Search Defaults and Choice Screens and its September 2022 Regulatory Reform Report remain entirely relevant to address competition and consumer harms in digital platform service markets.

In particular, the ACCC considers that there remains a need for service-specific codes for 'designated' digital platforms supporting targeted obligations to:

- prevent anti-competitive self-preferencing, tying and exclusive pre-installation
- address data advantages
- ensure fair treatment of business users

- improve switching, interoperability and transparency.[15]

These proposed measures (along with other measures outlined in the Regulatory Reform Report) have been agreed to in principle by the Government. The ACCC's Digital Platform Services Inquiry is due to be completed in March 2025, with its final report due to the Assistant Treasurer by 31 March 2025.

[15] ACCC, Digital Platform Services Inquiry Fifth Interim Report, 11 November 2022, pp 5, 11-14.

1. Search in Australia: looking back and the current landscape

The ACCC has previously examined general search services in its third interim DPSI report (Report on Search Defaults and Choice Screens) in 2021, as well as more narrowly in its fifth interim DPSI report (Regulatory Reform Report) in 2022.

This chapter recaps what is general search and briefly discusses how consumers search preferences appear to be evolving.

1.1. Searching online in Australia

1.1.1. What is general search?

Most Australians use general search services every day to navigate the internet and search for information, typically through a search engine. It has been a significant innovation that has improved the efficiency of information discovery for users. It has also revolutionised how consumers and businesses discover and interact with each other.

Search engines function by maintaining a large index of websites available on the internet and displaying a list of curated, ranked results (known as a search engine results page) in response to a search query. Search engines typically monetise their services by presenting paid ads to users.

General search services are distinct from specialised or vertical search services, which involve maintaining a smaller index of webpages that focus on a specific category, such as flights or hotels.

Consumers access general search services via a range of methods:

- Browser navigation bar: browsers typically have default search engines embedded in their navigation bar. For example, Apple Safari uses Google Search as the default search engine.
- Manual web navigation: users can navigate to search engines by typing the URL into their browser, and many browsers have a search engine page as their home page.
- Search applications / widgets: mobile devices such as smartphones and tablets are typically pre-installed with search applications, widgets, and other search integrations such as iOS' Spotlight Search.[16] Users may use these default search apps or download a preferred search application from an app store to access search engines.
- Voice assistants: users can access search engines by asking queries via voice assistants (such as Google Assistant, Amazon Alexa, and Apple's Siri), available on Android and iOS smartphones and via smart speakers such as Google Nest, Amazon Echo, or Apple HomePod.

[16] Apple Support, Use Spotlight Search on your iPhone, iPad or iPod touch, 21 February 2024, accessed 17 September 2024.

In recent years, search engines have introduced several new ways to access search services. Google, for instance, has introduced Circle to Search, an AI-powered feature that allows users to search for information by circling, highlighting, scribbling, or tapping an image.[17] Additionally, users can now search Google via video, using AI integrations.[18] Similarly, Apple introduced Visual Look Up, which allows users to identify objects—such as landmarks, plants, or food—in images and search for related information.[19]

1.1.2. General search over time

The presentation of search results has evolved over time. Originally, a search engine's results page typically presented a user with a list of blue hyperlinks in response to a query. For example, although Google's web search product has operated in a prototype since 1996,[20] Google Image Search was introduced as a standalone product in 2001.[21] In 2007, Google began integrating its search products into a single results page, referred to as 'Universal Search'.[22]

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17 Google, Circle (or highlight or scribble) to Search, *The Keyword (Google Blog)*, 17 January 2024, accessed 17 September 2024.

18 Google, New ways to search in 2024, *The Keyword (Google Blog)*, 17 January 2024, accessed 17 September 2024.

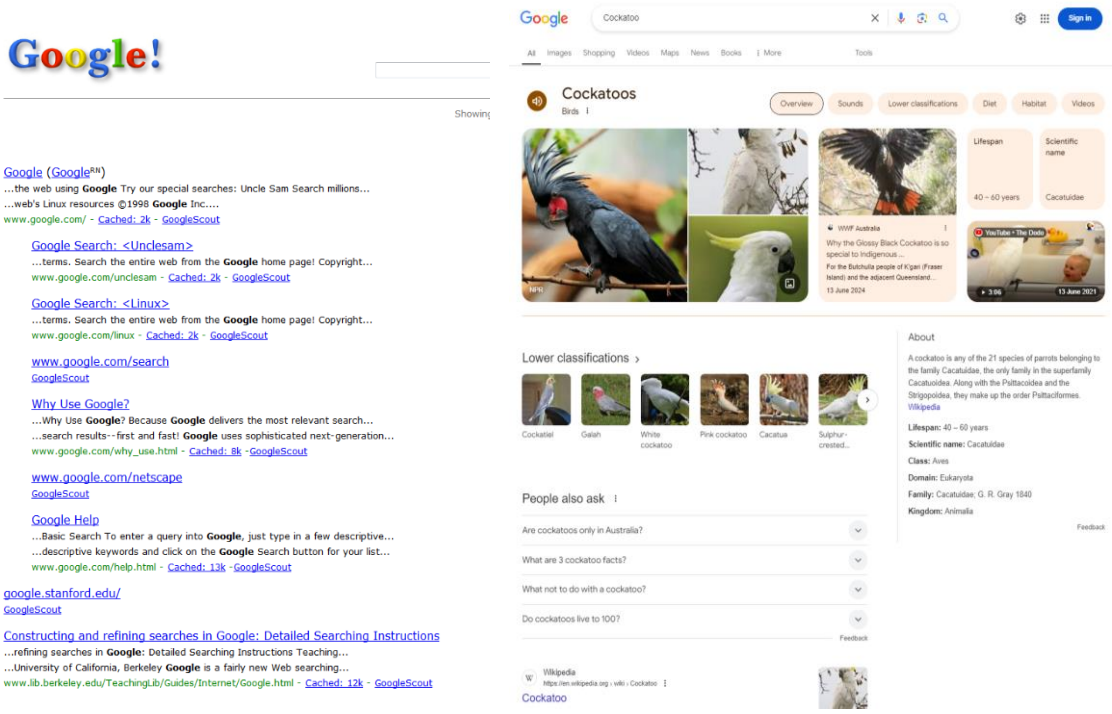
19 Apple, Use Visual Look Up to identify objects in your photos and videos on iPhone, *iPhone User Guide for iOS 18*, 2024, accessed 17 September 2024; Helpful photo examples in P Wolinski, 7 best ways to use your iPhone's awesome Visual Look Up feature, *tom's guide*, 12 November 2023, accessed 17 September 2024.

20 Google Inc was incorporated in 1998. In the two years prior to this, Google Search operated from Stanford University's computer science department. J Battelle, *'The Search: How Google and Its Rivals Rewrote the Rules of Business and Transformed Our Culture*', 2005, pp 73-87.

21 A Zipern, NEWS WATCH; A Quick Way to Search For Images on the Web, *The New York Times*, 12 July 2001, accessed 17 September 2024.

22 D Sullivan, Google Launches "Universal Search" & Blended Results, *Search Engine Land*, 16 May 2007, accessed 17 September 2024.

Figure 1.1: Google search engine results page in 1998 and 2024[23]



The presentation of information on a search engine results page has been a key focus of development by search engines in recent years, with Google Search, Bing, and DuckDuckGo introducing summary boxes and interactive elements on results pages. These features allow search engines to answer users' queries without referring them to other webpages.

A common type of feature relates to how information from knowledge graphs are presented. Knowledge graphs are specialised databases of facts and information about real-world entities (such as people, places, and events), which are used by search engines to present answers and fact panels to users in response to queries.[24] Google Search and Bing maintain their own knowledge graphs and use them in conjunction with other public sources to provide users with information in response to their queries.[25]

Search engines may also provide users with immediate answers to their queries sourced directly from the search results. These excerpts (referred to as 'featured snippets') highlight a sentence or paragraph that includes key information relevant to a query, and often provide a link to direct a user to the result to find further information. Another type of immediate answer format is an 'AI Overview', discussed further in sections 2.2.1 and 3.3.1.

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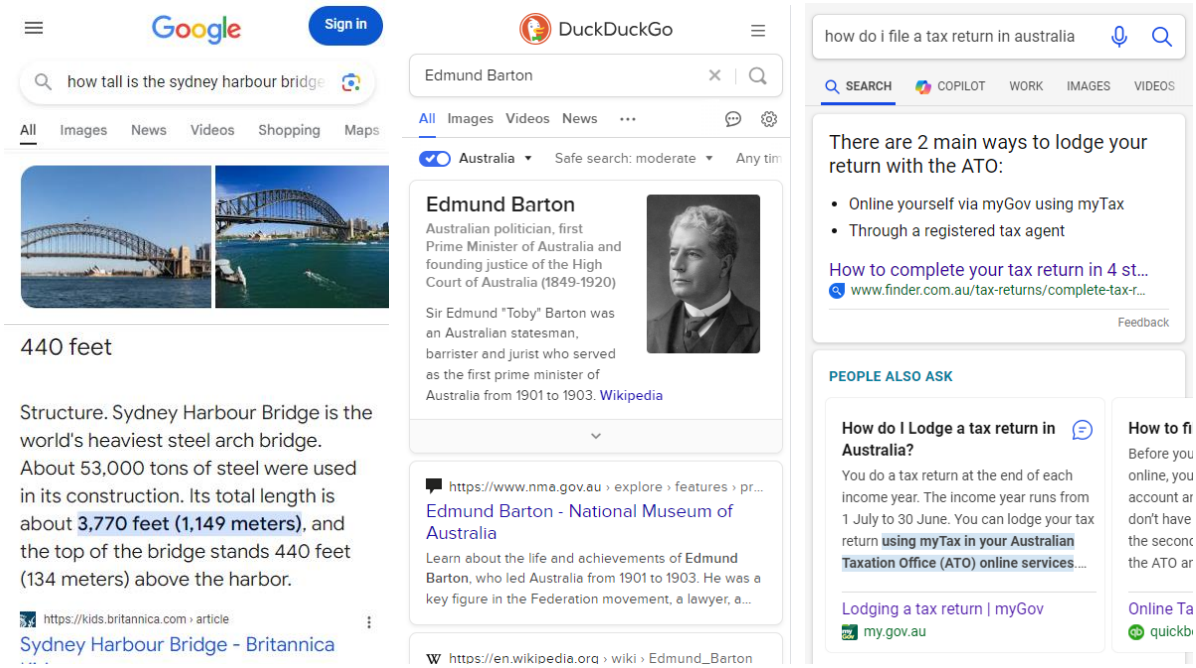
23 IONOS, Google search results: the evolution of the SERPs, 27 October 2022, accessed 17 September 2024; Image captured by ACCC on 26 August 2024.

24 IBM, What Is a Knowledge Graph?, accessed 17 September 2024.

25 Google, How Google's Knowledge Graph works - Knowledge Panel Help, *Knowledge Panel Help*, accessed 17 September 2024; Microsoft, Bring rich knowledge of people, places, things and local businesses to your apps | Search Quality Insights, *Microsoft Bing Blogs*, 12 July 2017, accessed 17 September 2024.

Figure 1.2: Examples of search engine results page information summary features[26]



Search engines may also include features referring to its other search verticals or products, such as images, videos, maps, news, shopping, and reviews features.[27] Other features may be specialised in response to certain types of queries, such as calculators, sports events, and public health events.[28]

Google's submission noted that a factor in '[Google] Search's ongoing popularity' is the 'useful search result formats that Google continues to improve and experiment with to understand how users can find relevant results more easily'.[29] The joint submission from the RMIT's School of Computing Studies and the ARC Centre of Excellence for Automated Decision-Making and Society (ADM+S), noted that the key metric for users seeking information from search engines is 'that they can find what they need, and fast'.[30]

The prevalence of 'zero-click searches', where users do not click on any of the results provided, may also indicate a significant change over time in how users find their answers with search engines. Although in some instances zero-click searches may be an indication that a search was unsuccessful, in many instances users have received the information that they sought. Multiple studies have suggested that a significant proportion of queries do not result in any clicks, with studies from 2019-2024 suggesting that approximately 50-65% of

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26 Screenshots taken of search engine results pages on 'www.google.com', 'www.bing.com', and 'duckduckgo.com' on 12 July 2024.

27 N Boroda, What Are SERP Features? 18 Google Search Features to Know, *Semrush,* 8 January 2022, accessed 17 September 2024.

28 Google Search Help, Manage calculator, unit converter & color codes, accessed 17 September 2024; 8 ways Google can help you keep up with the Olympic Games Paris 2024, *Google Blog,* 24 July 2024, accessed 17 September 2024; E Moxley, Connecting people with COVID-19 information and resources, *The Keyword (Google Blog),* 21 March 2020, accessed 17 September 2024.

29 Google, Submission to the ACCC Digital Platform Services Inquiry Ninth Interim Report, 29 May 2024, p 11.

30 School of Computing Technologies, RMIT University and the ARC Centre of Excellence for Automated Decision-Making and Society (ADM+S), Submission to the ACCC Digital Platform Services Inquiry Ninth Interim Report, 29 May 2024, p 11.

searches result in zero clicks.[31] An ACCC analysis of Similarweb data of Australia's 1000 most popular search queries suggested that from August 2023 to July 2024, 43% of searches were zero-click searches.[32]

General search services have changed substantially since their inception – particularly recently, with the emergence of generative AI. The ACCC considers that the increasing rate of technological developments is likely to mean significant uncertainty for how these services look and operate beyond the very near-term.

1.1.3. Some possible alternatives to traditional general search

While search engines are still the main access point for most consumers to search for information, there is some indication that this is evolving. Younger consumers are increasingly using social media (such as TikTok, Facebook, Instagram, and Reddit) as an access point to search.[33] This trend appears to be driven by answers on social media that feel more personalised and authentic (being human experiences and opinions) and may be easier to digest and visually appealing (videos instead of reading content).[34]

The ACCC considers that the overall trend of social media becoming a new way for consumers to search for information, at least for certain search topics,[35] is also likely to be happening in Australia, particularly for younger consumers.[36] The ACCC notes that Google is aware of this trend.[37] The ACCC will continue to assess the level and scope of any competitive constraint on Google Search from social media platforms as this trend develops.

The ACCC's Report on Search Defaults and Choice Screens found that while voice assistant search was growing, it was still small relative to text base search for Google Search and Bing.[38] Information provided to the ACCC indicates that voice search and searching by image remain small search methods relative to text search.[39]

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31 G Nguyen, 49% of all Google searches are no-click, study finds, *Search Engine Land*, 19 June 2019, accessed 17 September 2024; G Nguyen, Now, more than 50% of Google searches end without a click to other content, study finds, *Search Engine Land*, 14 August 2019, accessed 17 September 2024; G Nguyen, Zero-click Google searches rose to nearly 65% in 2020, *Search Engine Land*, 22 March 2021, accessed 17 September 2024; D Goodwin, Nearly 60% of Google searches end without a click in 2024, *Search Engine Land*, 2 July 2024, accessed 17 September 2024; M Tober, Zero-clicks Study, *Semrush*, 25 October 2022, accessed 17 September 2024. The ACCC notes that there is variance over what is considered to be 'zero click' (ie: whether zero click includes instances where the browsing session ends and instances where the consumer undertakes another search).

32 Data accessed via the Similarweb Pro platform on 2 September 2024, and is based on the 1000 most popular search queries in Australia across all industries from August 2023 – July 2024, ranked by total traffic for the 12-month period.

33 For example, Millennials and Generation Z consumers in the US are more likely than older generation to use social media over search engines: K Haan, Is Social Media The New Google?, *Forbes*, updated 31 May 2024, accessed 17 September 2024; M Iskiev, The Way People Search the Web is Changing: 4 Stats Marketers & SEOs Should Know [HubSpot Data], *Hubspot*, updated 16 August 2023, accessed 17 September 2024; M Sullivan, Is Reddit a better search engine than Google?, *Fast Company*, updated 18 February 2022, accessed 17 September 2024.

34 A Growcott, Is Social Media The New Search Engine?, *Glowmetrics*, 9 February 2024, accessed 17 September 2024.

35 According to a Forbes consumer survey, more Gen Z consumers in the US appear to use TikTok than Google for searches including: "Hair and Makeup" and "Gift Ideas," "Well-Being and Fitness", "Recipe and Meal Ideas": K Haan, Is Social Media The New Google?, *Forbes*, 31 May 2024, accessed 17 September 2024.

36 According to the ACMA's annual consumer survey, Australians aged 18-24 (70%) and 25-34 (64%) accessed news through social media in 2023: ACMA, How we access news report, [interactive report], February 2024, accessed 17 September 2024.

37 Google, Submission to the ACCC Digital Platform Services Inquiry Ninth Interim Report, 29 May 2024, p 1.

38 ACCC, Digital Platform Services Inquiry Third Interim Report, 28 October 2021, p 28-29.

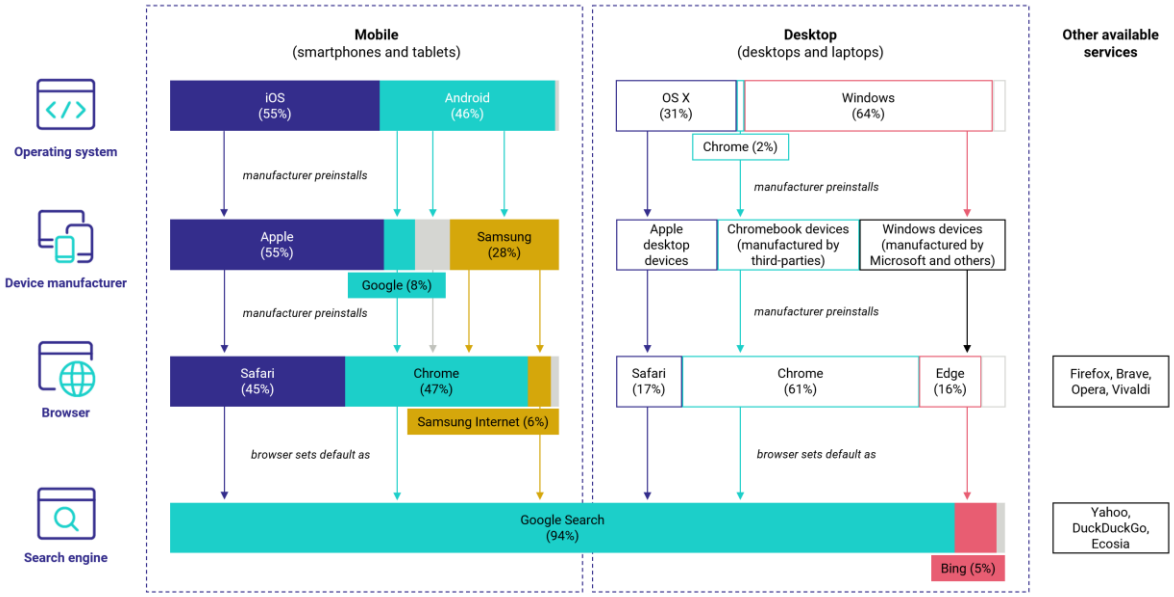
39 Information provided to the ACCC.

1.2. Google has maintained its dominance in search

Despite expansion attempts and new innovations by a range of general search services providers, the structure of the market for general search services appears to have remained broadly the same since the Report on Search Defaults and Choice Screens in 2021.

The most prominent general search engines available in Australia includes Google Search, Microsoft Bing, and Yahoo!. Google and Microsoft are further involved at various other levels of the supply chain, via operating systems, devices, and browsers, as shown below in Figure 1.3.

Figure 1.3: August 2024 Operating System, Device, Browser and Search Engine market shares[40]



There are other smaller search engines available for use in Australia, including:

- **DuckDuckGo** – a privacy-focused search engine which offers tracker-blocking and site encryption while not collecting or sharing the personal information of users
- **Brave Search** – a privacy-focused search engine released in beta in March 2021 by the creators of Brave Browser, which uses its own independent index for commonly searched queries
- **Ecosia** – marketed as an eco-friendly search engine, Ecosia uses adverting revenue from searches to plant trees. Ecosia launched a browser in April 2024.[41]

[40] Statcounter, Mobile Operating System Market Share Australia, accessed September 2024; Statcounter, Desktop Operating System Market Share Australia, accessed September 2024; Statcounter, Mobile Vendor Market Share Australia, accessed September 2024; Statcounter, Mobile Browser Market Share Australia, accessed September 2024; Statcounter, Desktop Browser Market Share Australia, accessed September 2024; Statcounter, Search Engine Market Share Australia, accessed September 2024.

[41] Ecosia, Designed for you, built for the planet, *Ecosia Blog,* 22 April 2024, accessed 17 September 2024.

1.2.1. Google has the majority of market share

In its September 2021 Report, the ACCC found Google Search to be the dominant search engine in Australia, with a market share of 94%.[42] As of August 2024, Google has maintained its 94% market share.[43]

Bing's market share appears to have grown slightly, from 3.9% to 4.7% between September 2021 and August 2024.[44] Yahoo!'s share of the market is 0.8% in August 2024, as it was in September 2021. DuckDuckGo (from 0.9% to 0.6%) and Ecosia (from 0.2% to 0.1%) have lost a substantial portion of their market share over the same period, albeit from a very low base.

The ACCC recognises the significance of branding as a barrier to expansion for smaller search services providers. As outlined in the Report on Search Defaults and Choice Screens, consumer awareness of Google Search is almost universal, with 96% of consumers reporting that they were aware of the platform.[45] Further, the ACCC considers that, in combination with consumers' tendency to remain with the default search engine, this is a significant and potentially costly hurdle for new entrants and smaller search engines to overcome.[46]

1.2.2. Entry and exit

Since the Report on Search Defaults and Choice Screens, there have been limited instances of new entrants that have successfully remained. One recent entrant into general search services is Kagi, a subscription-based, ad-free search engine which launched in June 2022 and allows users to customise results through 'lenses'.[47]

A notable recent entry and exit was Neeva. It was a subscription-based (with a free tier), ad-free search engine founded by ex-Google executives and launched in 2021. It rolled out to Australia in February 2023.[48] The ACCC's Report on Search Defaults and Choice Screens discussed it as a new entrant into general search services, noting that this business model diverged from that of Google Search and many other search engines, which are primarily funded by search advertising.[49] Neeva struggled to gain users and was acquired by Snowflake in May 2023.[50] It then shut down its consumer facing search engine in June 2023, less than two years after launch.[51]

In the US Department of Justice's Google Search monopoly trial, the court found that developing and maintaining a search engine is extremely capital-intensive.[52] In 2020, Google estimated that it would cost Apple around USD 20 billion to reproduce Google's technical

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42 ACCC, Digital Platform Services Inquiry Third Interim Report, 28 October 2021, p 9.

43 Statcounter, Search engine market share Australia September 2021 – August 2024, accessed September 2024.

44 Statcounter, Search engine market share Australia September 2021 – August 2024, accessed September 2024.

45 ACCC, Digital Platform Services Inquiry Third Interim Report, 28 October 2021, p 49.

46 ACCC, Digital Platform Services Inquiry Third Interim Report, 28 October 2021, p 88.

47 Kagi, About, *Kagi's Docs*, accessed 17 September 2024.

48 P Sawers, As ChatGPT hype hits fever pitch, Neeva launches its generative AI search engine internationally, *TechCrunch*, 13 February 2023, accessed 17 September 2024.

49 ACCC, Digital Platform Services Inquiry Third Interim Report, 28 October 2021, p 10.

50 B Dageville, Snowflake acquires Neeva to accelerate search in the Data Cloud through generative AI, *Snowflake*, 24 May 2023, accessed 17 September 2024.

51 Transcript of Proceedings, UNITED STATES OF AMERICA, et al. v GOOGLE, LLC, District Court of District of Columbia, No. 1:20-cv-3010, Mehta J, 2-3 October 2023, T.3686.14-17; T.3689.17-24; T.3712.9-12; T.3796.14-23 (Sridhar Ramaswamy). Neeva CEO, Sridhar Ramaswamy, gave evidence at the DOJ v Google trial that Neeva could not get enough users to regularly used Neeva. He identified the stickiness of consumers to the default search engine in their browser as a key barrier to Neeva's growth.

52 *US Department of Justice v Google LLC*, Memorandum Opinion, 5 August 2024, para 50.

infrastructure,[53] and Apple itself has estimated that it would cost a further USD 6 billion annually to run a search engine.[54] Further, it was noted that monetising a search engine is also extremely costly, with Google having spent USD 11.1 billion to operate its search ads business in 2020.[55]

1.2.3. Commercial relationships

Pre-installation and default arrangements remain present

The ACCC's Report on Search Defaults and Choice Screens particularly focused on browser and search engine pre-installation and default arrangements, which typically involve:

- an operating system having a pre-installed web browser as the default browser. This means the pre-installed browser automatically opens when a user clicks a hyperlink within the device ecosystem, such as from an email or message
- the browser having a pre-set search engine default. This means the search engine is automatically used when a query is typed into the browser's address bar, or is automatically displayed when opening a new browser tab.[56]

The Report on Search Defaults and Choice Screen found that Apple, Google and Microsoft were the primary suppliers of device ecosystems,[57] which continues to be the case today. As outlined in Figure 1.3 above, in Australia, the supply of each of mobile and desktop device ecosystems is concentrated between two suppliers: Apple (with iOS) and Google (with Android) for mobile;[58] and Apple (with macOS) and Microsoft (with Windows) for desktop.[59]

Google Search is the dominant search engine and is the pre-set default across a number of search access points through:

- Vertical integration – Google Search is the default search engine on its Google Chrome browser.
- Commercial arrangements – Google has commercial arrangements for Google Search to be the default search engine on third-party browsers or devices. For example, on the Apple Safari browser or on original equipment manufacturers' (OEMs) devices that use Google's Android operating system.

Google's key commercial arrangements are set out below. The ACCC notes that Microsoft also has commercial arrangements that mainly relate to desktop devices whereby the Microsoft Edge browser and Bing search engine are pre-installed or pre-set as the default on a third-party OEM device. Given the significantly smaller presence of Microsoft Edge and Bing, demonstrated by Bing's market share figures in section 1.2.1 above, these have not been the focus below.

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53 *US Department of Justice v Google LLC*, Memorandum Opinion, 5 August 2024, para 51.

54 *US Department of Justice v Google LLC*, Memorandum Opinion, 5 August 2024, para 54.

55 *US Department of Justice v Google LLC*, Memorandum Opinion, 5 August 2024, para 55.

56 ACCC, Digital Platform Services Inquiry Third Interim Report, 28 October 2021, p 25-26.

57 ACCC, Digital Platform Services Inquiry Third Interim Report, 28 October 2021, p 29. Device ecosystems relate to the integrated suite of hardware and software services that connect and relate to one another (namely, search services, web browsers, operating systems and devices). Device ecosystems are distinguishable from device providers. For example, Google is not a device provider, however, is a primary supplier of a device ecosystem due to its commercial arrangements with third parties to have its search service, web browser and operating system pre-installed or pre-set as the default on a device.

58 Google Search is the pre-installed search engine on iOS (via the Apple Safari browser) and Android (via the Google Chrome browser).

59 Google Search is the pre-installed search engine on macOS (via the Apple Safari browser), and Microsoft Bing is the pre-installed search engine on Windows (via the Microsoft Edge browser).

Google's key pre-installation and default arrangements

Android operating system

In relation to mobile devices, Google's Android operating system is licensed to third-party OEMs. Google has agreements with most of these OEMs to pre-set Google Search as the default search engine.[60] Google also has agreements with these OEMs to pre-install Google Chrome and other Google apps.[61]

The ACCC notes that Samsung's arrangements with Google allow its browser, Samsung Internet, to be pre-installed alongside Google Chrome on Samsung mobile devices.[62]

Apple

In relation to mobile and desktop devices, Google has arrangements with Apple for Google Search to be the pre-set default search engine on Apple's Safari browser, and other search access points on Apple, for example, the use of Google Search by Apple's voice assistant, Siri.[63]

Other browsers

In relation to mobile and desktop devices, Google has arrangements with other browsers (which do not have their own search engine), such as Mozilla Firefox[64] and Opera, [65] to be the pre-set default search engine on the partner's browser.

As noted in the US Google Search monopoly trial decision, Google paid out USD 26.3 billion under these key commercial arrangements in 2021.[66] This figure represented Google's most significant expense that year and was almost four times more than all other search-related costs combined.[67] The court noted that Apple is a crucial partner for Google, with 28% of all queries in the US being entered through the Safari default.[68] In 2022, Google paid an estimated USD 20 billion to Apple under their agreement.[69]

The ACCC is not aware of any information to suggest that Google's key commercial arrangements globally with Apple and OEMs are no longer in place.

Publicly available data in Figure 1.4 shows that Google Search was, and continues to be, the pre-set search engine default on most browsers in Australia, in particular on mobile browsers, assuming no user changed their default search engine.[70] This is largely due to its ownership of the Chrome browser and arrangements with Apple and OEMs that use the Android operating system.

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60 ACCC, Digital Platform Services Inquiry Third Interim Report, 28 October 2021, p 68.

61 ACCC, Digital Platform Services Inquiry Third Interim Report, 28 October 2021, p 68.

62 ACCC, Digital Platform Services Inquiry Third Interim Report, 28 October 2021, p 37.

63 ACCC, Digital Platform Services Inquiry Third Interim Report, 28 October 2021, p 68, 78.

64 Mozilla, Firefox FAQ, accessed 17 September 2024.

65 Opera help, Search, accessed 17 September 2024.

66 *US Department of Justice v Google LLC*, Memorandum Opinion, 5 August 2024, para 289.

67 *US Department of Justice v Google LLC*, Memorandum Opinion, 5 August 2024, para 289.

68 *US Department of Justice v Google LLC,* Memorandum Opinion, 5 August 2024, para 297.

69 *US Department of Justice v Google LLC,* Memorandum Opinion, 5 August 2024, para 299.

70 The ACCC recognises that some users do change their search engine defaults. However, as explored in the Report on Search Defaults and Choice Screens many consumers have a tendency to remain with the pre-installed default services, in particular, on mobile devices (ACCC, Digital Platform Services Inquiry Third Interim Report, 28 October 2021, p 43).

Figure 1.4 – Market shares of key browsers in Australia with Google Search as the pre-set search engine 2021 & 202471

	August 2024		June 2021	
Browsers' Google Search was the default search engine	Mobile[72]	Desktop[73]	Mobile[74]	Desktop[75]
Chrome and Safari	91%	77%	89%[76]	81%[77]

Google Search's position as the pre-set default search engine on the two most popular browsers, Google Chrome and Apple Safari, means that it was the pre-set search engine on at least 91% of mobile browsers and 77% of desktop browsers in Australia as at August 2024. These figures do not include the shares of other browsers for which Google Search is the pre-set default, such as Opera and Mozilla's Firefox. Mobile devices are an important distribution channel for general search services given 95% of Australian adults accessed the internet via a mobile device in the previous six months to June 2023, an 11% increase from 2017.[78]

The ACCC's Report on Search Defaults and Choice Screens considered that Google's pre-installation and default arrangements likely contributed to Google's dominance in general search services by providing it access to a substantial majority of users and data, and therefore access to scale, enabling it to further realise network effects.[79] In response to the Issues Paper, several market participants submitted that Google's dominance is, in large part, due to pre-installation and default agreements.[80]

The ACCC recognises that these arrangements are a source of revenue for OEMs and Apple. However, at the very least, the cumulative effect of these arrangements, combined with vertical integration, is that Google is able to foreclose important search entry points for its rivals, and therefore rivals' access to users and click-and-query data. This was also noted in the ACCC's Report on Search Defaults and Choice Screens.[81]

71 This table uses the market shares of browsers in Australia given browsers are a key search access point for consumers to access and use search engines: ACCC, Digital Platform Services Inquiry Third Interim Report, 28 October 2021, p 23.

72 Statcounter, Mobile browser market share Australia September 2021 – August 2024, accessed September 2024.

73 Statcounter, Desktop browser market share Australia September 2021 – August 2024, accessed September 2024.

74 Statcounter, Mobile browser market share Australia September 2021 – August 2024, accessed September 2024.

75 Statcounter, Desktop browser market share Australia September 2021 – August 2024, accessed September 2024.

76 ACCC, Digital Platform Services Inquiry Third Interim Report, 28 October 2021, p 36.

77 ACCC, Digital Platform Services Inquiry Third Interim Report, 28 October 2021, p 36.

78 Australian Communications and Media Authority (ACMA), Communications and media in Australia: How we use the internet, [interactive report], December 2023, accessed 17 September 2024; ACMA, How we use the internet – Executive summary and key findings, December 2023, p 3.

79 ACCC, Digital Platform Services Inquiry Third Interim Report, 28 October 2021, p 68.

80 See CPRC, Submission to the ACCC Digital Platform Services Inquiry Ninth Interim Report, 29 May 2024, p 6; Man of Many, Submission to the ACCC Digital Platform Services Inquiry Ninth Interim Report, 29 May 2024, pp 5-6; ATTIA, Submission to the ACCC Digital Platform Services Inquiry Ninth Interim Report, 29 May 2024, p 3.

81 ACCC, Digital Platform Services Inquiry Third Interim Report, 28 October 2021, pp 11-13, 78, 86, 93, 109.

The ACCC's ongoing competition investigation into Google's pre-installation and default arrangements with third parties

Google also has pre-installation and default arrangements with mobile network operators that supply mobile devices in Australia. On 2 July 2024, the ACCC publicly announced that it accepted undertakings from Telstra and Optus 'that, after 30 June 2024, they will not renew or enter any new arrangements with Google that require its search services to be pre-installed and set as the default search function on an exclusive basis on devices they supply'.[82]

The ACCC noted that 'Google's agreements with Telstra and Optus, in place since at least 2017, limited the ability for rival search engines to be pre-installed and promoted on Android devices, in return for a share of Google's advertising revenue'[83] and Commissioner Liza Carver noted that '[p]ractices such as entering into agreements to ensure exclusivity can limit consumer choice or deter innovation'.[84]

On 13 August 2024, the ACCC announced it had accepted a similar undertaking from TPG, which relevantly had agreements with Google in place since at least 2018.[85]

These undertakings are part of the ACCC's ongoing competition investigation into Google's search services in Australia.

Syndication agreements

Syndication agreements are another type of agreement in general search services. As discussed in the Report on Search Defaults and Choice Screens, some smaller search engine providers, such as Ecosia and DuckDuckGo, syndicate search results from larger search engines that maintain an index of websites given the costs of indexing and crawling websites.[86] In practice, Microsoft and Google 'are the only English-language search engines that maintain an extensive index of web pages.'[87]

Syndication agreements enable a downstream provider (for example, Ecosia and DuckDuckGo) to respond to a user search query using the upstream provider's (for example, Microsoft or Google) search results under the downstream provider's own branding.[88] Downstream providers may also syndicate ads to be displayed next to search results.[89] Under syndication agreements, the parties to the agreement generally share search advertising revenue.[90]

Microsoft is the main upstream syndication provider, supplying its Bing search results to search engines such as Yahoo!,[91] DuckDuckGo,[92] Ecosia (which also has a strategic

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82 ACCC media release, ACCC accepts undertakings from Telstra and Optus during its ongoing investigation into Google's search services, 2 July 2024.

83 ACCC media release, ACCC accepts undertakings from Telstra and Optus during its ongoing investigation into Google's search services, 2 July 2024.

84 ACCC media release, ACCC accepts undertakings from Telstra and Optus during its ongoing investigation into Google's search services, 2 July 2024.

85 ACCC media release, ACCC accepts undertaking from TPG in ongoing investigation into Google's search services, 13 August 2024.

86 ACCC, Digital Platform Services Inquiry Third Interim Report, 28 October 2021, pp 97-98.

87 ACCC, Digital Platform Services Inquiry Third Interim Report, 28 October 2021, p 97.

88 ACCC, Digital Platform Services Inquiry Third Interim Report, 28 October 2021, p 98.

89 ACCC, Digital Platform Services Inquiry Third Interim Report, 28 October 2021, p 98.

90 ACCC, Digital Platform Services Inquiry Third Interim Report, 28 October 2021, p 98.

91 Yahoo, How your content is ranked, accessed 17 September 2024.

92 DuckDuckGo, Where do DuckDuckGo search results come from?, accessed 17 September 2024.

partnership with System1)[93] and OceanHero.[94] Google also supplies its Google Search results to Ecosia.[95]

Syndication agreements allow smaller search engines to compete, however, they rely on key inputs (search results) from Microsoft and Google, with whom they compete with downstream. Therefore, there is a potential risk that smaller search engines may not be able to compete if Microsoft and Google ceased syndicating search results.

Syndication agreements demonstrate the interconnected nature of general search services, whereby Google and Microsoft are the main search engines and smaller search engines are reliant on them to some extent. This dynamic is also reflected in other digital platform supply chains.

1.2.4. General search services and AI

One much-publicised development relating to general search is the uptake in generative AI use. More recently, existing general search services have begun to offer new, innovative offerings – particularly through the integration of generative AI features. The integration of AI into search engines is discussed further below in section 2.

1.3. Regulatory change and enforcement actions are occurring internationally, but their impact is still developing

Since the ACCC's Report on Search Defaults and Choice Screens in September 2021, a number of regulatory reforms have been implemented. Most notably, the European Union's Digital Markets Act (DMA) recently took effect, though several non-compliance investigations are currently ongoing. Further reforms are underway internationally, as well as investigations by regulators and legal proceedings.

Although these developments appear to have had some early effects, the ACCC considers it too early to determine the medium- to long-term impacts of these developments on the market for general search services. Nevertheless, they serve as a useful guide for any similar regulatory reform in Australia.

1.3.1. The European Union's Digital Markets Act

As outlined in the Report on Search Defaults and Choice Screens, the European Commission proposed the DMA in December 2020.[96] It aims to prevent 'gatekeepers'—platforms designated by the European Commission—from imposing unfair conditions on businesses and consumers, as well as to ensure the openness of important digital services.

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93 Ecosia, We protect your privacy, accessed 17 September 2024; Ecosia, Sep '23: Content and privacy changes, accessed 17 September 2024; System1, System1 Announces Strategic Partnership with Ecosia, a Leading Green Search Engine, 17 October 2023, accessed 17 September 2024.

94 EarthHero, Switch search engine to OceanHero, accessed 17 September 2024.

95 Ecosia, We protect your privacy, accessed 17 September 2024; Ecosia, Sep '23: Content and privacy changes, accessed 17 September 2024.

96 ACCC, Digital Platform Services Inquiry Third Interim Report, 28 October 2021, p B1.

The DMA entered into force on 1 November 2022, with broad obligations and prohibitions applicable from 2 May 2023.[97] It designated Alphabet (Google's parent company), Amazon, Apple, ByteDance, Meta and Microsoft as the first six 'gatekeepers' on 6 September 2023 as they offered 'core platform services' that met certain user and monetary thresholds. They were required to comply with the obligations by 7 March 2024.[98] It also designated Booking as a gatekeeper for its online intermediation service Booking.com on 13 May 2024. In total, 24 core platform services from these seven gatekeepers have been designated. [99]

To date, Alphabet's Google Search is the only general search service to have been designated. The European Commission also designated Alphabet a gatekeeper with respect to several other services, including its Android operating system and Chrome browser.

Microsoft has been designated as a gatekeeper with respect to its Windows desktop operating system; however, the European Commission's market investigation determined Microsoft should not be designated as a gatekeeper with respect to its online search engine Bing and web browser Edge in February 2024.[100]

The provisions of the DMA most relevant to general search services, and outlined in further detail below, are:

- Article 6(3) – provision on choice screens, including obligations for gatekeepers to prompt end-users to select their online search engines from a list of the main providers when they are selecting defaults for the first time
- Article 6(5) – prohibition on self-preferencing in ranking
- Article 6(9) – provision on data portability
- Article 6(11) – obligation to share click-and-query data.[101]

Search engine and browser choice screens

The DMA includes requirements for designated gatekeepers to display choice screens for online search engines, browsers, and virtual assistant services, as well as requirements to allow users to uninstall pre-installed apps. As the sole designated gatekeeper with respect to search services, Google is required to display a search choice screen in its Chrome browser. Although Google had previously implemented multiple iterations of search choice screens across the European Union, it has made several further changes to its existing choice screen

97 CMA, About the Digital Markets Act, accessed 17 September 2024.

98 European Commission, Designated gatekeepers must now comply with all obligations under the Digital Markets Act, 7 March 2024, accessed 17 September 2024.

99 European Commission, Gatekeepers, *Digital Markets Act (DMA)*, accessed 17 September 2024.

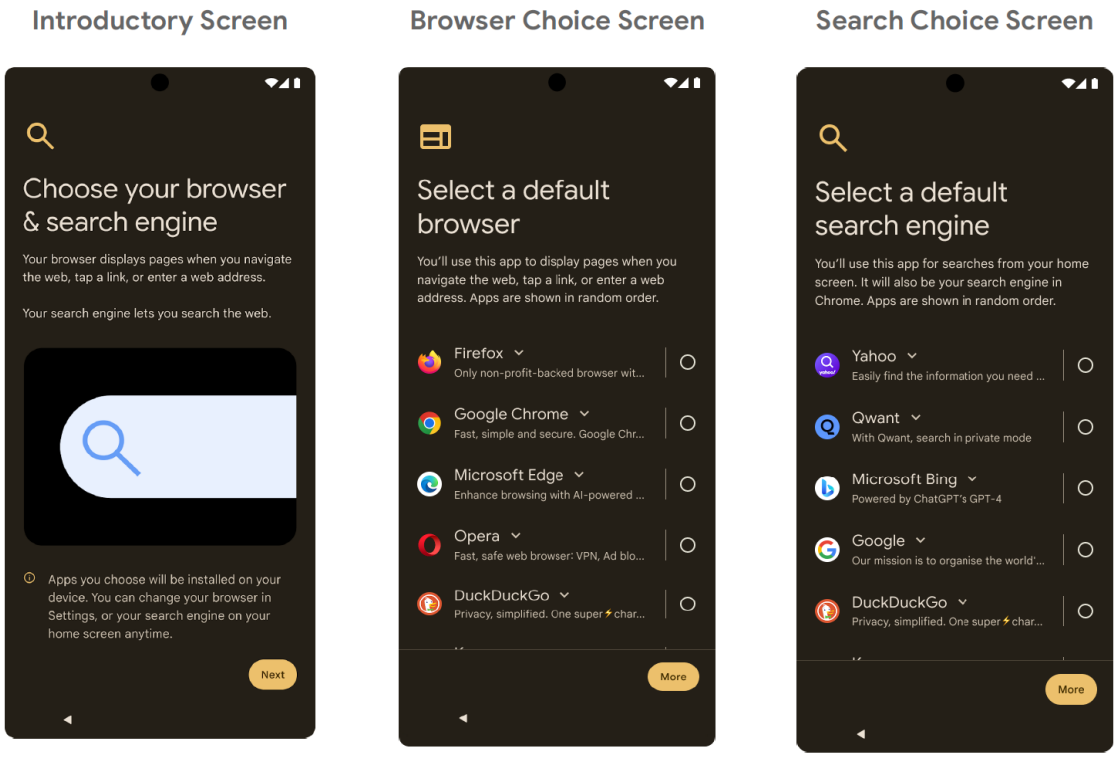
100 European Commission, EC closes DMA investigations into Microsoft and Apple, 13 February 2024, accessed 17 September 2024: "Apple and Microsoft should not be designated as gatekeepers for the following core platform services: Apple's messaging service iMessage, Microsoft's online search engine Bing, web browser Edge and online advertising service Microsoft Advertising."

101 European Union, Regulation (EU) 2022/1925 of the European Parliament and of the Council of 14 September 2022 on contestable and fair markets in the digital sector and amending Directives (EU) 2019/1937 and (EU) 2020/1828 (Digital Markets Act), 14 September 2022, accessed 17 September 2024.

design and has introduced additional free choice screens in response to Article 6(3) of the DMA:

- introducing a new browser choice screen, in addition to search choice screens, visible at device setup on Android[102] smartphones and tablets
- showing a search choice screen on Chrome on non-Android platforms.[103]

Figure 1.5: Android's Choice Screen in response to EU's Digital Markets Act[104]



As a designated gatekeeper with respect to its Safari browser service, Apple has also introduced a browser choice screen in response to the DMA.[105] The European Commission has opened a non-compliance investigation against Apple, noting concerns that its choice screen design may be preventing users from truly exercising choice.[106] In August 2024, Apple announced that, in response to discussions with the European Commission about compliance with the Digital Markets Act, it would be making changes to its choice screen by the end of the year.[107]

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102 European Commission, Compliance with the DMA: Google, 21 March 2024, accessed 17 September 2024. On Android devices, the revised search and browser choice screens are not skippable, do not include Google branding, appear on every device (i.e., are not synchronised across devices), use a fully randomised list, automatically download the relevant third-party app, allow for full descriptions of search engines to be revealed via a chevron, force the user to scroll past all options before choosing their search engine and propagate the choice to the search widget, Chrome browser, text search and other search tools.

103 Chrome, The choice screens: your Chrome, your choice, updated 16 July 2024, accessed 17 September 2024.

104 Google, EU Digital Markets Act (EU DMA) Compliance Report Non-Confidential Summary, *Google Transparency Report*, 7 March 2024, p 114.

105 Apple, About the browser choice screen in the EU, *Apple Developer*, accessed 17 September 2024.

106 European Commission, Commission opens non-compliance investigations against Alphabet, Apple and Meta under the Digital Markets Act, 25 March 2024, accessed 17 September 2024.

107 Apple, About the browser choice screen in the EU, *Apple Developer*, updated August 2024, accessed 17 September 2024.

Given that browsers are a key avenue through which consumers access search services, the ACCC recognises that browser choice screens may also have a significant effect on competition in general search services.

In response to the Issues Paper, Google raised concerns about the DMA choice screen obligations, including that too many choices may create downsides for consumers, the effectiveness of choice screens should not be judged on any changes to the consumers' choice, and any choice interventions should not be applied discriminatorily.[108] Man of Many noted the mixed reactions to the DMA choice screen obligations and submitted that the choice screens do not address the underlying reasons for Google's dominance.[109] However, there is support for a similar rollout in Australia once the full effects of the DMA changes have been considered.[110]

Prohibition on self-preferencing

Article 6(5) of the DMA prohibits 'gatekeeper' platforms from self-preferencing in the ranking, indexing and crawling of search results. It also requires them to apply transparent, fair and non-discriminatory conditions to such ranking.[111] In relation to general search services, Article 6(5) currently applies only to Google Search.

Google submitted in its compliance report that it already applied fair, reasonable and non-discriminatory criteria to its search results prior to the adoption of the DMA.[112] However, Google undertook a review of its search results following the DMA's adoption and implemented a series of changes to strike a balance between the interests of end users and business users in line with the DMA's principles. The changes involved both removing existing features and adding new features and designs.[113] Additionally, Google submitted it has introduced new features and designs aimed at improving the prominence of third-party vertical search services (such as Skyscanner for airline tickets) and direct suppliers.[114]

Some stakeholders raised concerns with Google's changes. Skyscanner and the Asia Travel Technology Industry Association (ATTIA) submitted, in response to the Issues Paper, that removing Google Flights was a welcome first step, but insufficient.[115] Other stakeholders raised concerns in the DMA compliance workshop that feedback given to Google in non-public workshops (organised by both Google and the EC) had been ignored. For example,

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108 Google, Submission to the ACCC Digital Platform Services Inquiry Ninth Interim Report, 29 May 2024, pp 21-22.

109 Man of Many, Submission to the ACCC Digital Platform Services Inquiry Ninth Interim Report, 29 May 2024, pp 7-8.

110 Ecosia, Submission to the ACCC Digital Platform Services Inquiry Ninth Interim Report, 29 May 2024, p 2; CPRC, Submission to the ACCC Digital Platform Services Inquiry Ninth Interim Report, 29 May 2024, pp 9-10. Google and The App Association submitted that Australia should not make any changes without carefully considering the effect of the DMA changes in the EU: Google, Submission to the ACCC Digital Platform Services Inquiry Ninth Interim Report, 29 May 2024, p 2; ACT | The App Association, Submission to the ACCC Digital Platform Services Inquiry Ninth Interim Report, 29 May 2024, p 2.

111 European Union, Regulation (EU) 2022/1925 of the European Parliament and of the Council of 14 September 2022 on contestable and fair markets in the digital sector and amending Directives (EU) 2019/1937 and (EU) 2020/1828 (Digital Markets Act), 14 September 2022, accessed 17 September 2024.

112 Alphabet, EU Digital Markets Act (EU DMA) Compliance Report Non-Confidential Summary, 7 March 2024, p 176.

113 For example, Google removed features that self-preferenced its services in the search results and menu bar and removed the Google Flights unit. It has also replaced the product ads unit to allow comparison shopping sites as well as from merchant websites: Alphabet, EU Digital Markets Act (EU DMA) Compliance Report – Non-Confidential Summary, 7 March 2024, pp 177-178.

114 Alphabet, EU Digital Markets Act (EU DMA) Compliance Report Non-Confidential Summary, 7 March 2024, pp 178-184. These new features include rich results for vertical search services and direct suppliers, a dedicated unit for vertical search services, entity results trigger results pages, new options to connect directly to suppliers in entity results, a new airlines unit, allowing vertical search services to participate in offer results blocks, query shortcut chips, the ability to focus results on vertical search services via refinement chips, and a new ad format for comparison shopping sites.

115 Skyscanner, Submission to the ACCC Digital Platform Services Inquiry Ninth Interim Report, 29 May 2024, p 5; Asia Travel Technology Association, Submission to the ACCC Digital Platform Services Inquiry Ninth Interim Report, 29 May 2024, p 3.

some direct suppliers stated that the new display of shopping comparison sites creates another layer of intermediation, hindering their ability to compete.[116]

Some analysis also suggests that Google's design changes to its results page have not been effective in combating self-preferencing.[117]

Submissions to the Issues Paper were generally supportive of the rollout of Article 6(5) in Europe but noted that it was still in its early phase. Stakeholders also highlighted the harms of self-preferencing conduct to consumers and businesses,[118] and continued to endorse introducing similar measures in Australia to prohibit designated platforms from self-preferencing.[119]

Google noted that there is a natural tension between the interests of vertical search services and those of direct suppliers – if Google increases the exposure of vertical search services (such as large intermediaries and aggregators) on the Google Search results page, it will reduce the exposure for direct suppliers (such as hotels, airlines, merchants and restaurants).[120]

Google also noted that it believes that some of the changes that stakeholders are requesting would degrade the search experience for users in Europe. [121] In its submission to the Issues Paper, it argued that bans on self-preferencing may risk outlawing designs that would benefit users and suppliers. [122]

In relation to its compliance with the DMA, Google submitted that its changes to search results have:

- increased traffic to large intermediaries and aggregators, and sent significantly less valuable traffic to direct suppliers
- given intermediaries disproportionately large exposure relative to the interest of users
- made it more difficult for users to find what they are looking for on the results page
- resulted in the removal of features that users find useful, such as links to Google Maps.[123]

In March 2024, the European Commission opened proceedings against Alphabet for falling short of compliance with its obligations under the DMA with respect to its search services. The European Commission has concerns that it is preferencing its own vertical search services, such as Google Shopping and Google Hotels, over similar rival services despite being designated as a gatekeeper with respect to general search.[124] In September 2024,

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116 European Commission, Alphabet DMA Compliance Workshop, 21 March 2024, accessed 17 September 2024.

117 M Blumenthal, D Mihm & G Sterling, Google DMA compliance: A study of Irish consumer restaurant search behaviour, 21 March 2024. D Paresh, Google Tweaked Search to Comply With EU Rules. Yelp Says It Makes Results Even More Unfair, *Wired,* 23 February 2024, accessed 17 September 2024.

118 Man of Many, Submission to the ACCC Digital Platform Services Inquiry Ninth Interim Report, 29 May 2024, p 9; Nick Ross, Submission to the ACCC Digital Platform Services Inquiry Ninth Interim Report, 29 May 2024, p 1.

119 Skyscanner, Submission to the ACCC Digital Platform Services Inquiry Ninth Interim Report, 29 May 2024, pp 4-5; Free TV, Submission to the ACCC Digital Platform Services Inquiry Ninth Interim Report, 29 May 2024, p 9. Yelp, Submission to the ACCC Digital Platform Services Inquiry Ninth Interim Report,9 September 2024, p 14.

120 European Commission, Alphabet DMA Compliance Workshop, 21 March 2024, accessed 17 September 2024. N Agius, Google unveils major changes to ensure Digital Markets Act Compliance, *Search Engine Land*, 5 March 2024, accessed 17 September 2024.

121 Alphabet, EU Digital Markets Act (EU DMA) Compliance Report Non-Confidential Summary, 7 March 2024, pp 189-190.

122 Google, Submission to the ACCC Digital Platform Services Inquiry Ninth Interim Report, 29 May 2024, p 17.

123 Google, Submission to the ACCC Digital Platform Services Inquiry Ninth Interim Report, 29 May 2024, p 18.

124 European Commission, Commission opens non-compliance investigations against Alphabet, Apple and Meta under the Digital Markets Act, *Digital Markets Act (DMA)*, 25 March 2024, accessed 17 September 2024.

media reported that Google is planning to roll out a new search option giving users looking for flights, restaurants or other services the choice between direct suppliers or comparison websites, in order to better comply with its obligations under the DMA.[125]

Data portability and data sharing measures

The DMA includes several data-related measures. The ACCC considers the most relevant articles to general search services are:

- Article 6(9), the gatekeeper is obliged to provide end users and third parties authorised by an end user with effective data portability of the end user's data
- Article 6(11), the gatekeeper is obliged to offer third-party online search engines fair, reasonable and non-discriminatory terms to ranking, query, click and view data.

To comply with Article 6(9), Google has updated its existing centralised portability tool, Takeout, by introducing a new Data Portability API. Among other features, Takeout can be used to migrate files and data to a new service or device. Under the new solution, users can visit a third-party service and authorise it to export what they want to share with that third party.

In its submission to the Issues Paper, Google supported data portability as a potential alternative to data sharing.[126]

To comply with Article 6(11), Google has introduced a new European Search Dataset Licensing Program, which includes click, query, view, and ranking data. Eligible licensees are then able to pay for data – whether a full set, 50% sample, or 10% sample of the European Economic Area or any subset of countries within.[127]

Ecosia submitted that this provision 'does not go far enough and is not a substitute for syndication with [fair, reasonable and non-discriminatory] terms'.[128]

Google submits that the DMA obligations in relation to the mandatory data sharing demonstrate the challenges in anonymising search data. [129] To comply with the anonymisation element of Article 6(11), Google has anonymised data based on frequency thresholds, but notes that this approach limits the data that can be shared – for instance, tail queries will not meet these thresholds and therefore will not be disclosed. However, Google submits that this is the best way to anonymise search data.[130]

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125 T Gil, N Hirst, L Crofts, Google overhauls search screen in new bid to comply with EU's 'gatekeeper' law, *MLex*, 12 September 2024, accessed 17 September 2024.

126 Google, Submission to the ACCC Digital Platform Services Inquiry Ninth Interim Report, 29 May 2024, p 20.

127 European Commission, Alphabet DMA Compliance Workshop, 21 March 2024, accessed 17 September 2024.

128 Ecosia, Submission to the ACCC Digital Platform Services Inquiry Ninth Interim Report, 29 May 2024, p 1.

129 Google, Submission to the ACCC Digital Platform Services Inquiry Ninth Interim Report, 29 May 2024, p 19.

130 Google, Submission to the ACCC Digital Platform Services Inquiry Ninth Interim Report, 29 May 2024, p 20.

The ACCC's previous DPSI recommendations

The ACCC has previously considered, made recommendations and suggested measures similar to those obligations implemented under the DMA.

The ACCC's Report on Search Defaults and Choice Screens, recommended the implementation of a mandatory choice screen, in combination with other measures and subject to consultation, to improve competition and consumer choice in the supply of general search services in Australia.[131]

Further potential measures considered were:

- limiting the ability of a search engine, which meets a pre-defined criteria, from:
  - tying or bundling
  - paying for certain default positions
- mandating such a search engine to provide:
  - access to click-and-query data and possibly other datasets subject to privacy impacts
  - syndication search results to downstream search engines on fair, reasonable and non-discriminatory terms.[132]

The ACCC's Regulatory Reform Report recommended mandatory service-specific codes for 'designated' digital platforms (which may, for example, include search services) supporting targeted obligations to:

- prevent anti-competitive self-preferencing, tying and exclusive pre-installation
- address data advantages
- ensure fair treatment of business users
- improve switching, interoperability and transparency.[133]

1.3.2. The UK's Digital Markets, Competition and Consumers Bill

The UK Parliament passed the Digital Markets, Competition and Consumers Bill on 23 May 2024. The legislation grants power to the Competition and Market's Authority's Digital Markets Unit to designate digital firms as having Strategic Market Status.[134]

Under the regime, designated firms will have to comply with:

- tailored codes of conduct, enforceable through fines of up to 10% of global turnover
- mandatory merger reporting requirements
- possible pro-competition interventions, which may include data-related interventions, obligations to provide access on fair and reasonable terms, or separation remedies.

The CMA has published draft guidance for consultation, which closed on 12 July 2024.[135]

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131 ACCC, Digital Platform Services Inquiry Third Interim Report, 28 October 2021, p 17.

132 ACCC, Digital Platform Services Inquiry Third Interim Report, 28 October 2021, pp 18-19.

133 ACCC, Digital Platform Services Inquiry Fifth Interim Report, 11 November 2022, pp 5, 11-14.

134 S King, The Digital Markets, Competition and Consumer Bill Passes: A New Era Begins, *Bird & Bird,* 29 May 2024, accessed 17 September 2024.

135 Competition and Markets Authority, Consultation on new digital markets competition guidance, updated 23 July 2024, accessed 17 September 2024.

1.3.3. Relevant investigations in general search services

As well as international reforms, overseas regulators have brought court proceedings in relation to general search services, including the US Department of Justice.

US and Plaintiff States vs Google LLC (2020)

On 20 October 2020, the US Department of Justice and 11 state Attorneys-General filed a civil antitrust lawsuit against Google, alleging that Google has unlawfully maintained monopolies in the markets for general search and search advertising through default and pre-installation agreements with device manufacturers such as Apple and Samsung, and web browser companies.[136] The 10-week trial concluded on 16 November 2023, with closing arguments finishing on 4 May 2024.[137]

The US Department of Justice submitted that Google's conduct forecloses competition in markets for general search engine services and search advertising. The US Department of Justice alleged that Google's conduct harms consumers by reducing the quality of general search services, including aspects such as privacy, data protection and the use of consumer data, reducing choice in general search services and impeding innovation.[138]

Google strongly disputed the US Department of Justice's allegations. It argued that default arrangements enhance the user experience[139] and that it was the quality of its search products that has sustained its dominance.[140]

On 5 August 2024, the Court found that Google had illegally maintained its monopoly in two product markets in the United States—general search services and general text advertising—through its exclusive distribution agreements.[141]

Since the ruling in the Department of Justice's Google Search monopoly trial, Yelp has filed an antitrust lawsuit alleging that Google has illegally abused its dominance to dominate the local search and local search advertising markets.[142]

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136 United States Department of Justice, Justice Department Sues Monopolist Google For Violating Antitrust Laws, 20 October 2020, accessed 17 September 2024.

137 M Barakat, Google, Justice Department make final arguments about whether search engine is a monopoly, *The* Associated Press, updated 4 May 2024, accessed 17 September 2024.

138 United States Department of Justice, Justice Department Sues Monopolist Google For Violating Antitrust Laws, 20 October 2020, accessed 17 September 2024.

139 *UNITED STATES OF AMERICA v. GOOGLE LLC, 1:20-cv-03010, (D.D.C. Feb 23, 2024) ECF No. 833, p 49*.

140 *UNITED STATES OF AMERICA v. GOOGLE LLC, 1:20-cv-03010, (D.D.C. Feb 23, 2024) ECF No. 833, p 1*.

141 R Milne, In Landmark Decision, D.C. Federal Court Holds Google Maintained an Illegal Monopoly in Internet Search and Advertising Markets and Sets the Stage For Future Enforcement Actions, *White & Case*, 16 August 2024, accessed 17 September 2024.

142 J Stoppelman, Fighting for fair competition, consumer choice, and a more helpful Google search experience, *Yelp blog*, 28 August 2024, accessed 17 September 2024; Yelp, Submission to the ACCC Digital Platform Services Inquiry Ninth Interim Report, 9 September 2024.

2. Generative AI and general search services

Generative AI is increasingly being integrated into general search services.[143] This is occurring alongside a proliferation of consumer-facing generative AI tools, ranging from AI chatbots to various features embedded within existing consumer applications. This section:

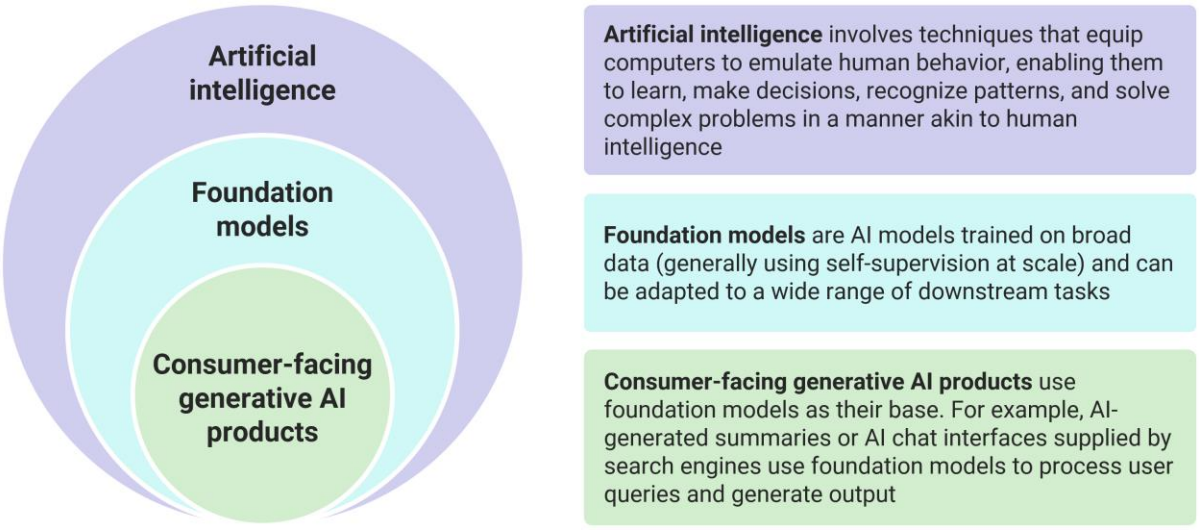
- provides an introduction to generative AI technologies
- discusses the application of generative AI to general search services
- considers the impacts of generative AI on general search services
- summarises recent international and domestic regulatory developments on competition and consumer issues that relate to the integration of generative AI into general search services.

2.1. Introduction to generative AI

2.1.1. What is generative AI?

Generative AI refers to algorithms trained to learn the patterns and structure of their training data, and generate new content in response to prompts.[144] As shown in Figure 2.1 below, generative AI can be understood as a more advanced form of earlier artificial intelligence technologies, including machine learning and deep learning.

Figure 2.1: AI, foundation models and consumer-facing generative AI products[145]



143 See S Goldman, OpenAI's new SearchGPT takes aim at Google in the battle for AI search dominance. But will it win the war?, *Fortune*, 26 July 2024, accessed 17 September 2024; M Wong, The AI Search War Has Begun, *The Atlantic*, 30 July 2024, accessed 17 September 2024.

144 K Martineau, What is generative AI?, *IBM Blog*, 20 April 2023, accessed 17 September 2024.

145 Adapted from L Zhuhandar, Unravelling AI complexity – A comparative view of AI, Machine Learning, Deep Learning and Generative AI, 29 July 2023, accessed 17 September 2024; UK Central Digital and Data Office, Generative AI Framework for HM Government, 18 January 2024, accessed 17 September 2024.

Foundation models, the core technology underpinning generative AI systems, are trained on large datasets and can be adapted to a wide range of tasks and operations.[146]

Large language models (LLMs) are foundation models that process text-based prompts and generate text in response, such as the model that powered ChatGPT when it launched.[147] Increasingly, foundation models are 'multimodal', processing and generating text, images, audio content and videos.[148] Examples of multimodal foundation models include OpenAI's GPT-4o and more recent models in foundation model 'families' including Google's Gemini, Anthropic's Claude and Meta's Llama.[149] Consumer-facing generative AI products such as AI chatbots use foundation models to process user prompts and generate responses.[150]

2.1.2. The generative AI supply chain

The supply of the key inputs (see below) required to develop foundation models are constrained, and large technology firms, including Google, Microsoft and OpenAI, typically have superior access to these inputs.[151] These features of the supply chain have contributed to smaller technology firms depending on those larger firms for access to their foundation models.[152] These features of the generative AI supply chain have raised concerns that a small number of the largest technology firms 'could profoundly shape the development of [foundation model]-related markets to the detriment of fair, open and effective competition'.[153] Potentially, this may have implications for the development and supply of consumer-facing services that rely on these models, including AI-generated search services, as discussed in section 2.3.

Critical inputs to foundation models[154]

Compute – The computational power required for a foundation model to process data, for training models to perform tasks, and enabling outputs to be generated.

Compute generally refers to physical hardware, including specialised AI chips and cloud computing infrastructure. Nvidia is estimated to supply between 70% and 95% of AI chips globally.[155] Nvidia's AI chips currently cost between USD 30,000 and USD 40,000 per unit.[156] Developing advanced foundation models requires a large amount of computing

146 Competition and Markets Authority, AI Foundation Models: Initial Report, 18 September 2023, p 8.

147 At its launch, ChatGPT was powered by GPT-3.5, an advanced series within the third generation of OpenAI's GPT foundation models (GPT-3). OpenAI has been progressively updating ChatGPT with the fourth generation of GPT (GPT-4), including GPT-4o model which has enhanced visual and voice features.

148 Stanford University, Artificial Intelligence Index Report 2024, 15 April 2024, p 77; C Li et al, Multimodal Foundation Models: From Specialists to General-Purpose Assistants, *arXiv preprint arXiv:2309.10020*, 18 September 2023, p 91.

149 Meta's Llama is an 'open-weights' model which means the pre-trained model is generally available for free to developers for further modification and use. While Meta markets Llama as 'open-source', other developers do not have access to Llama's source codes or training data. OpenAI's GPT, Google's Gemini and Anthropic's Claude are examples of 'closed' or proprietary models.

150 E Jones, What is a foundation model?, *Ada Lovelace Institute*, 17 July 2023, accessed 17 September 2024.

151 Competition and Markets Authority, AI Foundation Models: Update Paper, 11 April 2024, pp 6-7.

152 Competition and Markets Authority, AI Foundation Models: Initial Report, 18 September 2023, p 56.

153 Competition and Markets Authority, AI Foundation Models: Update Paper, 11 April 2024, p 12.

154 Autorité de la concurrence, Generative artificial intelligence: the Autorité issues its opinion on the competitive functioning of the sector, 28 June 2024, accessed 17 September 2024; Competition and Markets Authority, AI Foundation Models: Initial Report, 18 September 2023; Federal Trade Commission, Generative AI Raises Competition Concerns, 29 June 2023, accessed 17 September 2024.

155 K Leswing, Nvidia dominates the AI chip market, but there's more competition than ever, *CNBC*, 2 June 2024, accessed 17 September 2024.

156 K Leswing, Nvidia's latest AI chip will cost more than $30,000, CEO says, *CNBC*, 19 March 2024, accessed 17 September 2024.

power.[157] Based on cloud compute rental prices, it would have cost around USD 78 million of compute to train OpenAI's GPT-4 and USD 191 million to train Google's Gemini Ultra.[158]

Data – Large datasets required to pre-train foundation models.

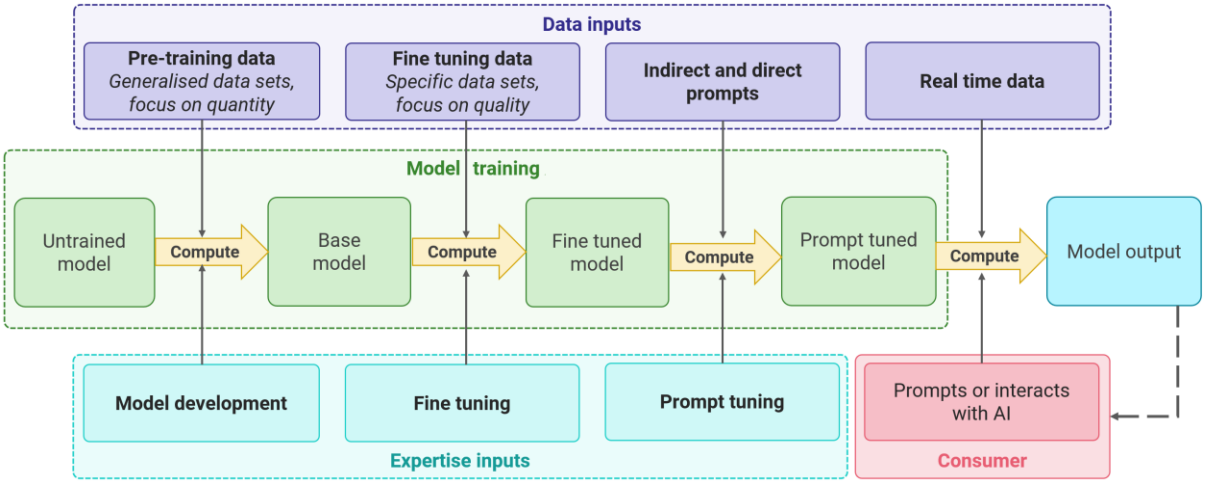
These datasets have typically been sourced by crawling websites and publicly available datasets.[159] Increasingly, model developers are entering into licensing arrangements with data holders to access their datasets, which ensure developer access to the dataset and provide some compensation to the data holder.[160] Although outside the scope of this Report, regulatory scrutiny on the implications for copyright and privacy arising from the use of publicly available data to pre-train foundation models has been increasing.[161]

Technical expertise – AI specialists with highly specific skillsets are required to develop and train generative AI systems.

Due to a limited talent pool, there is a strong competition among large technology companies to attract and retain AI talent.[162] For example, OpenAI has been reportedly offering up to USD 10 million in annual compensation packages, mostly in the form of stock, to senior Google AI researchers.[163]

Foundation model training generally occurs in three stages: pre-training, fine-tuning and prompt tuning, as shown in Figure 2.2 below.

Figure 2.2: Processes of training and deploying foundation model[164]



157 For example, Meta's Llama3.1 was trained using 16,000 Nvidia H100 Tensor Core AI chips, each of which cost around USD 25,000 to 40,000. Nvidia, NVIDIA AI Foundry Builds Custom Llama 3.1 Generative AI Models for the World's Enterprises, 23 July 2024, accessed 17 September 2024; K Leswig, Nvidia's latest AI chip will cost more than $30,000, CEO says, *CNBC*, 19 March 2024, accessed 17 September 2024.

158 Stanford University, Artificial Intelligence Index Report 2024, 15 April 2024, p 5.

159 Competition and Markets Authority, AI Foundation Models: Initial Review, 18 September 2023, p 11.

160 Competition and Markets Authority, AI Foundation Models: Update Paper, 11 April 2024, p 6.

161 For example, see Office of the Australian Information Commissioner, Global expectations of social media platforms and other sites to safeguard against unlawful data scraping, 24 August 2023, accessed 17 September 2024; Attorney-General's Department, Copyright and AI reference group to be established, 5 December 2023, accessed 17 September 2024; Copyright Agency, Submission to the ACCC Digital Platform Services Inquiry Ninth Interim Report, 29 May 2024.

162 K Bindley, The Fight for AI Talent: Pay Million-Dollar Packages and Buy Whole Teams, *The Wall Street Journal*, 27 March 2024, accessed 17 September 2024.

163 J Victor, OpenAI's New Weapon in Talent War With Google: $10 Million Pay Packages for Researchers, *The Information*, 10 November 2024, accessed 17 September 2024.

164 Adapted from Competition and Markets Authority, AI Foundation Models: Initial Report, 18 September 2023, p 54; J Omiye et al, Large language models in medicine: the potentials and pitfalls, August 2023, p 4.

A foundation model builds its knowledge at the pre-training stage, where the model is given a very large quantity of data which it can use to discover patterns and insights in the data, without explicit guidance or instruction.[165] Pre-training is the most computationally intensive step of foundation model development.[166] A pre-trained foundation model usually undergoes further training through fine-tuning and prompt tuning before being deployed in consumer-facing generative AI products.[167] During fine-tuning, a model is enhanced with specific capabilities using particular datasets and customised for specific tasks or use cases.[168] Fine-tuning is also used to improve the behaviour of a model to align with the expectations or preferences of human users.[169] For example, human feedback is used to train models to distinguish outputs that could be biased, false or harmful, or to generate conversational responses.[170] Depending on the specific use case, fine-tuning may be supplemented or substituted with 'prompt tuning', a reiterative process of adding and adjusting prompts to guide the model towards generating the desired output.[171]

These training processes enable the model to develop many parameters – in the hundreds of millions or hundreds of billions – which are the connections 'chosen by the model and learned during training, [and which] are sometimes called weights'.[172]

When a consumer inputs a prompt into a trained model through a consumer-facing generative AI product, the model processes and analyses the new data to generate a new prediction (i.e. the output).[173] This process requires significant compute at scale.[174]

2.1.3. AI investments and partnerships relevant to search

Capital expenditures on generative AI is expected to reach over USD 1 trillion in coming years, including significant investments in data centres, AI chips, other AI infrastructure and the power grid.[175]

In the first quarter of 2024, Google spent around USD 12 billion in AI infrastructures and expected to continue investing at a similar level throughout 2024.[176] Microsoft made USD 14 billion of capital expenditures in the first quarter of 2024 and expects those cost to 'increase materially', driven in part by AI infrastructure investments.[177]

There are numerous ways to apply generative AI to search. Figure 2.3 shows some examples of how generative AI technologies may be integrated into general search, and provides examples of Google and Microsoft's presence at many critical points of the AI search supply chain.

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165 Google, What is unsupervised learning?, *Google Cloud Blog*, accessed 17 September 2024.

166 Competition and Markets Authority, AI Foundation Models: Initial Report, 18 September 2023, p 126.

167 Competition and Markets Authority, AI Foundation Models: Initial Report, 18 September 2023, p 46.

168 Competition and Markets Authority, AI Foundation Models: Initial Report, 18 September 2023, p 10-11. Pre-training has usually been done through unsupervised training and fine-tuning through supervised learning, However, both supervised and unsupervised learning methods, or a combination of both, can be used in pre-training and fine-tuning.

169 Competition and Markets Authority, AI Foundation Models: Initial Report, 18 September 2023, p 11.

170 Competition and Markets Authority, AI Foundation Models: Initial Report, 18 September 2023, p 12.

171 D Didmanizde, Understanding Prompt Tuning: Enhance Your Language Models with Precision, *Data Camp*, May 2024, accessed 17 September 2024; K Martineau, What is prompt-tuning?, *IBM*, 15 February 2023, accessed 17 September 2024; C Si et al, Prompting GPT-3 To Be Reliable, *International Conference on Learning Representations (ICLR 23)*, May 2023, p 3.

172 Elliot Jones, What is a foundation model?, *Ada Lovelace Institute*, 17 July 2023, accessed 17 September 2024.

173 K Martineau, What is AI inferencing?, *IBM*, 6 October 2023, accessed 17 September 2024.

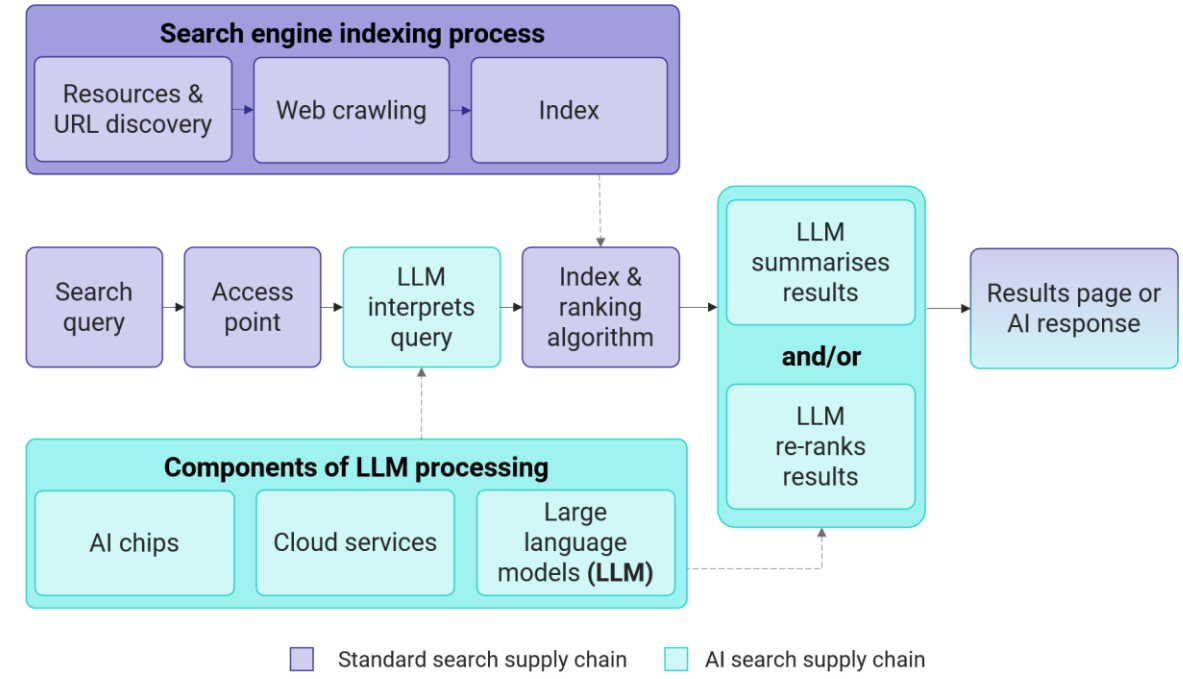
174 Competition and Markets Authority, AI Foundation Models: Initial Report, 18 September 2023, p 14.

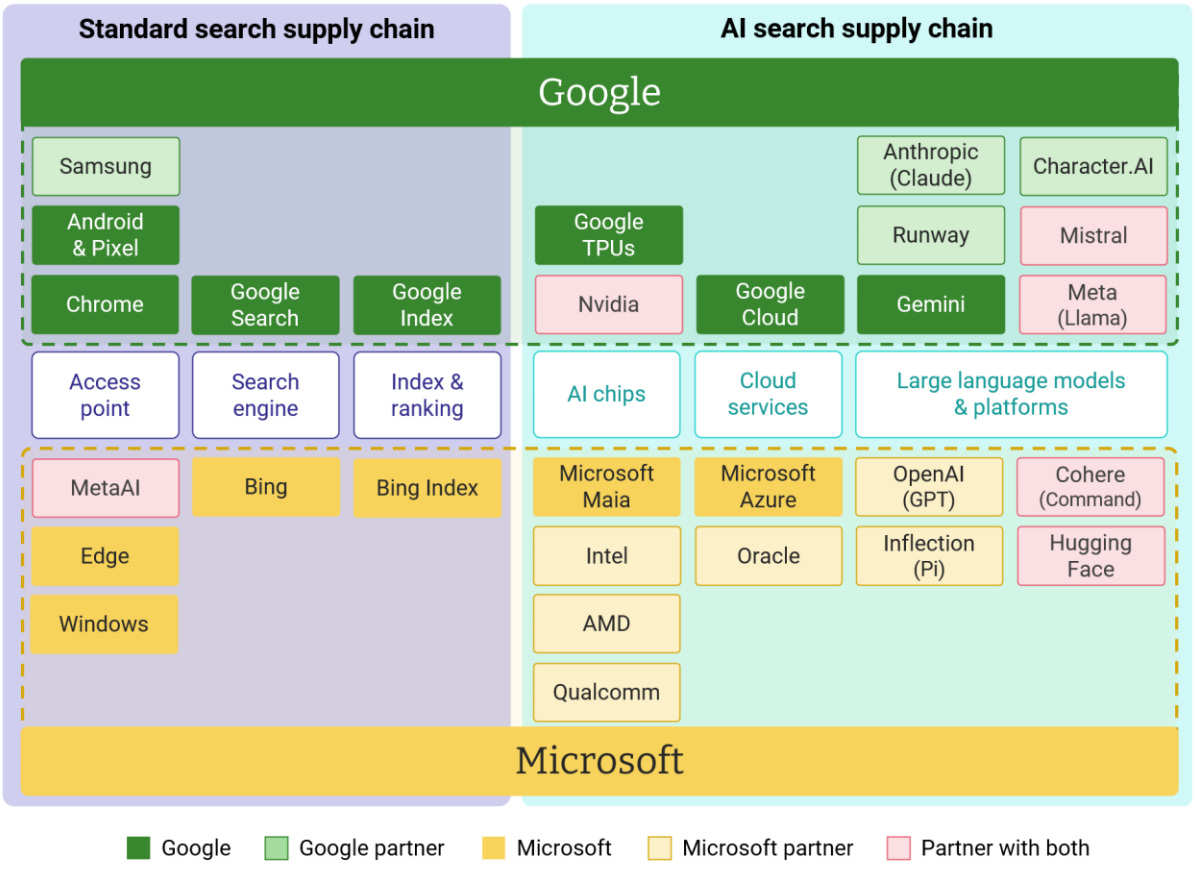
175 Goldman Sachs, Gen AI: Too Much Spend, Too Little Benefit?, 25 June 2024, p 3.

176 S Fiegerman and M Day, Why developing AI costs so much, *Bloomberg News*, 22 July 2024, accessed 17 September 2024.

177 S Fiegerman and M Day, Why developing AI costs so much, *Bloomberg News*, 22 July 2024, accessed 17 September 2024.

Figure 2.3: The AI search supply chain, and Google and Microsoft's presence throughout the chain through first-party products and partnerships





In-house generative AI capabilities

Google is vertically integrated in the generative AI supply chain, including through in-house generative AI assets.[178]

AI chips

In 2016, Google announced its AI chips (called TPUs – Tensor Processing Units) capable of training and running AI models much faster than traditional chips.[179] The ability to develop AI chips in-house provides Google with an advantage in foundation model development. Google's latest in-house foundation model family Gemini was trained using TPUs.[180] The sixth generation TPUs called the Trillium was announced in May 2024.[181]

Microsoft has also developed supercomputing infrastructure in Azure, Microsoft's cloud platform, capable of training advanced foundation models. Microsoft's supercomputing infrastructure has been utilising Nvidia's AI chips.[182] In November 2023, Microsoft announced custom-designed AI chips called Maia AI Accelerator which will be used to power Azure and Microsoft's generative AI services.[183]

Data

The US Federal Trade Commission has noted that, in the context of developing generative AI systems, more established firms 'may benefit from access to data collected from their users over many years', particularly if those firms 'also own digital platform services that amass large amounts of data', and 'have developed and honed proprietary data collection tools and technologies for acquiring or scraping data'.[184] Both Google and Microsoft have collected large amounts of data which may be valuable for the training of foundation models, and both have developed comprehensive indexes of web pages using search crawlers that browse and index web pages across the internet.[185]

Foundation models

Google currently uses a customised version of Gemini to supply generative AI features in search.[186] In addition to Gemini, Google's other in-house foundation model families have also been used in search.[187]

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178 F Y Chee, Microsoft singles out Google's competitive edge in generative AI, *Reuters*, 15 March 2024, accessed 17 September 2024; R Speed, Microsoft says AI alliances are needed to compete with Google, *The Register*, 15 March 2024, accessed 17 September 2024.

179 N Jouppi, Google supercharges machine learning tasks with TPU custom chip, Google Cloud Blog, 19 May 2016, accessed 17 September 2024.

180 S Pichai and D Hassabis, Introducing Gemini: our largest and most capable AI model, *The Keyword (Google Blog)*, 6 December 2023, accessed 17 September 2024.

181 A Vahdat, Announcing Trillium, the sixth generation of Google Cloud TPU, 15 May 2024, accessed 17 September 2024.

182 J Roach, How Microsoft's bet on Azure unlocked an AI revolution, *Source (Microsoft Blog)*, 13 March 2023, accessed 17 September 2024.

183 J Siegel, With a systems approach to chips, Microsoft aims to tailor everything 'from silicon to service' to meet AI demand, *Source (Microsoft Blog)*, 15 November 2023, accessed 17 September 2024.

184 Federal Trade Commission, Generative AI Raises Competition Concerns, 29 June 2023, accessed 17 September 2024.

185 Competition and Markets Authority, AI Foundation Models: Initial Report, 18 September 2023, p 29.

186 L Reid, Generative AI in Search: Let Google do the searching for you, *The Keyword (Google Blog)*, 14 May 2024, accessed 17 September 2024.

187 The other foundation model families include BERT, PaLM2 and MUM: S Venkatachary et al, A new way to search with generative AI: An Overview of SGE, *Google*, October 2023, pp 3-9.

Microsoft has released some in-house foundation models, such as those in the Phi series.[188] These models are generally 'small' language models and appear not to have been used in generative AI features in Bing, which have been utilising OpenAI's GPT foundation models.[189] Microsoft is reportedly training a new foundation model called MAI-1, which is expected to have capabilities comparable to Google's and OpenAI's models.[190]

Commercial relationships

The generative AI supply chain is characterised by investments and strategic partnerships involving large technology firms at each key level, involving the supply of AI chips, cloud computing, data, technical expertise, and foundation models.

Foundation models

One of the most notable partnerships in generative AI has been Microsoft's partnership with OpenAI, which includes Microsoft reportedly investing up to USD 13 billion in OpenAI.[191] Microsoft Azure is OpenAI's exclusive cloud provider and OpenAI's foundation models are used across Microsoft's consumer and enterprise products.[192]

Google currently uses its Gemini foundation models in its generative AI-powered search (discussed in section 2.1.3.1). Google also continues to make investments in other AI model developers, including making an investment of USD 2 billion in Anthropic.[193]

AI chips and cloud computing

Nvidia is a major partner or supplier of almost every major market participant in the generative AI supply chain, including Google and Microsoft.[194] While Google uses its in-house AI chips[195] and Microsoft has also announced AI chips designed in house,[196] they both have reportedly placed or are planning to place sizable orders of Nvidia's latest AI chips.[197] OpenAI's latest foundation models are trained on Nvidia's AI chips hosted in Microsoft's

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188 S Beatty, Tiny but mighty: The Phi-3 small language models with big potential, *Source (Microsoft Blog)*, 23 April 2024, accessed 17 September 2024.

189 Y Mehdi, Reinventing search with a new AI-powered Microsoft Bing and Edge, your copilot for the web, *Official Microsoft Blog*, 7 February 2023, accessed 17 September 2024.

190 A Holmes, Meet MAI-1: Microsoft Readies New AI Model to Compete With Google, OpenAI, *The Information*, 6 May 2024, accessed 17 September 2024.

191 F Y Chee and Y Malik, Microsoft-OpenAI deal set to dodge formal EU merger probe, sources say, *Reuters*, 18 April 2024, 17 September 2024.

192 Microsoft, Microsoft and OpenAI extend partnership, *Microsoft Corporate Blogs*, 23 January 2023, accessed 17 September 2024.

193 K Hu, Google agrees to invest up to $2 billion in OpenAI rival Anthropic, *Reuters*, 28 October 2023, accessed 17 September 2024.

194 K Leswing, Nvidia dominates the AI chip market, but there's more competition than ever, *CNBC*, 2 June 2024, accessed 17 September 2024.

195 S Pichai and D Hassabis, Introducing Gemini: our largest and most capable AI model, *The Keyword (Google Blog)*, 6 December 2023, accessed 17 September 2024; K Tarasov, How Google makes custom chips used to train Apple AI models and its own chatbot, Gemini, *CNBC*, 23 August 2024, accessed 17 September 2024.

196 Microsoft has announced different types of AI chips. For example, Maia 100 AI Accelerator will power some of the largest internal AI workloads running on Microsoft Azure while Qualcomm chips are used for AI features in Copilot+ PC. See J Siegel, With a systems approach to chips, Microsoft aims to tailor everything 'from silicon to service' to meet AI demand, *Source (Microsoft blog)*, 15 November 2023, accessed 17 September 2024; Y Mehdi, Introducing Copilot+ PCs, 20 May 2024, *Official Microsoft Blog*, accessed 17 September 2024.

197 Google's order of Nvidia GB200 AI chips is reportedly worth USD 10 billion whereas Microsoft has reportedly planned to order between 55,000 and 65,000 GB200 AI chips ready for OpenAI to use by the first quarter of 2025. Q Liu and A Gardizy, Nvidia's New AI Chip is Delayed, Impacting Microsoft, Google, Meta, *The Information*, 2 August 2024, accessed 17 September 2024.

cloud platform Azure.[198] Nvidia has also invested in several AI startups, including Perplexity, a newer supplier of an AI-generated search service.[199]

Microsoft has a multi-year agreement with Oracle to use Oracle Cloud Infrastructure (in addition to its use of Microsoft Azure AI infrastructure) on AI models that are being optimised to power Microsoft Bing conversational searches.[200]

As major providers of cloud services, both Google and Microsoft also have partnerships with other foundation model developers who use their cloud services to train their AI models. For example, both Microsoft and Google have partnership with French AI startup Mistral.[201] While some smaller search providers including Brave and Perplexity use Mistral's model to power their generative AI features,[202] neither Google nor Microsoft appear to use Mistral's foundation models in their generative AI features in search.

While there has been shortages of AI chips, the supply may diversify as other chip suppliers Intel and AMD, and cloud service providers Amazon, Microsoft and Google, have either released AI chips or announced their future release.[203]

Data

Some large AI model developers are entering into licensing agreements with news publishers and social media platforms to use their data to train AI models.[204] For example, OpenAI has entered into agreements with publishers such as News Corp, The Atlantic, Condé Nast, and Time, and Google have entered into an agreement with Reddit.[205] Although such agreements have been criticised for undervaluing publishers' intellectual property, they are expected to become more common.[206]

The ACCC notes that, around mid-2024, Reddit reportedly started to restrict scraping of its website by search engines and AI models, with Google Search the only mainstream search engine that users can use to find current Reddit results.[207] A Reddit spokesperson reportedly

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198 Competition and Markets Authority, AI Foundation Models: Update Paper, 11 April 2024, p 6; K Leswing, Nvidia dominates the AI chip market, but there's more competition than ever, *CNBC*, 2 June 2024, accessed 17 September 2024.

199 K Hu and P Biswas, Search startup Perplexity AI valued at $520 mln in funding from Bezos, Nvidia, *Reuters*, 5 January 2024, accessed 17 September 2024.

200 Oracle, Oracle Cloud Infrastructure Utilized by Microsoft for Bing Conversational Search, 7 November 2023, accessed 17 September 2024.

201 Reuters, Google Cloud partners with Mistral AI on generative language models, 14 December 2023, accessed 17 September 2024; R Dilet, Microsoft made a $16M investment in Mistral AI, *TechCrunch*, 27 February 2024, accessed 17 September 2024.

202 Brave, Brave Leo, the AI browser assistant, now features Mixtral for improved performance, 25 January 2024, accessed 17 September 2024; Perplexity.ai, Mistral Large is now available to all Perplexity Pro users! [Tweet], 28 February 2024, accessed 17 September 2024.

203 K Leswing, Nvidia dominates the AI chip market, but there's more competition than ever, *CNBC*, 2 June 2024, accessed 17 September 2024.

204 A Bruell et al, OpenAI, WSJ Owner News Corp Strike Content Deal Valued at Over $250 Million, *The Wall Street Journal*, 22 May 2024, access 17 September 2024; Reddit, Reddit and OpenAI Build Partnership, *Upvoted (Reddit Blog)*, 16 May 2024, accessed 17 September 2024; R Patel, An expanded partnership with Reddit, *The Keyword (Google Blog)*, 22 February 2024, accessed 17 September 2024.

205 OpenAI, A landmark multi-year global partnership with News Corp, 22 May 2024, accessed 17 September 2024; OpenAI, A content and product partnership with The Atlantic, 29 May 2024, accessed 17 September 2024; OpenAI, OpenAI partners with Condé Nast, 20 August 2024, accessed 17 September 2024; OpenAI, Strategic Content Partnership with TIME, 27 June 2024, accessed 17 September 2024; Google, An expanded partnership with Reddit, *The Keyword (Google Blog)*, 22 February 2024, accessed 17 September 2024.

206 J Lessin, Media Companies Are Making a Huge Mistake With AI, *The Atlantic*, 24 May 2024, accessed 17 September 2024.

207 Emanuel Maiberg, Google Is the Only Search Engine That Works on Reddit Now Thanks to AI Deal, *404*, 24 July 2024, accessed 17 September 2024.

indicated that the restrictions were not related to Reddit's partnership with Google.[208] Some content publishers have expressed a preference for their content to be included in AI-generated search features without being used to train foundation models.[209]

Technical expertise

Both Microsoft and Google have been seeking to attract top talent from other foundation model developers, including through special licencing agreements which include staff hiring provisions.[210] Microsoft's licencing agreement with AI developer Inflection, reportedly worth over USD 650 million, gives Microsoft access to Inflection's models, and allows Microsoft to hire most of Inflection's staff including its co-founders.[211] Under a licencing agreement with Character.AI, Google has hired the co-founders of Character.AI and some of its researchers.[212]

Digital platform services

Both Microsoft and Google are partnering with other digital platform service providers in relation to generative AI, including by launching generative AI features in their products and services. For example, Google has entered a partnership with Samsung to offer certain Google generative AI search features on Samsung's smartphones.[213] Real-time search results from both Google Search and Bing are integrated into MetaAI, accessible on Facebook, Instagram, Messenger and WhatsApp.[214] Apple has reportedly used Google's AI chips to train in-house foundation models, to be used in forthcoming generative AI features in Apple's products and services.[215]

2.2. Use of generative AI in general search

Search providers have increasingly been integrating generative AI into their search services since the launch of ChatGPT in November 2022.[216] Before this, the use of foundation models in general search was generally limited to backend of search engine operations rather than consumer-facing interfaces.[217]

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208 Emma Roth, Reddit is now blocking major search engines and AI bots — except the ones that pay, *The Verge*, 25 July 2024, accessed 17 September 2024.

209 OpenAI, SearchGPT Prototype, 25 July 2024, accessed 17 September 2024.

210 G Hammond, Big Tech's talent raids on AI start-ups sideline early investors, *Financial Times*, 15 August 2024, accessed 17 September 2024; M O'Brien and S Parvini, US senators call out Big Tech's new approach to poaching talent, products from smaller AI startups, *AP*, 13 July 2024, accessed 17 September 2024.

211 K Hu and H M Varghesse, Microsoft pays Inflection $650 mln in licensing deal while poaching top talents, source says, *Reuters*, 22 March 2024, accessed 17 September 2024.

212 E Woo, Google Makes Former Character.AI CEO Shazeer a Co-Leader of Gemini AI, *The Information*, 24 August 2024, accessed 17 September 2024.

213 H Lockheimer, The power of Google AI comes to the new Samsung Galaxy S24 series, *The Keyword (Google Blog)*, 17 January 2024, accessed 17 September 2024.

214 M G Southern, Meta Integrates Google & Bing Search Results Into AI Assistant, *Search Engine Journal*, 18 April 2024, accessed 17 September 2024.

215 Apple, Apple Intelligence Foundation Language Models, 29 July 2024, accessed 17 September 2024; K Leswing, Apple says its AI models were trained on Google's custom chips, *CNBC*, 29 July 2024, accessed 17 September 2024.

216 M Murgia and R Waters, How Google lost ground in the AI race, *Financial Times*, 6 April 2024, accessed 17 September 2024.

217 For example, Google's use of its in-house LLM to improve search ranking (discussed under 'AI-assisted ranking' in section 2.2.1.).

Foundation models are current to a point in time, generating responses based on the data the model was trained on.[218] Search engines that incorporate generative AI can overcome this limitation by updating the responses generated by the foundation model with real-time search results from the web.[219]

There are limitations and risks to using generative AI in general search, as discussed in section 3.3. Despite these limitations, generative AI systems are useful for satisfying many of the information needs of users. When integrated into search engines, their utility for consumers has the potential to greatly increase, especially for those who prefer direct answers over links in standard search engine results pages.[220]

The section below provides an overview of the key ways generative AI is being integrated into general search services, both by incumbent general search providers and new entrants.

2.2.1. Google and Microsoft's AI-powered search

AI-powered search does not replace standard search engine algorithms, which analyse keywords in search queries and generate a list of ranked websites on search engine results pages. Rather, generative AI systems enable three additional features: conversational search interfaces, AI-generated summaries, and AI-assisted ranking.

AI-conversational search

The rise of conversational interfaces in search has been one of the most visible effects of generative AI on search. While standard keyword search generates search engine results pages with links to web pages indexed by the search engine, conversational search uses the natural language processing of LLMs to process user queries and to generate responses, or 'answers', by synthesising and summarising information from websites indexed by the search engine.[221] Conversational search also allows users to refine their answers by asking follow-up questions, with context carried over from question to question.[222]

Both Google and Microsoft offer conversational search, although the feature is integrated into search in different ways.

In February 2023, Microsoft introduced Microsoft Copilot (as Bing Chat) to its Bing search engine.[223] Microsoft Copilot in Bing produces conversational search responses by processing search queries through Microsoft's Prometheus model, which combines customised OpenAI LLM with information from Bing's web index.[224] Microsoft Copilot is integrated into and displayed prominently on the Bing homepage on desktop and mobile devices.

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218 J Cheng et al., Dated Data: Tracing Knowledge Cutoffs in Large Language Models, 19 March 2024, accessed 17 September 2024.

219 This is achieved through technologies is generally referred to as grounding and retrieval-augmented generation (RAG). See E Berger, Grounding LLMs, *Microsoft FastTrack*, 9 June 2023, accessed 17 September 2024; R Merrit, What Is Retrieval-Augmented Generation, aka RAG?, *Nvidia Blog*, 15 November 2023, accessed 17 September 2024.

220 See M Ptthast et al, The dilemma of the direct answer, *ACM SIGIR Forum* 54(1), 19 February 2021, 1-12; Z Wu et al, Providing Direct Answers in Search Results: A Study of User Behavior, *Proceedings of the 29th ACM International Conference on Information & Knowledge Management*, 19 October 2020, pp 1635-1644.

221 E Couvat, What Are Conversational Search Engines and Why Should You Use Them?, Perplexity, 26 July 2024, accessed 17 September 2024.

222 B Weber, The new conversational Search experience we're thankful for, *The Keyword (Google Blog)*, 23 November 2020, accessed 17 September 2024.

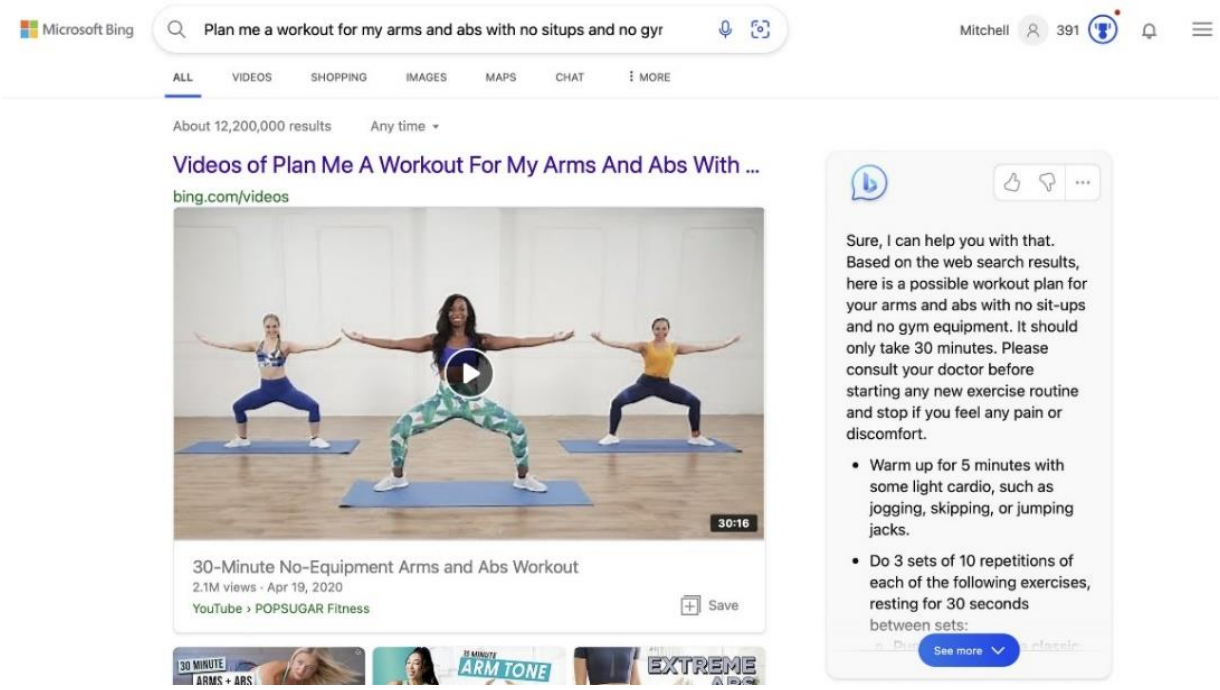
223 Y Mehdi, Reinventing search with a new AI-powered Microsoft Bing and Edge, your copilot for the web, *Official Microsoft Blog*, 7 February 2023, accessed 17 September 2024.

224 Microsoft, Submission to the ACCC Digital Platform Services Inquiry Ninth Interim Report, 29 May 2024, p 3.

Google's AI chatbot was launched (as Bard) in March 2023 and rebranded as Gemini in February 2024.[225] While Google has indicated its AI chatbot is a 'complement to search' rather than a search service,[226] the Gemini chatbot can generate up-to-date responses to user queries based on real-time information from the web.

Gemini is accessible through a web page separate to Google Search, and is available on iOS via the Google App, and on Android via the Gemini App.[227]

Figure 2.4 – Bing Chat integrated into Bing's results page[228]



AI-generated summaries

AI-generated summaries provide a preview of a topic or query based on one or more sources retrieved from the internet. AI-generated summaries could appear as part of the search engine results page or as responses or 'answers' in AI-conversational search interfaces.

Google currently supplies AI Overviews as part of Google Search to users in the US and 6 other countries.[229] Users in another 120 countries can also opt-in to AI Overviews via Google's Search Labs which is available in seven languages, however, this is not available in Australia as of August 2024.[230] AI Overviews provides AI-generated summaries of results, with links to the information sources. They appear at the top of search results in search

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225 S Hsiao, Bard becomes Gemini: Try Ultra 1.0 and a new mobile app today, *The Keyword (Google Blog)*, 8 February 2024, accessed 17 September 2024.

226 J Elias, Google execs tell employees in testy all-hands meeting that Bard A.I. isn't just about search, *CNBC*, 3 March 2023, accessed 17 September 2024.

227 gemini.google.com. A user must login to their Google account to access Gemini.

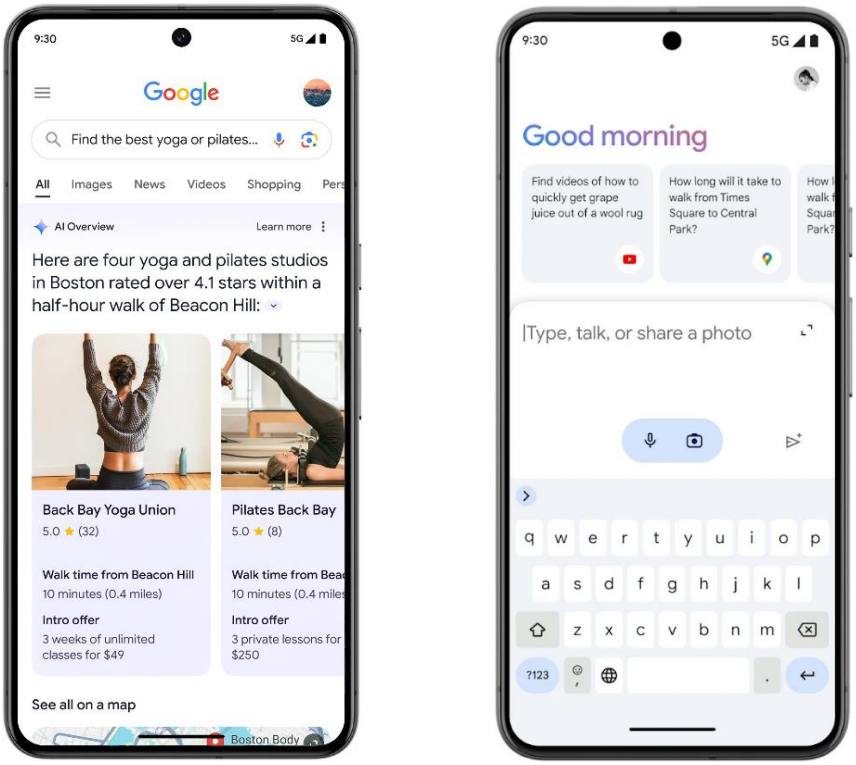
228 M Clark and E Roth, Microsoft's ChatGPT-powered Bing is open for everyone to try starting today, *The Verge*, 8 February 2023, accessed 17 September 2024.

229 L Reid, Generative AI in Search: Let Google do the searching for you, *The Keyword (Google Blog)*, 14 May 2024, accessed 17 September 2024; H Budaraju, New ways to connect to the web with AI Overviews, *The Keyword (Google Blog)*, 15 August 2024, accessed 17 September 2024.

230 Google, Where Search Labs & experiments are available - Google Search Help, accessed 17 September 2024.

engine result pages. AI Overviews is powered by a version of Google's in-house Gemini foundation model customised for Google Search.[231]

Figure 2.5 – Google AI Overviews (Left) and Gemini (Right)



In addition to AI-generated summaries generated by Copilot in Bing, Microsoft has also introduced a separate generative search experience in Bing for a small percentage of user queries.[232] With Bing generative search experience, AI-generated summaries, which contain links to the sources of information, are presented at the main central panel of the search engine results page. Organic search results appear on a separate panel at the right-hand side of the AI-generated summaries. According to Microsoft, Bing generative search aims to fulfil the intent of the user's query more effectively by dynamically matching the search query with sources of information across the internet and generate search results in a new AI-generated layout.[233]

AI-assisted ranking

The use of generative AI technologies to improve search ranking existed prior to the launch of ChatGPT. For example, in 2019, Google announced that it was applying its own LLM (called BERT) to improve ranking in Search to help Search to better understand the intent behind some search queries by considering the context of the words in search queries.[234] Google also started to use another in-house LLM in its search algorithms in 2021.[235]

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231 L Reid, Generative AI in Search: Let Google do the searching for you, *The Keyword (Google Blog)*, 14 May 2024, accessed 17 September 2024.

232 Microsoft, Introducing Bing generative search, *Microsoft Bing Blogs*, 24 July 2024, accessed 17 September 2024.

233 Microsoft, Introducing Bing generative search, *Microsoft Bing Blogs*, 24 July 2024, accessed 17 September 2024.

234 P Nayak, Understanding searches better than ever before, *The Keyword (Google Blog)*, 25 October 2019, accessed 17 September 2024.

235 Google, Supplementary Submission to the ACCC Digital Platform Services Inquiry Ninth Interim Report, 26 July 2024, p 9.

In December 2023, Microsoft introduced 'deep search', which builds on Bing's existing web index and ranking system and enhances them with GPT-4.[236] 'Deep search', which appears next to the Copilot button on the search bar of the search engine, aims to capture the intent and expectations of users more accurately by converting search queries into a more comprehensive description of what an ideal set of search results should include.[237] Microsoft had said that the application of AI models to Bing's core search algorithm has led to the biggest improvement in the relevance of Bing search results in two decades.[238]

2.2.2. Other AI-powered search services

Several other search engines including DuckDuckGo, Brave Search and Ecosia have also introduced generative AI features. However, some of these features are more limited than those provided through Google Search and Bing. For example, responses in DuckDuckGo's DuckAssist only begun incorporating sources beyond Wikipedia from July 2024.[239]

Several smaller AI-powered search engines have also emerged in recent years offering AI chatbots with search features, including:

- **Perplexity**, marketed as an 'answer engine', uses a combination of in-house and third-party generative AI technologies and its own web index to produce conversational search results[240]
- **You.com** draws on a range of third-party foundation models and its own web index while also partnering with Bing for some results[241]
- **Komo** uses its in-house foundation model to provide AI-generated search results in a range of formats, including conversational search, as well as traditional blue link style results[242]
- **Andi** is a privacy-focused AI chatbot[243]
- **Exa**, which has received funding from Nvidia, uses an LLM to predict the next set of links (rather than the next set of words).[244]

Some firms have integrated generative AI into web browsers to display search results in new formats. For example, Arc, a web browser, supplies a search-focused web browser for iOS called Arc Search. When users enter a search query into their browser bar, they can select between searching with their default search service or using Arc's 'Browse for Me' feature,

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236 Microsoft, Introducing deep search, *Microsoft Bing Blog*, 5 December 2023, accessed 17 September 2024.

237 Microsoft, Introducing deep search, *Microsoft Bing Blog*, 5 December 2023, accessed 17 September 2024.

238 Y Mehdi, Reinventing search with a new AI-powered Microsoft Bing and Edge, your copilot for the web, *Official Microsoft Blog*, 7 February 2023, accessed 17 September 2024.

239 DuckDuckGo, DuckDuckGo launches DuckAssist: a new feature that generates quick natural language summaries in response to search queries [UPDATE], 8 March 2023, accessed 17 September 2024 (updated in July 2024 with the following information: 'DuckAssist answers are now generated from sources beyond just Wikipedia'.)

240 Perplexity, What is an answer engine? How is Perplexity an answer engine?, accessed 17 September 2024.

241 M Hachman, You.com's AI-infused Google rival provides a tantalizing glimpse of the future, *PCWorld*, 23 January 2023, accessed 17 September 2024; Celebral Valley, You.com is your AI-powered productivity engine, Plus: CEO Richard Socher on multimodal and AI research, 7 June 2024, accessed 17 September 2024.

242 Komo, Pricing, accessed 17 September 2024; Komo, Komo, accessed 17 September 2024.

243 Andi, Search for the next generation with an AI chat assistant, accessed 17 September 2024; A Birmingham, News Corp, PBL, Seven West alumni back Andi to take generative AI fight to ChatGTP and Bard, renowned Silicon Valley accelerator Y Combinator piles in, *Mi3*, 7 February 2023, accessed 17 September 2024.

244 J Bort, Exa raises $17M from Lightspeed, Nvidia, Y Combinator to build a Google for Ais, *TechCrunch*, 16 July 2024, accessed 17 September 2024.

which uses OpenAI's GPT-4o foundation model to generate a summary webpage of the search results.[245]

Several smaller search engines enable users to choose their preferred foundation model, although access to the most powerful models may require a subscription. Some search engines, including Perplexity, have customised open-weight foundation models, for which the parameters or weights of the model have been released, such as Meta's Llama series or Mistral models.[246]

On 25 July 2024, OpenAI launched SearchGPT, a prototype AI-powered search engine. According to OpenAI, SearchGPT combines the conversational capabilities of OpenAI's foundation models with real-time information from the web to deliver answers with sources cited. OpenAI has indicated it plans to integrate some SearchGPT features directly into ChatGPT in the future.[247]

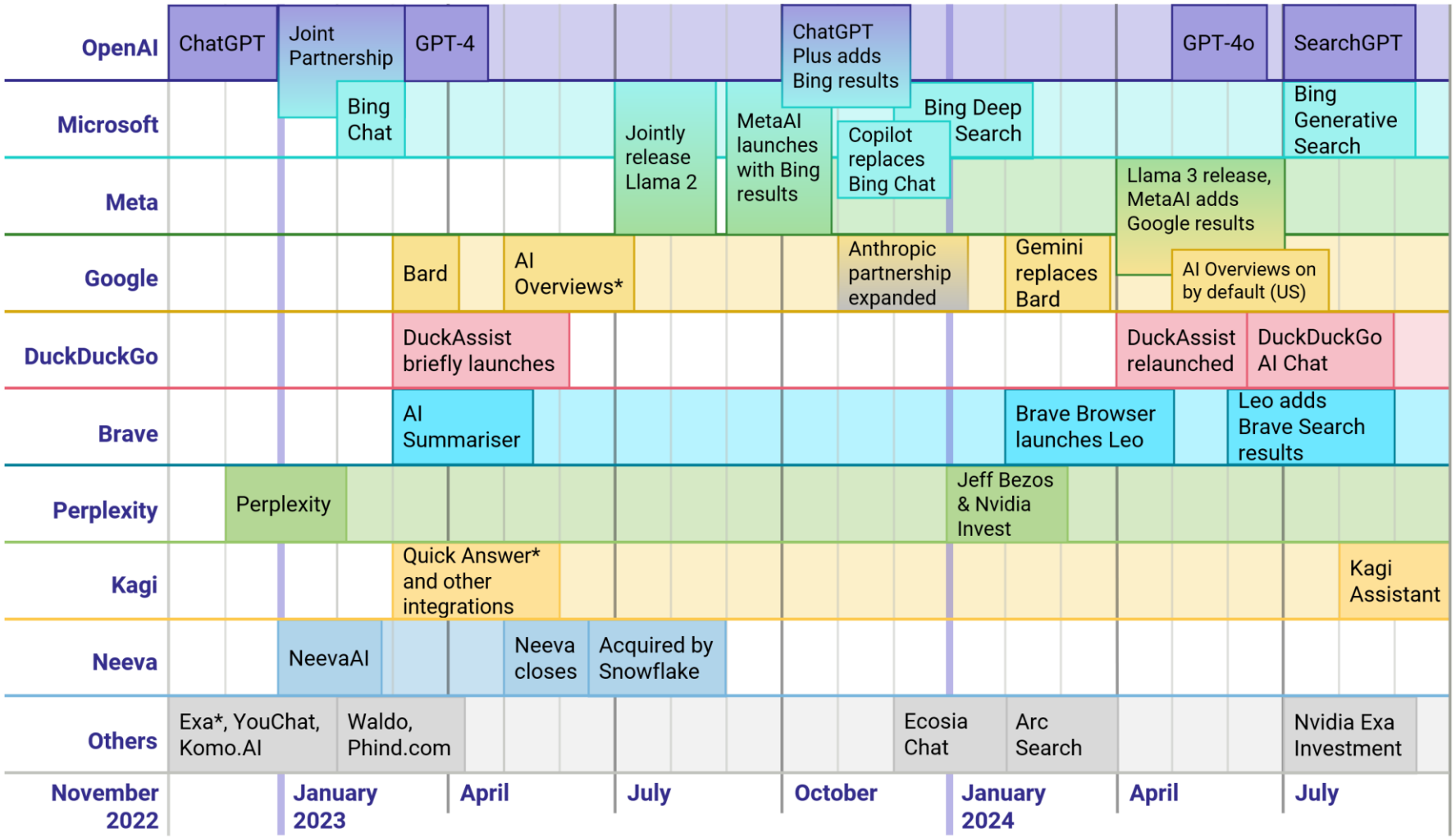
Figure 2.6 provides a timeline of key recent developments, including entry and exits, related to AI-powered search services.

[245] Arc Search, Arc Search Release Notes, 4 July 2024, accessed 17 September 2024; D Pierce, Arc Search combines browser, search engine, and AI into something new and different, *The Verge*, 29 January 2024, accessed 17 September 2024.

[246] Perplexity, Introducing PPLX Online LLMs: The first-of-its-kind Online LLM API, 29 November 2023, accessed 17 September 2024.

[247] OpenAI, SearchGPT Prototype, 25 July 2024, accessed 17 September 2024.

Figure 2.6: Key recent developments in AI-powered search



*Introduced under a different name

2.3. Potential impacts of generative AI on search

The use of generative AI technologies is an important change in general search services which could make these services much more innovative, and searching easier and more efficient for consumers. Established search services both large and small, and new entrants, have embraced the technology as a way to improve and differentiate their search service, and retain or attract users.

2.3.1. Generative AI may not be changing the structure of search

Google has indicated that developments in generative AI have led to increased competitive pressure from other search providers.[248] During an appearance before a parliamentary committee in August 2024, Google Director of Government Affairs for Australia and New Zealand Lucinda Longcroft indicated that the environment in which Australians search for information online is highly dynamic and competitive, and that there is also intense competition at every level of the AI value chain.[249]

It appears that the integration of generative AI into general search services has driven innovation in the form of new search features and products. However, generative AI appears to have had limited impact on the structure of general search in Australia, given Google's share of the supply of search services have remained largely unchanged in recent years.

Both Google and Microsoft are well-resourced firms that can likely sustain high levels of investment in generative AI for a significant period of time. Both have market capitalisations in the trillions and high revenues,[250] with Google's parent company Alphabet reporting global revenue of USD 84.7 billion for the second quarter of 2024.[251] While Google reportedly lowered the cost of AI-generated answers to queries by over 80% within a year of launching SGE in May 2023, due to 'hardware, engineering and technical breakthroughs',[252] achieving significant breakthroughs in generative AI technologies may require large financial investments.

In addition, Google and Microsoft's vertical integration into the generative AI supply chain – a supply chain characterised by high fixed and ongoing costs and high barriers to entry and expansion – may reduce the likelihood of disruptive expansion or entry in general search driven by innovations in AI-powered search. Both Google Search and Bing have access to key inputs to generative AI, which may enhance their ability to compete on the basis of AI-powered search features. For example, while there have been shortages in AI chips,[253] Google has developed its own AI chip to train its newest foundation models.[254] Compared to search engines that don't own cloud infrastructure, both Google and Microsoft may have better or more reliable access to cloud computing capacity, with the cloud appearing to be

248 Google, Submission to the ACCC Digital Platform Services Inquiry Ninth Interim Report, 29 May 2024, p 8.

249 Testimony of Lucinda Longcroft, Select Committee on Adopting Artificial Intelligence – public hearing, 16 August 2024, accessed 17 September 2024.

250 According to data from Companies Market Cap, as at 30 August 2024, Microsoft has a market capitalisation of around USD 3 trillion and Google's parent company Alphabet has a market capitalisation of around USD 2 trillion. Microsoft's annual revenue (calculated for the period between 1 July 2023 and 30 June 2024) was around USD 245 billion compared to USD 328 billion for Alphabet.

251 Alphabet, Alphabet Announces Second Quarter 2024 Results, 23 July 2024, p 1, accessed 17 September 2024.

252 J Victor, What Google Investors Should Really Be Cheering, *The Information*, 1 May 2024, accessed 17 September 2024.

253 For example, see M Kan, TSMC Sees AI Chip Shortage Persisting Until 2025 or 2026, *PC Mag Australia*, 19 July 2024, accessed 17 September 2024.

254 A Vahdat, Announcing Trillium, the sixth generation of Google Cloud TPU, *Google Cloud Blog*, 15 May 2024, accessed 17 September 2024.

the only way to access the computing power needed to train generative AI models, [255] although Google submits that access to highly scalable and cost-effective cloud infrastructure is available from a wide range of cloud services providers.[256]

Further, compared to search engines that are not part of large ecosystems with numerous revenue streams, both Google and Microsoft may have greater ability to recoup their investments in generative AI more quickly by using the technology in other parts of their large ecosystems of products and services, most notably cloud services.[257]

Given that, in addition to Google, Microsoft also benefits from competitive advantages in AI-powered search, it is possible that the increased integration of generative AI into general search services could potentially provide an avenue for Microsoft to supply a more differentiated general search service to Google. However, it appears likely that Google will retain its dominant position in general search, even if Microsoft continues to innovate and improve its search offerings using generative AI.

Microsoft has indicated it does not expect Microsoft Copilot to materially change Bing's search usage share, partly because default settings remain the most important mechanism to reach users in all types of searches, including AI chat-based searches.[258] Neeva CEO Sridhar Ramaswamy described default settings as an 'enormously powerful' factor in search engine usage during the US Department of Justice Google Search trial, when commenting on Neeva's exit from general search services.[259]

Syndication agreements and generative AI

As discussed in section 1.2.3, Microsoft and Google have syndication agreements with smaller search engines, including DuckDuckGo, Ecosia, and Yahoo!.

Syndication agreements enable smaller search engines to access search results from Microsoft and Google to serve the search results, under its own branding, to its users. The main function of syndication agreements is to supply search results, in response to a query, to be served to users. These syndication agreements may not allow smaller search engines to use search results supplied to develop their own web index or to train AI models.[260]

Smaller, less well-resourced generative AI-powered search engines are likely to be less able to disrupt Google's dominant position before they reach the end of their 'runway' of resources, given the high barriers to accessing search entry points, and the high costs involved in supplying AI-generated search results.

Professor John Swinson considers that, based on his observations, there is already competition between consumer-facing generative AI systems such as ChatGPT and general search services.[261] OpenAI may be better placed to disrupt Google's dominant position using a version of its SearchGPT prototype than other providers of generative AI-powered search services. OpenAI has reportedly raised USD 14 billion in funding, making it the most-funded

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255 Autorite de la concurrence, Opinion 24-A-05 of June 28, 2024 on the competitive functioning of the generative artificial intelligence sector – English language summary, 12 July 2024, p 3.

256 Google, Submission to the ACCC Digital Platform Services Inquiry Ninth Interim Report, 29 May 2024, p 3.

257 For examples, see: R DeFrancesco, Microsoft Steadily Ramps Up Generative AI Innovation And Monetization, *Forbes*, 31 May 2024, accessed 17 September 2024; R Miller, Google looks to monetize AI with two new $10 Workspace add-ons, *TechCrunch*, 9 April 2024, accessed 17 September 2024; G de Vynck and N Nix, Big Tech keeps spending billions on AI. There's no end in sight, *The Washington Post*, 25 April 2024, accessed 17 September 2024.

258 Microsoft, Submission to the ACCC Digital Platform Services Inquiry Ninth Interim Report, 29 May 2024, p 5.

259 Transcript of Proceedings, UNITED STATES OF AMERICA, et al. v GOOGLE, LLC, District Court of District of Columbia, No. 1:20-cv-3010, Mehta J, 3 October 2023, T.3796.20 (Sridhar Ramaswamy).

260 Information provided to the ACCC.

261 John Swinson, Submission to the ACCC Digital Platform Services Inquiry Ninth Interim Report, 29 May 2024, p 2.

AI firm,[262] and was projecting revenue of USD 3.4 billion for FY 2024.[263] In August 2024 it was reported that both Nvidia and Apple were in talks to invest in OpenAI as part of a fundraising round.[264] Prior to this, in June 2024, OpenAI and Apple announced partnership to integrate ChatGPT into Apple tools.[265]

However, Open AI does not have its own web index and therefore lacks a key component of a search engine, and one which has driven Google's success in general search. Further, to meaningfully challenge Google's dominance in general search, OpenAI would need to attract a large user base. While ChatGPT became the fastest growing consumer application in history when it gained over 100 million users within two months of launching in November 2022[266], this high growth rate does not appear to have been maintained. In August 2024, OpenAI reported having 200 million weekly active users of ChatGPT.[267]

Google's ability to access and use large volumes of data for training its generative AI systems, through data scraping or agreements with firms that have valuable datasets, may further increase its data advantage in general search, although other firms such as OpenAI and Perplexity have also entered into agreements with publishers of different sizes to use their content. The future availability and value of such datasets may depend on regulatory developments related to copyright.

2.3.2. Potential changes to search business models

The integration of generative AI into general search services significantly increases the marginal cost of fulfilling a search.[268] It remains unclear whether these increased costs will persist, and if they will change the advertising-based business models which have been most commonly used by search providers.

Some general search providers are focusing on integrating ads into AI-generated search results. The RMIT and ADM+S noted that the integration of generative AI into search may augment advertising monetisation strategies – for instance, where product placements are injected or integrated into conversational chat interfaces.[269] In Copilot, ads may appear for certain search queries within the response (labelled 'Ad') and also in a separate section at the end of the response in carousel format labelled as 'Ad'. In May 2024, Google announced that it would be testing Search and Shopping ads in AI Overviews for users in the US. According to Google, the ads will appear 'within AI Overview in a section clearly labelled as

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262 The Asset, OpenAI most-funded AI firm, US$14 billion raised, 18 April 2024, accessed 17 September 2024.

263 Bloomberg, OpenAI Doubles Annualized Revenue to $3.4 Billion, The Information Reports, 13 June 2024, accessed 17 September 2024.

264 J Singh and Z Kachwala, Apple, Nvidia in talks to join OpenAI funding round, media reports say, *Reuters*, 30 August 2024, accessed 17 September 2024.

265 OpenAI, OpenAI and Apple announce partnership to integrate ChatGPT into Apple experiences, 10 June 2024, accessed 17 September 2024

266 A Chow, How ChatGPT Managed to Grow Faster Than TikTok or Instagram, *Time*, 8 February 2023, accessed 17 September 2024.

267 E Roth, ChatGPT's weekly users have doubled in less than a year, *The Verge*, 30 August 2024, accessed 17 September 2024.

268 Alphabet's Chairman John Hennessy told Reuters that having an exchange with AI known as a large language model likely cost 10 times more than a standard keyword search, though fine-tuning will help reduce the expense quickly: J Dastin and S Nellis, Focus: For tech giants, AI like Bing and Bard poses billion-dollar search problem, *Reuters*, 23 February 2023, accessed 17 September 2024.

269 School of Computing Technologies, RMIT University and the ARC Centre of Excellence for Automated Decision-Making and Society (ADM+S), Submission to the ACCC Digital Platform Services Inquiry Ninth Interim Report, 29 May 2024, p 9.

'sponsored' when they're relevant to both the query and the information in the AI Overviews'.[270]

In July 2024, Perplexity announced it would soon start to share ad revenue with news publishers where their content is used in generating responses featuring ads.[271] In August 2024 it was reported that Perplexity also planned to facilitate the display of sponsored 'related' questions and answers, and other sponsored media such as video ads, alongside non-sponsored results.[272] However, the use of ads in generative AI tools remains experimental, and some search services integrating generative AI tools appear to be considering subscription models as a source of revenue to offset the increased cost of offering generative AI-powered search tools. Microsoft and several smaller search providers including Perplexity have introduced the so-called freemium models to their generative AI features, with subscription providing benefits such as faster processing of search queries and the use of their most advanced generative AI models. One search engine available on subscription-only basis is Kagi, which charges between USD 5 and USD 25 per month.[273] Since April 2024, there have been reports that Google is considering charging for premium features on its generative AI-powered search engine. [274] As of August 2024, AI Overviews in Google Search are available for free in the markets the feature is offered.[275] Google is already charging for subscription to advanced Gemini models.

Prior to the introduction of generative AI features in search, search engines have primarily been competing on user experience and search quality. However, with more search engines introducing paid subscriptions for their premier generative AI features, pricing could become an important basis of competition in search in the future.

The introduction of paid subscription for search services has implications for consumers. The CPRC has suggested the introduction of paid subscription models for some generative AI platforms will create tiers in accuracy and quality of responses, as well as barriers to accessibility for certain cohorts of the population.[276]

2.4. Regulatory developments

2.4.1. International regulatory developments

Generative AI raises concerns in different regulatory domains, including in competition and consumer protection, and approaches to AI safety broadly have been a major focus in Australia and internationally.[277]

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270 V Srinivasan, Ads creativity and performance at scale with Google AI, *Google Ads & Commerce Blog*, 21 May 2024, accessed 17 September 2024.

271 R Bellan, Perplexity details plan to share ad revenue with outlets cited by its AI chatbot, *TechCrunch*, 30 July 2024, accessed 17 September 2024.

272 T Ostwal, Inside the Deck Perplexity Is Using to Pitch Advertisers, *Adweek*, 22 August 2024, accessed 17 September 2024.

273 Kagi, Pricing, accessed 17 September 2024.

274 M Murgia and R Waters, Google considers charging for AI-powered search in big change to business model, *Financial Times*, 4 April 2024, accessed 17 September 2024.

275 AI Overviews is available in the US and six other countries. H Budaraju, New ways to connect to the web with AI Overviews, *The Keyword (Google Blog)*, 15 August 2024, accessed 17 September 2024.

276 Consumer Policy Research Centre, Submission to the ACCC Digital Platform Services Inquiry Ninth Interim Report, 29 May 2024, p 12.

277 For example, AI safety is the focus of the EU AI Act and the US White House Executive Order on the Safe, Secure, and Trustworthy Development and Use of Artificial Intelligence. The Australia Government has also published its interim response to the Department of Industry, Science and Resources (DISR) consultation on 'safe and responsible AI' (further discussed in section 2.4.2. Policy initiatives in Australia). At the international level, G7 leaders have established the Hiroshima AI Process framework which consists of guiding principles for all AI actors, guiding principles for developers of AI systems and a code of conduct for developers of AI systems.

Competition authorities in several jurisdictions, including the UK and France, have conducted, or are in the process of conducting, market studies on generative AI.[278] Some competition authorities, including the US Federal Trade Commission, the European Commission, and the UK Competition and Markets Authority, have also commenced investigations on large digital platforms' specific AI investments and partnerships that could impact competition in the deployment of generative AI into digital platform services, including general search. A key goal of these investigations is to examine whether large digital partnerships and investments constitute de facto mergers.[279]

Microsoft's strategic partnership with OpenAI has attracted substantial regulatory scrutiny. As OpenAI's GPT models appear to be the most widely deployed foundation model in general search, Microsoft's partnership with OpenAI could potentially impact how smaller search engines can access and deploy some of the most advanced foundation models in the market. In July 2024, it was widely reported that the US Federal Trade Commission would investigate Microsoft and OpenAI, after having commenced a broader inquiry into AI partnerships and investments in January 2024.[280] In June 2024, the European Commission confirmed that it was reviewing whether the Microsoft-OpenAI partnership violates European Union antitrust laws after deciding not to review the partnership under European Union merger rules.[281] The UK Competition and Markets Authority has decided to investigate the Microsoft-OpenAI partnership and is considering whether to investigate the Google-Anthropic partnership.[282]

Competition authorities are also considering potential anticompetitive effects of new types of commercial agreements emerging in relation to generative AI. One example is the practice of 'acqui-hires', where one company acquires another for the primary purpose of gaining access to the company's talent. With an ongoing AI talent shortage, large digital platforms such as Google and Microsoft may be able to attract talent more easily than their smaller competitors, including through 'acqui-hires'. As of September 2024, the European Commission and US Federal Trade Commission are investigating Microsoft's USD 650 million agreement with Inflection AI which involves Microsoft hiring most of the Inflection AI's staff including its co-founders.[283]

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278 Competition and Markets Authority, AI Foundation Models: initial review, 18 September 2023; Autorité de la concurrence, Generative artificial intelligence: the Autorité issues its opinion on the competitive functioning of the sector, 28 June 2024, accessed 17 September 2024. The ACCC understands that market studies on generative AI have been announced or are in progress in Hungary, India, Japan, and South Korea. The ACCC also understands that competition authorities in Portugal and Canada have published issues paper/discussion paper on competition in generative AI.

279 Federal Trade Commission, FTC Launches Inquiry into Generative AI Investments and Partnership, 25 January 2024, accessed 17 September 2024; Competition and Markets Authority, Microsoft / OpenAI partnership merger inquiry, 8 December 2023, accessed 17 September 2024; European Commission, Commission launches calls for contributions on competition in virtual worlds and generative AI, 9 January 2024, accessed 17 September 2024; Bundeskartellamt, Cooperation between Microsoft and OpenAI currently not subject to merger control, 15 November 2023, accessed 17 September 2024.

280 D McCabe, U.S. Clears Way for Antitrust Inquiries of Nvidia, Microsoft and OpenAI, *The New York Times*, 5 June 2024, accessed 17 September 2024.

281 M Vestager, Speech by EVP Margrethe Vestager at the European Commission workshop on 'Competition in Virtual Worlds and Generative AI', European Commission, 28 June 2024, accessed 17 September 2024.

282 Competition and Markets Authority, Microsoft / OpenAI partnership merger inquiry, accessed 17 September 2024; Alphabet Inc. (Google LLC) / Anthropic merger inquiry, accessed 17 September 2024.

283 M Vestager, Speech by EVP Margrethe Vestager at the European Commission workshop on 'Competition in Virtual Worlds and Generative AI', European Commission, 28 June 2024, accessed 17 September 2024; D Michaels and T Dotan, FTC Opens Antitrust Probe of Microsoft AI Deal, *The Wall Street Journal*, 6 June 2024, accessed 17 September 2024. On 4 September 2024 the UK Competition and Markets Authority announced that it assessed the agreement and found not give rise to a realistic prospect of a substantial lessening of competition. See Competition and Markets Authority, Microsoft Corporation's hiring of certain former employees of Inflection and its entry into associated arrangements with Inflection, 4 September 2024.

On 23 July 2024, the European Commission, the UK Competition and Markets Authority, the US Department of Justice and Federal Trade Commission issued a 'Joint Statement on Competition in Generative AI Foundation Models and AI Products'.[284] The statement outlines the enforcers' concerns over concentrated control of key inputs, large digital platforms potentially entrenching or extending market power in AI-related markets and arrangements involving key players that could be anti-competitive.

2.4.2. Policy initiatives in Australia

Some of the consumer harms associated with generative AI can become more pronounced in the context of general search. For example, a consumer may overestimate the accuracy and reliability of responses from generative AI features of a familiar search engine.[285] This can lead to harmful consequences, for example in medical or financial settings. Addressing and preventing consumer harms from generative AI, while not a focus of this report, has been a key objective of AI-related policy initiatives in Australia.

The Department of Industry, Science and Resources (DISR) has consulted on a 'Safe and responsible AI in Australia' Discussion Paper.[286] The ACCC and other members of Digital Platform Regulators Forum (DP-REG) made a joint submission to the DISR consultation.[287] On 17 January 2024, the Australian Government published its interim response to the DISR consultation and outlined its commitments to protect citizens from harms stemming from generative AI.[288] The Australian Government has committed AUD 39.9 million over a five-year period from 2023–2024 for the development of policies and capability to support the adoption and use of AI technology in a safe and responsible manner, including to review and strengthen existing regulations in the areas of health care, consumer and copyright law.[289] On 5 September 2024, DISR published a proposals paper for introducing mandatory guardrails for AI in high-risk settings.[290]

DP-REG members have also published a working paper examining LLMs and their impact on the regulatory roles of each member.[291]

Other ongoing AI-related policy initiatives in Australia include the Copyright and Artificial Intelligence Reference Group, led by the Attorney-General's Department, and the Australian Framework for Generative Artificial Intelligence in Schools, led by the Department of Education. In addition, the Productivity Commission has published a set of 3 papers outlining the economic opportunities and regulatory challenges that generative AI presents in Australia.[292]

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284 Competition and Markets Authority, Joint statement on competition in generative AI foundation models and AI products, 23 July 2024, accessed 17 September 2024.

285 Some specific examples can be found in Norwegian Consumer Council, Ghost in the Machine: Addressing the Consumer Harms of Generative AI, June 2023, p 22.

286 DISR, Supporting responsible AI: discussion paper, accessed 17 September 2024.

287 DP-REG, DP-REG joint submission to Department of Industry, Science and Resources' AI discussion paper, 26 July 2023, accessed 17 September 2024. DP-REG members include the ACCC, Australian Communications and Media Authority (ACMA), eSafety and Office of the Australian Information Commissioner.

288 Department of Industry, Science and Resources, Safe and responsible AI in Australia consultation: Australian Government's interim response, 17 January 2024, accessed 17 September 2024.

289 The Commonwealth of Australia, Budget 2024-2025: Budget Measures, Budget Paper No. 2, 14 May 2024, p 141.

290 DISR, Safe and responsible AI in Australia: Proposals paper for introducing mandatory guardrails in high-risk settings, 5 September 2024.

291 DP-REG, Working Paper 2: Examination of technology – Large Language Models, 25 October 2023, accessed 17 September 2024.

292 Productivity Commission, Making the most of the AI opportunity: productivity, regulation and data access, 1 February 2024, accessed 17 September 2024.

3. Search quality

Quality is a key aspect of a general search service. The quality of digital platform services, and the incentives for digital platform service providers to compete on aspects of quality, have been the subject of much public discussion.[293] Some of this discussion has focused on the quality of general search services.[294] Search engines shape how people consume and engage with information, and the quality of general search services has the potential to alter a significant part of the information environment for consumers. However, questions have been raised about the degree to which search engines satisfy the information needs of their users by providing them with useful high-quality and relevant information.[295]

Given that quality is central to the user experience of general search services, this Report considers select elements of search quality and their effects on consumers.

3.1. Search quality in general search

There are a range of different measures of search quality. While search quality can be challenging to measure, search engines and researchers refer to various qualitative and quantitative metrics which together can be used to make a wholistic assessment of a search engine's algorithm's quality. Perceptions of quality, and the different ways it can be measured, can also be contingent on the type of search query and a user's intention.

The most obvious, and most significant, indicator of quality is the relevance of search results to a user's query. That is, whether consumers are getting the information they are looking for or most relevant results. Google and Microsoft both consider relevance to be a key part of their attractiveness to consumers and monitor relevance as part of their internal quality measurements.[296]

3.1.1. Search service providers and quality

Search engines and other general search services regularly evaluate the quality of their services, including in response to major events, changes to the composition of content available online, and when considering changes to their ranking algorithms.

Search engines use algorithms to sort and evaluate both the quality of webpages, and the relevance of these webpages to a user's query. Due to the scale of the indexable web, and the number of webpages that are added and updated every minute, search engines must choose certain metrics about a webpage and/or website that can be measured, to determine whether to include the webpage in the search results, and where in those results the webpage should be ranked.

These metrics are important in determining whether a website appears high on a search engine results page in response to a query, or whether they do not appear at all. As a result,

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293 C Doctorow, 'Enshittification' is coming for absolutely everything, *Financial Times*, 8 February 2024, accessed 17 September 2024.

294 E Moore, Whatever happened to Google Search?, *Financial Times*, 6 January 2023, accessed 17 September 2024.

295 See, for example, A Rubin, Google who? Gen Z is searching on TikTok, YouTube instead, *Axios*, 13 April 2024, accessed 17 September 2024; and a study focusing on product reviews, J Bevendorff et al, Is Google Getting Worse? A Longitudinal Investigation of SEO Spam in Search Engines, *Advances in Information Retrieval: 46th European Conference on Information Retrieval*, March 2024, pp 56-71; E Moore, Whatever happened to Google Search?, *Financial Times*, 6 January 2023, accessed 17 September 2024.

296 Information provided to the ACCC. See Google, Submission to the Issues Paper, 29 May 2024, pp 10-11.

there is a high level of interest in what these metrics are from website operators and search engine optimisation specialists. The ranking metrics used by search engines, the ways in which website operators optimise their websites in response to these metrics, and their incentives to do so, are discussed further in section 3.2.2.

In response to the Issues Paper, Google submitted that '[Google] Search's ongoing popularity reflects that users consider it to be the highest-quality search service in Australia.' Google attributed its popularity to factors including 'Google's algorithms that … find the most relevant results within a fraction of a second; the useful search result formats that Google continues to improve and experiment with to understand how users can find relevant results more easily;' and 'language models that have helped Google take huge leaps forward in understanding queries and displaying relevant results'.[297]

Google also referred to third-party research on quality, noting that one study found that 'all search engines except Google [Search] consistently displayed conspiracy-promoting results and returned links to conspiracy-dedicated websites in their top results',[298] while another study 'analysed the prominence of misinformation in various search engines, finding Google [Search] to be significantly better.'.[299]

Microsoft has also publicly contended that the quality of Bing's algorithm is high, stating that, through third-party tests in 2023, it found that Bing's search experience was 'on par or better than any search experience' when brands are removed.[300] On 7 February 2023, during Microsoft's announcement of Bing Chat (later renamed Copilot in Bing), Microsoft noted that it had also recently applied AI models to Bing's core search ranking, and that doing so had resulted in the largest jump in relevance in two decades.[301]

3.1.2. Incentives to compete on quality

Search engines' incentive to maximise profits

When a product or service is offered at zero price (as is generally the case for general search services), the primary dimension of competition is quality, such as through a better search experience and results for consumers).[302] However, search engines' incentives to compete on quality may be affected by some of their other incentives.[303]

Search engines operate in multi-sided markets consisting of consumers, content creators and businesses that need to advertise. On one side, search engines offer free search services to consumers in exchange for their attention, user data and the subsequent ability to sell targeted advertising opportunities. On the other side, search engines use the data

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297 Google, Submission to the ACCC Digital Platform Services Inquiry Ninth Interim Report, 29 May 2024, pp 10-12.

298 A Urman, 'Where the Earth is flat and 9/11 is an inside job: A comparative algorithm audit of conspiratorial information in web search results', *Telematics and Informatics* 72, 6 December 2021, from Google, Submission to the ACCC Digital Platform Services Inquiry Ninth Interim Report, 29 May 2024, p 12.

299 D Bush and A Zaheer, 'Bing's Top Search Results Contain an Alarming Amount of Disinformation', *Stanford Cyber Policy Centre Internet Observatory,* 17 December 2019, from Google, Submission to the ACCC Digital Platform Services Inquiry Ninth Interim Report, 29 May 2024, p 12.

300 Introducing your copilot for the web: AI-powered Bing and Microsoft Edge, 7 February 2023, 19:29 – 19:55, accessed 17 September 2024.

301 Introducing your copilot for the web: AI-powered Bing and Microsoft Edge, 7 February 2023, 19:29 – 19:55, accessed 17 September 2024.

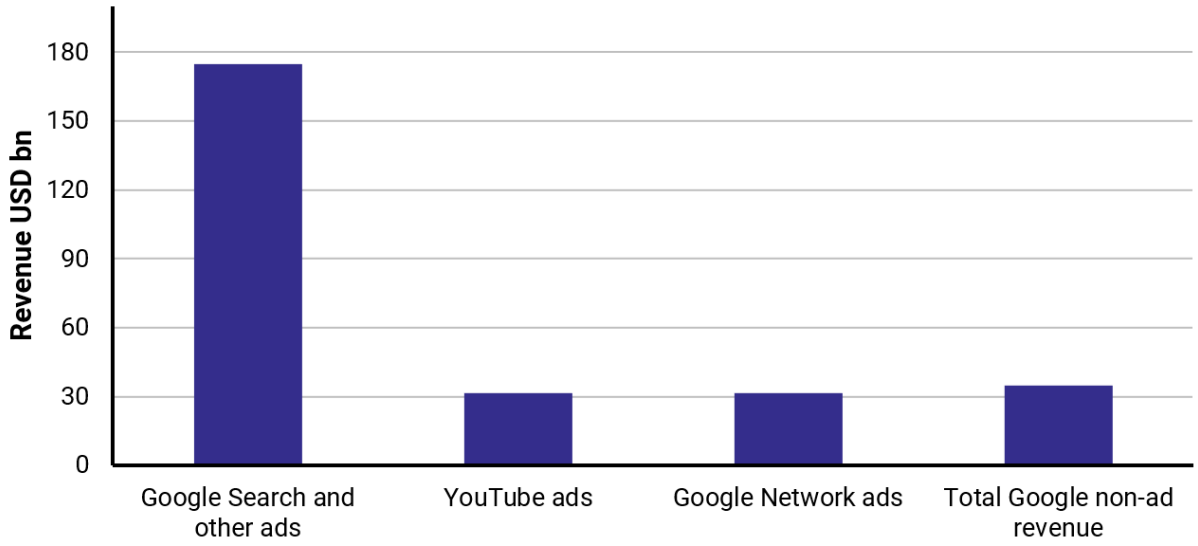
302 OECD, Quality considerations in digital zero-price markets, 2018, p 11; P Gibbard, The economics of platforms: Ad platforms, zero prices and network effects, September 2024, p 12.

303 M Stucke & A Ezrachi, When Competition Fails to Optimize Quality: A Look at Search Engines, *Yale Journal of Law & Technology*, 18:70 (2016), p 72.

collected, and their user base, to supply highly targeted advertising opportunities to businesses that need to advertise, in return for payments for those opportunities.[304]

Typically, a search engine's main source of revenue is from ads.[305] Google Search earns most of its global revenue through ads, as shown in Figure 3.1.[306] Therefore, search engines have a strong incentive to increase advertising revenue and/or decrease costs to maximise profits.

Figure 3.1 – Google's global revenue in 2023



As an example of how these incentives may inform the search results served in response to a query, a search engine is likely to have an incentive to increase ad engagement through ranking targeted sponsored search results above the most relevant non-sponsored search results. An increased prevalence and prominence of ads as a type of reduction in quality is discussed in more detail at section 3.2.1.

Search engines' ability to maximise profits

While search engines may have some incentive to increase advertising in order to increase their revenue, even if doing so reduces the quality of their service, they may be constrained in their ability to sustain an increase in their profits by the presence of effective competitors. Similarly, a search engine may be able to reduce its technical investments that would improve or maintain quality where it is less constrained by competitors.

The ACCC's Report on Search Defaults and Choice Screens found that Google had significant market power in the supply of general search services in Australia, as demonstrated by its dominant market share, which remains high (as shown in section 1.2).[307]

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304 ACCC, Digital Platform Inquiry Final Report, 26 July 2019, p 60-61; P Gibbard, The economics of platforms: Ad platforms, zero prices and network effects, September 2024, p 6.

305 ACCC, Digital Platforms Inquiry Final Report, 26 July 2019, p 62; DuckDuckGo, What is the business model for DuckDuckGo, accessed 17 September 2024; Ecosia, How Ecosia makes money, accessed 17 September 2024. In the Digital Platforms Inquiry Report, the ACCC found that in 2018 approximately 80 per cent of Google's total advertising revenue came from ads within Google Search results.

306 Google, Alphabet 2024 Q2 Earnings Release, p 2, 7; Alphabet, Alphabet 2023 Annual Report, pp 32, 86.

307 ACCC, Digital Platform Services Inquiry Third Interim Report, 28 October 2021, p 24.

The ACCC's Digital Platforms Inquiry Final Report found that Google is dominant in part because it is insulated from dynamic competition by barriers to entry and expansion for its competitors. Google enjoys significant economies of scale and scope advantages over its smaller rivals, which enable it to improve its search algorithm and produce better search results to attract or retain consumers more easily than those rivals can improve their own search results. Consumer inertia and Google's pre-installation and default arrangements also help Google maintain market dominance.[308]

Furthermore, the strong same-side and cross-side network effects Google enjoys as a result of its large user base, large and diverse search-and-query database from a vast user base, and extensive data on users,[309] make Google Search more valuable to advertisers compared to smaller competitors, as Google can serve more targeted ads to consumers.[310] Some economic literature suggests that large platforms may have a competitive advantage in advertising. This is because advertisers face some fixed costs in setting up and managing ad campaigns on platforms and must compare these costs with the benefits of additional sales from using the platform. Therefore, advertisers may be more likely to choose a large platform over a smaller one, as cited in the Gibbard Report.[311]

Research has suggested that the largest search engine, even in the face of competitors, could use its significant advantage in scale and scope to degrade quality for its users and increase its profits. A larger search engine could reduce the quality of its search results yet still generate better search results than its smaller rivals due to network effects.[312]

Conversely, smaller search engines will have less incentive or ability to degrade the quality of their search engine, as they risk reducing their relatively small pool of users, unless they can successfully differentiate their services on other non-price attributes.[313]

Further, the Gibbard Report suggests that, in a market with strong direct network effects, an incumbent may retain its dominance even where the intrinsic quality of its service (its quality in the absence of network benefits) is inferior, if the amount of intrinsic quality inferiority is not greater than the benefits of its network effects.[314]

These competitive dynamics that apply to general search mean that Google may be able to invest less in the quality of Google Search than it otherwise would in a more competitive market while maintaining its 'consumer' and 'advertiser' user bases. An internal study conducted by Google in 2020 showed that a significant depreciation in quality would not result in a significant loss of revenues for Google.[315] Additionally, in the US Department of Justice's Google Search trial, the judge noted that Google's exclusive agreements have diminished rivals' incentives to invest and innovate in general search services.[316]

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308 ACCC, Digital Platforms Inquiry Final Report, 26 July 2019, pp 68-70.

309 ACCC, Digital Platforms Inquiry Final Report, 26 July 2019, p 66.

310 M Stucke & A Ezrachi, When Competition Fails to Optimize Quality: A Look at Search Engines, *Yale Journal of Law & Technology*, 18:70 (2016), pp 87-89.

311 P Gibbard, The economics of platforms: Ad platforms, zero prices and network effects, September 2024, p 16.

312 M Stucke & A Ezrachi, When Competition Fails to Optimize Quality: A Look at Search Engines, *Yale Journal of Law & Technology*, 18:70 (2016), p 96.

313 M Stucke & A Ezrachi, When Competition Fails to Optimize Quality: A Look at Search Engines, *Yale Journal of Law & Technology*, 18:70 (2016), p 97.

314 P Gibbard, The economics of platforms: Ad platforms, zero prices and network effects, September 2024, p 11.

315 US Department of Justice v Google LLC, Memorandum Opinion, 5 August 2024, para 134.

316 US Department of Justice v Google LLC, Memorandum Opinion, 5 August 2024, p 216.

Ability and incentives, and their effect on quality

While a dominant search engine may have weaker incentives to invest in the quality of non-sponsored results than it would in a competitive market, it is unlikely that a position of dominance will result in such a search engine having no incentive to invest in quality.[317]

Google submitted that it has introduced a number of quality updates in recent years, including improvements to product reviews in March 2022, a 'helpful content update' in August 2022, and changes to quality assessment and spam policies in March 2024 to reduce the amount of 'spammy, unoriginal and low quality content on [Google] Search'.[318] Google further submitted that it undertakes hundreds of thousands of quality evaluations every year, employs many engineers, data scientists and researchers to develop and maintain Google Search's technology, and employs thousands of human raters that ensure the quality of Google Search's results.[319]

This incentive and ability may have changed as Google grew from a small search engine to a dominant one. For example, when introducing the Google prototype, its founders recognised that an advertising business model may not lead to a high quality search engine.[320] During its initial years, Google would have needed to increase its user base to achieve economies of scale and network effects. Therefore, it would likely have had a stronger incentive to prioritise customer experience and search quality to outcompete then-incumbents like Yahoo! and Microsoft MSN Search. This incentive is likely to have decreased as Google Search became more dominant through economies of scale and scope, and its preinstallation and default agreements. Google would likely then have been more able to increase ad revenue and or decrease costs related to technical investments, such as in its search algorithms. The Gibbard Report noted that this kind of heavy investment in quality in a zero-price platform in order to obtain dominance, followed by a reduction in expenditure on quality, would be analogous to the invest-harvest strategies based on price in the presence of positive direct network effects found in the academic literature.[321]

Further, Google Search's market share has been consistently above 90% globally and above 92% in Australia since 2009.[322] This indicates that Google is likely to be getting a significant boost to its search quality from direct network effects.

3.2. Certain features that affect quality

The Report focuses on selected elements of search quality. The ACCC has considered these elements as they can affect what consumers see when they use a search engine, and appear to have changed over time. They include:

- **The prominence and number of ads**, including how search services providers' reliance on advertising revenue affects their incentives to serve sponsored content to users.

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317 M Stucke & A Ezrachi, When Competition Fails to Optimize Quality: A Look at Search Engines, *Yale Journal of Law & Technology*, 18:70 (2016), p 97.

318 Google, Submission to the ACCC Digital Platform Services Inquiry Ninth Interim Report, 29 May 2024, pp 14-15.

319 Google, Submission to the ACCC Digital Platform Services Inquiry Ninth Interim Report, 29 May 2024, pp 11-12.

320 S Brin and L Page, The Anatomy of a Large-Scale Hypertextual Web Search Engine, Appendix A, 1998, accessed 17 September 2024.

321 P Gibbard, The economics of platforms: Ad platforms, zero prices and network effects, September 2024, p 12. See, for example, H Halaburda et al, Dynamic competition with network externalities: How History Matters, *The RAND Journal of Economics*, 51(1) (Spring 2020), pp 3-31.

322 Statcounter, Search engine market share Australia 2009-2024, accessed September 2024; Statcounter, Search engine market share worldwide 2009-2024, accessed September 2024.

- **The prevalence of search engine optimised content**, including the quality implications of the providers of general search services preferencing certain website characteristics in search result ranking algorithms for the organic results served to users, and for the quality of content on the internet more generally.
- **The diversity and personalisation of search results**, including the emergence of different kinds of content served on search engine results pages such as interactive dashboards, and consumer perceptions of such content.

Differences in these measures of search quality between providers of general search services, and over time, are considered below.

The Report also examines the implications of generative AI on the quality of search, including issues related to the accuracy and reliability of information served to users, and emerging potential implications for the quality of content available on the internet.

Although other dimensions of quality that apply to the supply of digital platform services, such as privacy and data security, are relevant to the market for the supply of general search services, the Report focuses on measures of quality specific to general search services.[323]

As the largest providers of general search services in Australia, Google Search and Bing, operate globally and offer similar services across jurisdictions, the discussion on quality below, by way of example, refers to measures of quality in a global context, which are relevant to Australian users of search engines.[324] Small search engines such as DuckDuckGo, Ecosia and Yahoo! also provide similar services in Australia and globally.

The following section considers how the competitive dynamics in the supply of general search services influence the incentives of providers of general search services to compete on aspects of search quality.

3.2.1. The impact of advertising on search quality

This section discusses the link between advertising on search engine results pages and search quality. Paid search advertising has evolved significantly since it emerged as a monetisation strategy for search engines in the mid- to late-1990s, with Google Search introducing AdWords to sell ads on its results page in 2000.[325] The type, relevance and prevalence of ads on search engines, and consumer perceptions of these factors, can be considered to be criteria against which search quality is evaluated, in addition to the other measures of quality discussed in this Report.

Paid search advertising as a monetisation strategy for general search service providers

Paid search advertising involves an advertiser purchasing ad placement within the search engine results page.[326] Advertisers purchase search ads via auction. Placement of ads via auction is determined via algorithms of the search service advertising services, which match

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323 For further details on quality considerations in zero-price markets (which are markets for which products/services are provided to consumers for a price of zero) see OECD, Quality considerations in digital zero-price markets, 2018.

324 Although Google's AI Overviews search functionality is currently unavailable in Australia, there is otherwise substantial overlap between the standard search services offered by Google in Australia versus overseas jurisdictions.

325 S B Barnes and N F Hair, From Banners to YouTube: Using the Rear-View Mirror to Look at the Future of Internet Advertising, *International Journal of Internet Marketing and Advertising*, 2007, p 5; Google, Google Launches Self-Service Advertising Program, 23 October 2000, accessed 17 September 2024.

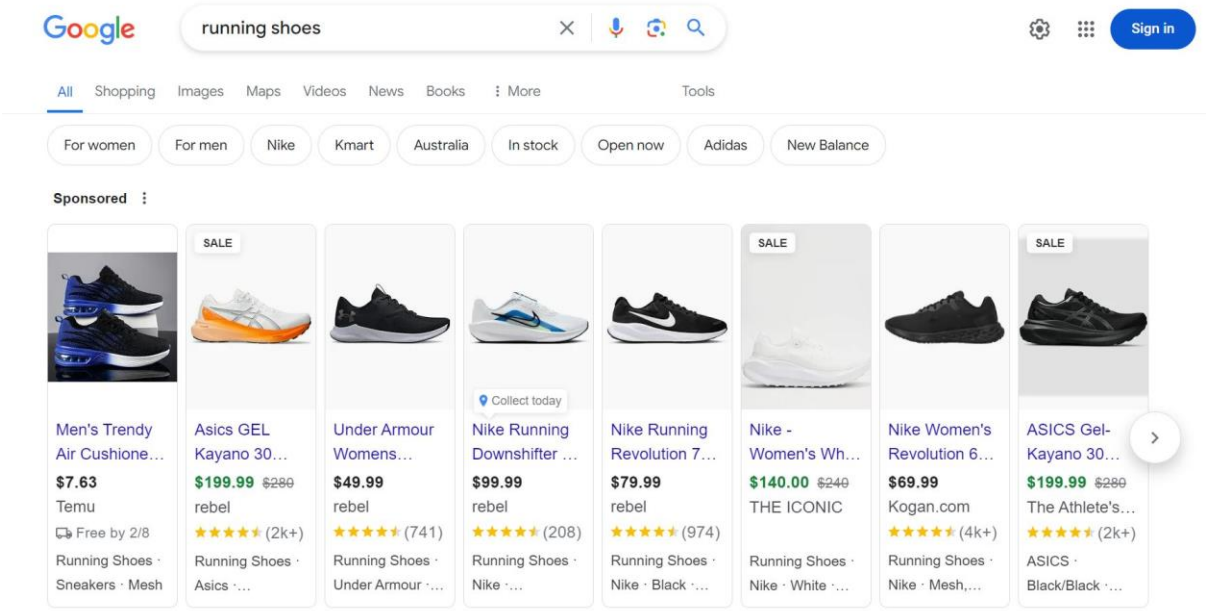
326 CMA, Online platforms and digital advertising, Market study final report, 1 July 2020, p 158.

sets of candidate ads to a user's query using probabilistic models.[327] These models estimate the probability that a user will click on an ad (based on metrics including the user's search query keywords) and are weighted when determining the winning bid and price to be paid by the advertiser to the search engine for placement of the ad in the event that the ad is clicked by the user.[328] Whether and where an ad is placed is determined by its relevance to the search query, the bid price and other factors.[329]

There are two main types of search ads: sponsored (non-organic) links and ad carousels. Sponsored links are typically displayed at the first listing position on a search engine results page. However, sponsored links can also appear in lower listings on the results page. Sponsored links serve as access points for consumers to advertisers' websites. Ad carousels feature images of products and can be displayed among (above and below) the listed links on a search engine results page. Users can scroll and click through products featured in ad carousels.

Examples of sponsored and non-sponsored links and ad carousels on Google Search and Bing are shown in Figure 3.2 and Figure 3.3.

Figure 3.2: Sponsored carousel ad placement on a results page of Google Search for the query 'running shoes'[330]



327 H B McMahan et al, Ad Click Prediction: A View from the Trenches, *KDD '13: Proceedings of the 19th ACM SIGKDD international conference on Knowledge discovery and data mining*, 11 August 2013, p 1,222.

328 H B McMahan et al, Ad Click Prediction: A View from the Trenches, *KDD '13: Proceedings of the 19th ACM SIGKDD international conference on Knowledge discovery and data mining*, 11 August 2013, p 1,222.

329 Google, What is online marketing, accessed 17 September 2024.

330 Screenshot of Google results page, captured by ACCC on 12 July 2024.

Figure 3.3: The appearance of sponsored and non-sponsored links on a results page of Bing for the query 'running shoes'.[331]

Google and Microsoft each operate their own search service advertising services. The UK Competition and Markets Authority found that Google Search and Bing are the only English-language search engines with sufficient scale in search queries and search advertising to effectively monetise the search queries of their users.[332]

Smaller search engines without their own web index, such as Ecosia and DuckDuckGo, do not own and operate their own search advertising services and serve ads on behalf of the larger general search service providers. For example, ads can be placed on Ecosia with Google Ads and Microsoft Advertising,[333] and ads can be placed on DuckDuckGo through Microsoft Advertising.[334]

The appearance of search ads on search engine results pages has evolved over time

The appearance and prominence of ads on search engine results pages has changed over time.[335] These changes may have made it more difficult for users to distinguish between sponsored and non-sponsored results and access non-sponsored results.

Some discussion has focused on the ability of consumers to differentiate between sponsored and non-sponsored links.[336] Visual cues and labels distinguishing sponsored and non-sponsored links on search engine results pages have changed over time. For example, Google changed the colour shading of sponsored links on its search engine results page between 2007 and 2013, and in 2013 removed colour shading on sponsored links.[337] Google

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331 Screenshot of Bing results page, captured by ACCC on 12 July 2024.

332 CMA, Online platforms and digital advertising, Market study final report, 1 July 2020, p 91.

333 Ecosia, Advertising on Ecosia, 16 October 2023, accessed 17 September 2024.

334 DuckDuckGo, Advertise on DuckDuckGo Search, accessed 17 September 2024.

335 M Ahmed and P Haskell-Dowland, Is Google getting worse? Increased advertising and algorithm changes may make it harder to find what you're looking for, *The Conversation*, 1 September 2021, accessed 17 September 2024.

336 N Lomas, Google's latest user-hostile design change makes ads and search results look identical, *TechCrunch*, 23 January 2020, accessed 17 September 2024; Associate Professor Ramon Lobato, Submission to the ACCC Digital Platform Services Inquiry Ninth Interim Report, 29 May 2024, p 2.

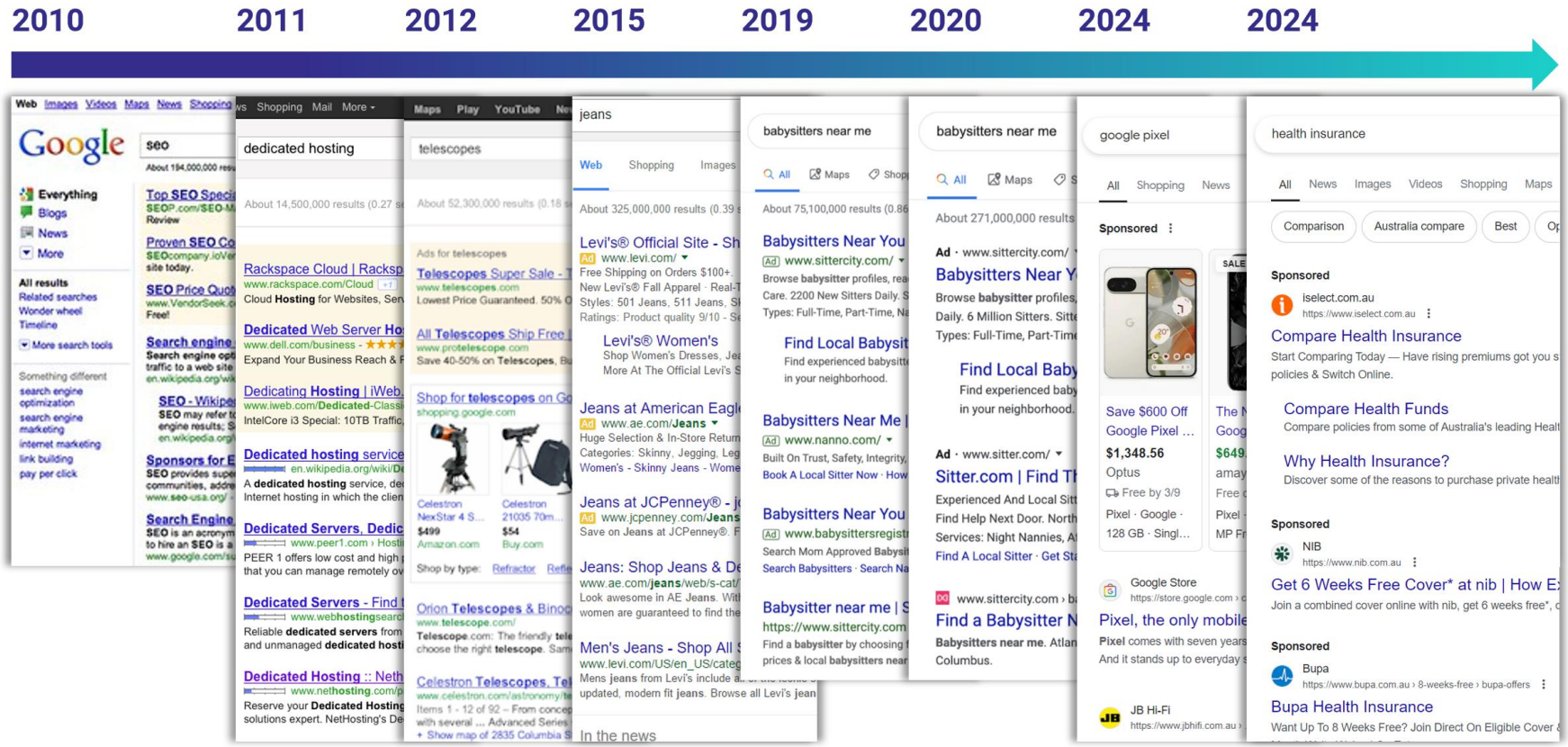
337 G Marvin, A visual history of Google ad labelling in search results, *Search Engine Land*, 8 January 2020, accessed 17 September 2024; G Marvin, Color fade: A history of Google ad labelling in search results, *X*, 26 July 2016, accessed 17 September 2024.

has also changed the size and font of text in sponsored links.[338] Before 2007 such links were displayed in a box with a blue background.[339] Figure 3.4, below, depicts the evolution of these kinds of ad labelling changes between 2011 and 2014.

[338] G Marvin, Color fade: A history of Google ad labelling in search results, *X*, 26 July 2016, accessed 17 September 2024; G Marvin, A visual history of Google ad labelling in search results, *Search Engine Land*, 8 January 2020, accessed 17 September 2024.

[339] Google Inside AdWords, Two changes to how top ads are displayed, 5 April 2007, accessed 17 September 2024.

Figure 3.4: The evolution of sponsored links labels on Google's search engine results page[340]



340 Note: This is not an exhaustive overview of all labelling of sponsored links on Google Search during this period. Images have been presented alongside one another to assist with comparison, however as this has been assembled from historic material, the comparative size of the ads may vary to a lesser or greater extent than documented. **2010:** B Schwartz, Want The Old Google Design? Here Is How., *Search Engine Roundtable*, 10 May 2010, accessed 22 August 2024; **2011:** J Rampton, AdWords Ad Transparency, *PPC.org*, 3 November 2011, accessed 22 August 2024; **2012:** Note: the Google Shopping element contains a 'Sponsored' label on the right side (not pictured). A Cohen, 8 Changes to Google AdWords in 2012 You Shouldn't Miss, *Search Engine Watch*, 6 December 2012, accessed 22 August 2024; **2015:** G Marvn, After FTC Guidelines, Ad Demarcations In Search Engine Results Have Become More Muted, *Search Engine Land*, 18 November 2015, accessed 22 August 2024; **2019 & 2020:** B Sebald, Google's Current Desktop Design, *Greenlane*, 31 March 2020, accessed 22 August 2024; **2024:** Screenshots of Google.com captured by the ACCC on 22 August 2024. Captured on Google Chrome on Windows 11, on a 14" laptop display. These two examples are of the full height of the page first displayed to a user.

At the time of writing the Report, sponsored links on Google Search are currently labelled 'Sponsored' above the listing of the sponsored link. However, the text font and size of sponsored links are arguably less easy to distinguish from non-sponsored links. There is some evidence to suggest that some of these changes increase the amount of time a user spends looking at sponsored links rather than non-sponsored links.[341]

At the time of writing the Report, sponsored links on Bing are currently labelled 'Ad' in a box next to the byline which appears directly under the link to the website, with the text font and size of sponsored links appearing similar to the non-sponsored links.

As internet speeds have increased, the forms of advertising available to search engines to serve to users has expanded and ads have become more sophisticated. Ad carousels now frequently occupy a large portion of search engine results pages. Examples of carousel ads are illustrated in figure 3.2 above.

Google has recently been reported to be exploring new ways to integrate ads into its generative AI-powered search features.[342] Where Google Search generative AI-powered features are available in overseas jurisdictions, ads are displayed above the dialogue box on desktop and below the dialogue box on mobile.[343]

The providers of general search services may face a tension between serving the interests of their users and the interests of advertisers

Search engines that serve ads face incentives to increase the prominence of ads on their results pages. These incentives have likely led to the reduction in the prominence of non-sponsored content on search engine results pages.

Carousel ads that take up a large amount of screen space on a user's device likely increase the time a user takes to scroll down the search results page to find the information they are looking for (for example, if this information is in non-sponsored links). Consumers may in some instances have to scroll down multiple screens before reaching non-sponsored results. [344]

The subtlety in the ways in which sponsored and non-sponsored links can be distinguished likely make it difficult for some consumers to differentiate between sponsored and non-sponsored results. It is also less clear how search providers assess the quality of sponsored content, compared to non-sponsored content.

The ACCC recognises that a user may value seeing ads in some circumstances. If, for example, a user enters a shopping query into a search engine (known as a 'transactional' query), they may value being served ads related to their query on the results page of a search engine. However, if a user intends to reach a particular website (known as a 'navigational' query) or find information on a particular topic (known as an 'informational' query), such as when conducting research, they may place relatively less value on being served ads. [345]

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341 E Blacquière, Steeds meer ruimte AdWords, ten koste van SEO [More and more space for AdWords, at the expense of SEO], 27 April 2014, accessed 17 September 2024. Note the reference is in Dutch.

342 I Mehta, Google is actively looking to insert different types of ads in its generative AI search, 25 October 2023, accessed 17 September 2024.

343 I Mehta, Google is actively looking to insert different types of ads in its generative AI search, 25 October 2023, accessed 17 September 2024.

344 M Ahmed and P Haskell-Dowland, Is Google getting worse? Increased advertising and algorithm changes may make it harder to find what you're looking for, *The Conversation*, 1 September 2021, accessed 17 September 2024.

345 A Broder, A taxonomy of web search, *IBM Research*, accessed 17 September 2024.

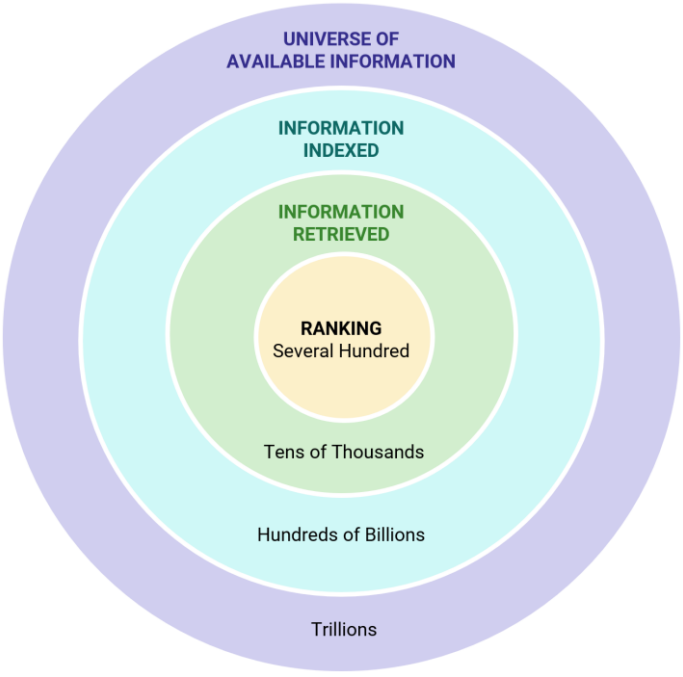
3.2.2. The relationship between website quality and search result quality

Search engines use certain website characteristics to rank websites

Non-sponsored (also known as organic) links on search engine results pages are the main access point to websites for consumers (websites hereafter refer to the whole website accessed by a consumer while a page refers to an individual page on a website). Search engines select which non-sponsored links to serve their users based on a range of metrics about the characteristics of websites using complex ranking algorithms.[346]

As discussed previously, Google Search and Bing are the only search engines in the English language that maintain extensive web indexes. In response to a user query, they select non-sponsored links from their own web indexes and serve these results to users.[347] As set out in the UK Competition and Markets Authority's report, Google Search and Bing use a process known as crawling to find and add websites to their web indexes by following URL addresses and links on websites previously catalogued in their indexes.[348] Websites can also request search engines crawl their pages.[349] Figure 3.5 describes the process by which a search engine with a web index produces search results.

Figure 3.5: The process by which a search engine crawls, culls, sorts and ranks web results on the internet—numbers refer to web results [350]



346 C Ziakis et al, Important Factors for Improving Google Search Rank, 11(2) (2019), *Future Internet*.

347 CMA, Online platforms and digital advertising market study, Appendix I: Search Quality and Economies of Scale, 1 July 2020, pp I18-I19. The ACCC notes that there are different processes for the placement of sponsored results.

348 CMA, Online platforms and digital advertising market study, Appendix I: Search Quality and Economies of Scale, 1 July 2020, p I18.

349 CMA, Online platforms and digital advertising market study, Appendix I: search quality and economies of scale, 1 July 2020, p I18.

350 Diagram adapted from Memorandum Opinion, UNITED STATES OF AMERICA, et al. v GOOGLE, LLC, District Court of District of Columbia, No. 1:20-cv-3010-APM; STATE OF COLORADO, et al., v GOOGLE, LLC, District Court of District of Columbia, Mehta J, 5 August 2024; pp 14-16.

Search engines without a web index instead purchase and receive search results (sometimes along with ads) from search engines with a web index under what are known as syndication agreements.[351] Ecosia, DuckDuckGo and Yahoo! Search serve results generated by Bing's ranking algorithms.[352] Ecosia also serves Google's results for some of its searches where possible.[353] The ranking of the top results on these search engines are not always ranked the same as those of the search engine's from which they purchase their results.[354]

Google Search and Bing appear to use similar ranking metrics. Google Search ranks search results based on the meaning of a user's query, the relevance of identified websites in its index to a query, the website's quality, including its expertise, authoritativeness and trustworthiness, usability of the website on mobile devices, and the context of a user's query, such as a user's language and location.[355] The publication date of a website, known as freshness, is also an important ranking metric.[356]

Bing ranks results using metrics such as relevance, quality and credibility, user engagement, freshness, location, language and page load time.[357]

Ranking systems have evolved over time and have become more complex as they have moved towards deeper analysis of website content, including for the consideration of multi-form website content and social media signals.[358]

Each website is catalogued in a search engine's web index based on these ranking metrics. Relevance is an important metric. Relevance generally refers to whether the content on a website contains the information a user is searching for and involves matching the terms in a user's query with synonymous terms displayed on websites listed in a search engine's web index.[359]

Quality is another important metric for websites. A search engine can assess the quality of a website by using signals such as whether it is from a government or educational source, and can be considered authoritative, or the extent to which its content is accurate, honest, safe and reliable, and can be considered trustworthy.[360] Non-sponsored links to websites with .gov and .edu domains specified in their URLs tend to rank highly on search engine results pages.[361]

The page size of a website is another determinant of website quality used by search engines. It influences the time it takes for a user to load a website on their device.[362]

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351 CMA, Online platforms and digital advertising, market study Final Report, 1 July 2020, p 76.

352 See, Ecosia, We protect your privacy, accessed 17 September 2024; DuckDuckGo, Where do DuckDuckGo search results come from?, accessed 17 September 2024; Yahoo!, How your content is ranked, accessed 17 September 2024.

353 Ecosia, We protect your privacy, accessed 17 September 2024.

354 For example, some differences in the ranking of results about information related to COVID-19 have been observed between Bing and DuckDuckGo. See M Makhortykh et al, How search engines disseminate information about COVID-19 and why they should do better, *The Harvard Kennedy School Misinformation Review*, 2020.

355 Google Search, Ranking results, accessed 17 September 2024.

356 Google Search, Ranking results, accessed 17 September 2024.

357 Microsoft, How Bing delivers search results, February 2024, accessed 17 September 2024.

358 A Veglis and D Giomelakis, Search Engine Optimization, 12(1) (2019), *Future Internet*, p 1. Multi-form website content includes text, images, video and interactive features. Social media signals include the popularity of a website on social media.

359 Google Search, Ranking results, accessed 17 September 2024; Microsoft, How Bing delivers search results, February 2024, accessed 17 September 2024.

360 Search quality evaluator guidelines -General Guidelines, *Rater Hub (Google),* 5 March 2024, pp 26-64.

361 C Ziakis et al, Important Factors for Improving Google Search Rank, 11(2) (2019), *Future Internet*, p 6.

362 C Ziakis et al, Important Factors for Improving Google Search Rank, 11(2) (2019), *Future Internet*, p 5: '[l]oading speed is affected not only by graphic elements but the HTML file and all elements regardless of their file type contribute to the size of website and affect the loading speed.'

Websites with longer loading times tend be ranked lower on search engine results pages and search engines will not even index pages that exceed a certain file size.[363]

Another determinant of the relevance of a website to a user's query can be whether and to what degree other websites on the internet link back to it (referred to as backlinks).[364] One of Google's ranking algorithms (previously referred to as PageRank) has been reported to calculate a numerical value for the assessment of the importance and authority of a website based on the number and quality of backlinks to it from other websites on the internet.[365]

User engagement is also important in search engines' ranking algorithms. It can be assessed by understanding how users interact with search results.[366] How users interact with search results can be informed by click-and-query data. Search engines use a measure known as a website's bounce rate as a proxy for the quality of a website in their ranking algorithms.[367] The bounce rate is the proportion of visitors to a website who leave the website soon after viewing its first page without viewing other pages of the website.[368]

Websites that have a low bounce rate are typically deemed of better quality and will rank higher on a search engine's results page. The time a user spends on a website after referral from a search engine is also a factor considered by search ranking algorithms, with longer time spent by a user on a website indicating the website is likely higher quality (or more relevant to consumers).[369]

While the ranking metrics outlined above are not exhaustive, they reveal there is a wide range of factors that search engines consider in ranking non-sponsored links on their results pages.

Websites are optimised based on the characteristics used in search ranking algorithms

Search engines are the main avenue through which websites gain visibility on the internet and derive user traffic. Many websites receive most of their traffic from users accessing them via non-sponsored links listed on the results page of a search engine.[370] This means website owners and online marketers (hereafter referred to as website operators) value non-sponsored links to their websites appearing and ranking highly on search engine results pages.[371]

Website operators configure their websites in ways that align with the website characteristics search engines use in their ranking algorithms. Search engine optimisation (often referred to as SEO) includes the techniques used by website operators to this end.[372]

As discussed in section 1.2.1, Google Search has the largest market share in the supply of general search services, website operators likely face a greater incentive to optimise their

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363 C Ziakis et al, Important Factors for Improving Google Search Rank, 11(2) (2019), *Future Internet*.

364 C Ziakis et al, Important Factors for Improving Google Search Rank, 11(2) (2019), *Future Internet*.

365 C Ziakis et al, Important Factors for Improving Google Search Rank, 11(2) (2019), *Future Internet*.

366 Microsoft, How Bing delivers search results, February 2024, accessed 17 September 2024.

367 C Ziakis et al, Important Factors for Improving Google Search Rank, 11(2) (2019), *Future Internet*.

368 C Ziakis et al, Important Factors for Improving Google Search Rank, 11(2) (2019), *Future Internet*.

369 C Ziakis et al, Important Factors for Improving Google Search Rank, 11(2) (2019), *Future Internet*.

370 A Veglis and D Giomelakis, Search Engine Optimization, 11(2) (2019), *Future Internet*, p 1; R Fishkin, *Who Sends Traffic on the Web and How Much? New Research from Datos & SparkToro*, *SparkToro*, 11 March 2024, accessed 17 September 2024.

371 See, for example, Barka Parka, Submission to the ACCC Digital Platform Services Inquiry Ninth Interim Report, 29 May 2024.

372 D Goodwin, What is SEO – Search Engine Optimization?, *Search Engine Land*, accessed 17 September 2024.

websites with reference to the ranking algorithms used by Google Search. Optimising for Google Search alone, however, will also likely optimise for Bing, as each search engine uses similar website characteristics in their ranking algorithms.

There are three main ways websites are optimised. The first involves the moderation of the backend technical specifications of websites (for example, the structure of URLs, JavaScript, meta tags, HTML attributes and page and content meta data), second, website content added by website operators and, third, offsite promotion/marketing activities.[373] These optimisation techniques are discussed below. Industry websites publish comprehensive guides on optimisation, underscoring the importance of optimisation to website operators.[374]

The technical specifications of websites are typically configured to make websites crawlable by search engines as a first step. Making a website crawlable by either Google Search or Bing means it will likely be catalogued in both search engines web index.[375] Making a website crawlable can involve ensuring the file size of a website does not exceed the maximum file size catalogued by web indexes and including a targeted keyword in the URL of a website, making it easier for crawlers to trace the website.[376] Optimising the internal link structure of a website (the number and placement of in-text hyperlinks linking to other parts of the same website) can also 'facilitate the tracing and indexing' of each page on a website.[377]

Search engines can also crawl websites for use in search-based generative AI products. Websites can choose whether to grant Google's 'Google-Extended' common crawler access to their sites to help 'improve [Google's] Gemini Apps and Vertex AI generative APIs'.[378] Websites can also prevent their content from being used to train Microsoft's 'generative AI foundation models'.[379]

Websites are then configured in ways to make websites more likely to rank highly on search engine results pages. This can involve building backlinks to websites from other websites on the internet as ranking algorithms prefer websites with more backlinks (this is separate from optimising the internal link structure of a website).[380] This involves purchasing links on other websites (that link to their own websites), arranging with linkfarms (website groups that link to each other to boost search rankings)[381] for links to be provided to their website and exchange links with other websites.[382]

Text, headings and graphics on websites are also typically optimised by website operators. Website operators tailor keywords in the headline text first seen by a user when they open a

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373 C Ziakis et al, Important Factors for Improving Google Search Rank, 11(2) (2019), *Future Internet*.

374 See, for example, Search Engine Land, Periodic Table of SEO Elements, *Search Engine Land*, 2024, accessed 17 September 2024.

375 A website may block access to particular search engine's crawler bot, resulting in the website not appearing in the index of the blocked search engine. The CMA found that Google's web crawler bot had the 'greatest access' to websites on the internet, 'followed by Bing's, with DuckDuckGo and new entrants more frequently denied access to [web]sites'. See CMA, Appendix I: Search Quality and Economies of Scale, 1 July 2020, p I24.

376 C Ziakis et al, Important Factors for Improving Google Search Rank, 11(2) (2019), *Future Internet*.

377 C Ziakis et al, Important Factors for Improving Google Search Rank, 11(2) (2019), *Future Internet*.

378 D Romain, An update on web publisher controls, *The Keyword (Google Blog)*, 28 September 2023, accessed 17 September 2024.; Google Search Central, Overview of Google crawlers and fetchers (user agents), 21 June 2024, accessed 17 September 2024.

379 Microsoft Bing Blogs, Announcing new options for webmasters to control usage of their content in Bing Chat, 22 September 2023, accessed 17 September 2024.

380 C Ziakis et al, Important Factors for Improving Google Search Rank, 11(2) (2019), *Future Internet*.

381 T Kurtz, How much will backlinks matter in 2023, *Search Engine Land*, 2 February 2023, accessed 17 September 2024.

382 C Ziakis et al, Important Factors for Improving Google Search Rank, 11(2) (2019), *Future Internet*.

website and in the text of subsequent subheadings and are advised to compose short titles: no more than 70 characters are reportedly suggested by Google.[383]

The density of keywords featured within the text of a website are also optimised. Keyword density refers to the frequency with which particular keywords appear in the text.[384] The ideal keyword density has been said to range between 2% and 8% of the text on a website page.[385] The optimisation of keyword density is balanced with readability. The use of too many keywords may reduce readability and lead to a lower search ranking.[386]

Text known as 'alt text' is also typically published in the backend of websites to enable search ranking algorithms to understand the type of visual elements on a website (alt text are the textual descriptions of visual elements in a website such as images and video). Google suggests 'when writing alt text, focus on creating useful, information-rich content, that uses keywords appropriately and is in context of the content of the page' of a website.[387]

Off-page techniques can involve strategies to increase a website's social media signals.[388] This can involve website and/or brand promotion strategies. Social media can be a source of backlinks to a website, which might increase its perceived authority by a search engine.[389]

The performance of a website (such as a website's ability to attract traffic via a search engine) can be assessed with respect to a range of optimisation techniques using data analytics tools provided by search engines and third parties. Google, for example, provides Search Console to help website operators measure search traffic and suggest how websites can increase their prominence in Google's search results.[390] The keywords people are searching for can be tracked by website operators as well as the number of backlinks to a website (including the top referring domains). Websites are then tailored accordingly based on this data.

Given the number of factors discussed above, website operators may face difficulties deciphering the factors that feed into the ranking algorithms of search engines. Man of Many noted, in a submission to the Issues Paper, the lack of transparency regarding how content is ranked on search engine results pages.[391] In another submission to the Issues Paper, Barka Parka submitted that the ranking algorithms used by Google Search had a detrimental impact of on the visibility of their website on the results page.[392]

Highly ranked websites on search engine results pages display similar characteristics that optimise for Google Search

The top results on Google Search appear to typically link to websites with features of optimisation. Figure 3.6 shows one of the highest ranked results on Google Search for the query 'chocolate cake recipe' at the time of writing the Report.

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383 C Ziakis et al, Important Factors for Improving Google Search Rank, 11(2) (2019), *Future Internet*.

384 C Ziakis et al, Important Factors for Improving Google Search Rank, 11(2) (2019), *Future Internet*.

385 C Ziakis et al, Important Factors for Improving Google Search Rank, 11(2) (2019), *Future Internet*.

386 C Ziakis et al, Important Factors for Improving Google Search Rank, 11(2) (2019), *Future Internet*.

387 Google Search Central, Google image SEO best practices, 3 July 2024, accessed 17 September 2024.

388 A Veglis and D Giomelakis, Search Engine Optimization, 11(2) (2019), *Future Internet*.

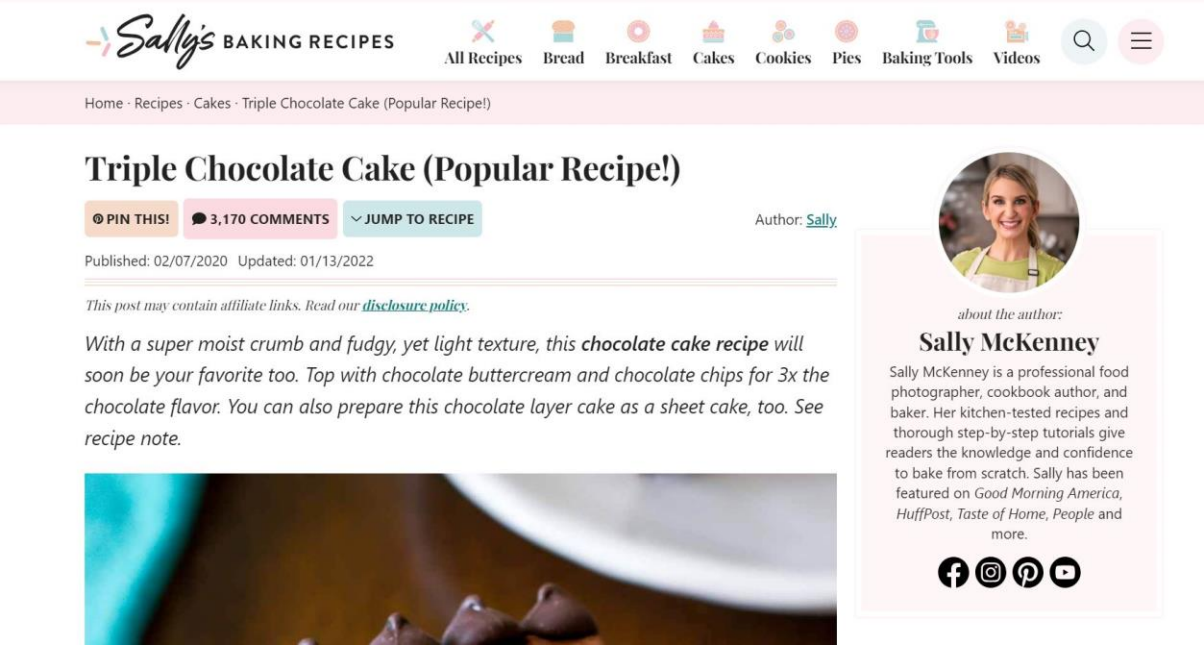
389 C Ziakis et al, Important Factors for Improving Google Search Rank, 11(2) (2019), *Future Internet*.

390 Google, Search Console, accessed 17 September 2024.

391 Man of Many, Submission to the Digital Platform Services Inquiry Ninth Interim Report, 29 May 2024.

392 Barka Parka, Submission to the Digital Platform Services Inquiry Ninth Interim Report, 29 May 2024.

Figure 3.6: Landing page of a highly ranked website on Google Search for the query 'chocolate cake recipe'[393]



On this page, there are a number of characteristics similar to those discussed above, that may contribute to this website ranking near the top of search rankings:

- indication of freshness (i.e. date the page on the website was last updated is featured)
- prominent social media icons and direct link to share the page on social media
- keyword density: frequent use of the words 'cake' and 'chocolate'
- clear internal link structure of website: 'Home – Recipes – Cakes – Triple Chocolate Cake (Popular Recipe!)'
- the 'about the author' biography.

Optimisation likely influences the quality of search results and content on the internet

Research suggests at least 80% of websites on the internet engage in some form of optimisation (based on analysis of plugins, URLs, HTML features and load speed).[394] Optimisation, though, has been described as a 'double-edged sword': while the use of optimisation has the potential to raise the visibility of high-quality websites for consumers, it may also increase the likelihood of low-quality websites ranking higher on results pages.[395]

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393 S McKenney, Triple Chocolate Cake (Popular Recipe!), Sally's baking recipes, 13 January 2022, captured 11 July 2024. Note the website remained the second top ranked website on Google's search results page as of 2 September 2024.

394 J Bevendorff et al, Is Google Getting Worse? A Longitudinal Investigation of SEO Spam in Search Engines, *Advances in Information Retrieval: 46th European Conference on Information Retrieval*, March 2024, p 3; D Lewandowski et al, The influence of search engine optimization on Google's results: A multi-dimensional approach for detecting SEO, (2021), *WebSci '21: Proceedings of the 13th ACM Web Science Conference 2021*, pp 12–20.

395 J Bevendorff et al, Is Google Getting Worse? A Longitudinal Investigation of SEO Spam in Search Engines, *Advances in Information Retrieval: 46th European Conference on Information Retrieval*, March 2024, p 3.

There are 2 ways optimisation has the potential to detrimentally influence the quality of search results:

- First, website operators may face the incentive to alter the content and technical specifications of their websites with reference to ranking algorithms in ways that materially change the understandability and usability of websites for consumers.
- Second, the variables of search ranking algorithms can be considered as a reference point for some website operators with the intention of featuring prominently on a search engine results page irrespective of their websites' relevance to user queries, generating spam among search results (sometimes referred to as 'spamdexing'), despite efforts by search engines to limit such behaviour.

These incentives may also shape the quality of content on the internet as search ranking algorithms select websites with largely similar content and technical specifications. It has been suggested optimisation may homogenise the content available on the internet.[396] This raises the potential for a reduction in the diversity of search results served to users.

Higher ranked websites on search engine results pages related to product queries have been found to be more optimised and are likely to display what can be considered to be lower quality text.[397] Consumers have also been found to identify lower ranked, non-optimised websites as higher quality (determined as competent and reputable) than higher ranked, optimised websites.[398] This may have implications for the ability of consumers to find reliable and accurate information online, such as for issues related to healthcare and financial advice.

Search engines update ranking algorithms to attempt to mitigate optimisation spam

Google Search and Bing appear to attempt to limit non-sponsored link spam appearing on their search engine results pages. This typically involves making periodic updates to their search ranking algorithms. Google noted in a submission to this Report that it has 'sophisticated spam systems to detect and remove spam content from its results'.[399] Google also noted that it views 'search as a never "solved" problem' and 'technological developments continuously drive changes to users' expectations of search quality'.[400] Google also submitted that its 'ranking systems will prioritise results that … contain higher quality content over results that … have lower quality content'.[401] Google noted that 'optimising a website for specific individual metrics without improving the overall helpfulness, expertise, authoritativeness and trustworthiness of that website's content will not guarantee a higher ranking of that website'.[402] Microsoft uses spam-filtering systems to detect and minimise spam on Bing's search engine results page.[403]

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396 The Verge, Google shapes everything on the web, accessed 17 September 2024.

397 J Bevendorff et al, Is Google Getting Worse? A Longitudinal Investigation of SEO Spam in Search Engines, *Advances in Information Retrieval: 46th European Conference on Information Retrieval*, March 2024, p 13.

398 S Schultheiß et al, Does Search Engine Optimization come along with high-quality content? A comparison between optimized and non-optimized health-related web pages, *ACM SIGIR Conference on Human Information Interaction and Retrieval*, March 2022, p 14.

399 Google, Submission to the Digital Platform Services Inquiry Ninth Interim Report, 29 May 2024.

400 Google, Supplementary Submission to the Digital Platform Services Inquiry Ninth Interim Report, 26 July 2024, p 7.

401 Google, Supplementary Submission to the Digital Platform Services Inquiry Ninth Interim Report, 26 July 2024, p 3.

402 Google, Supplementary Submission to the Digital Platform Services Inquiry Ninth Interim Report, 26 July 2024, p 3

403 Microsoft Bing Blogs, Web Spam Filtering, 28 August 2014, accessed 17 September 2024.

After spam updates are released, some websites may experience a change in their ranking on a search engine's results page. At the time of writing, Google's most recent spam update was in June 2024.[404]

Updates to ranking algorithms may only have a short-lived impact on the prevalence of spam on search engine results pages as producers of spam content will often adjust their strategies shortly following algorithmic changes.[405]

Updates to ranking algorithms by search engines also mean that the characteristics websites optimise content and technical specifications with reference to are continually evolving. Otherwise, websites face the potential to fall in ranking position on results pages.

AI-powered search tools may spur changes to optimisation

There has been some discussion about whether and how the emergence of AI powered search tools could change the practice of optimisation.[406]

The ways this could play out are twofold:

- First, websites may develop new optimisation techniques with respect to emerging AI-powered search engines.
- Second, websites may change optimisation techniques with respect to the emerging AI-powered search tools integrated into Google Search and Bing.

These developments potentially create 'a new information pipeline that marketers need to monitor to ensure their brands are presented for relevant prompts and described accurately'.[407] This might involve the manipulation of LLMs to increase product visibility.[408]

3.2.3. Personalisation and targeting

Personalisation is the process where algorithms tailor the content served to a consumer based on information the product (for example, a search engine) holds about the consumer, including location, interests, preferences, and demographic information. In the context of search, search engine algorithms adjust and tailor the results and other content they serve based on information other than the consumer's search query. For example, if a consumer searches for 'pizza', a non-personalised search may provide information about pizza and information about nationwide or international pizza chains. A search result personalised based on the consumer's location information may include results for nearby pizza restaurants, including a map element showing local stores.

Personalised search has been incorporated into consumer facing products for many years. In 2004, Google introduced personalised search as a separate Google Labs product.[409] In 2005, personalised search was enabled for the main Google Search product by default for

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404 Google, Google Search Status Dashboard, accessed 17 September 2024.

405 Bevendorff et al, Is Google Getting Worse? A Longitudinal Investigation of SEO Spam in Search Engines, *Advances in Information Retrieval: 46th European Conference on Information Retrieval*, March 2024, p 13.

406 S Puntoni et al, How Marketers Can Adapt to LLM-Powered Search, *Harvard Business Review*, 24 May 2024, accessed 17 September 2024.

407 S Puntoni, M Ensing and J Bowers, How Marketers Can Adapt to LLM-Powered Search, *Harvard Business Review*, 24 May 2024, accessed 17 September 2024.

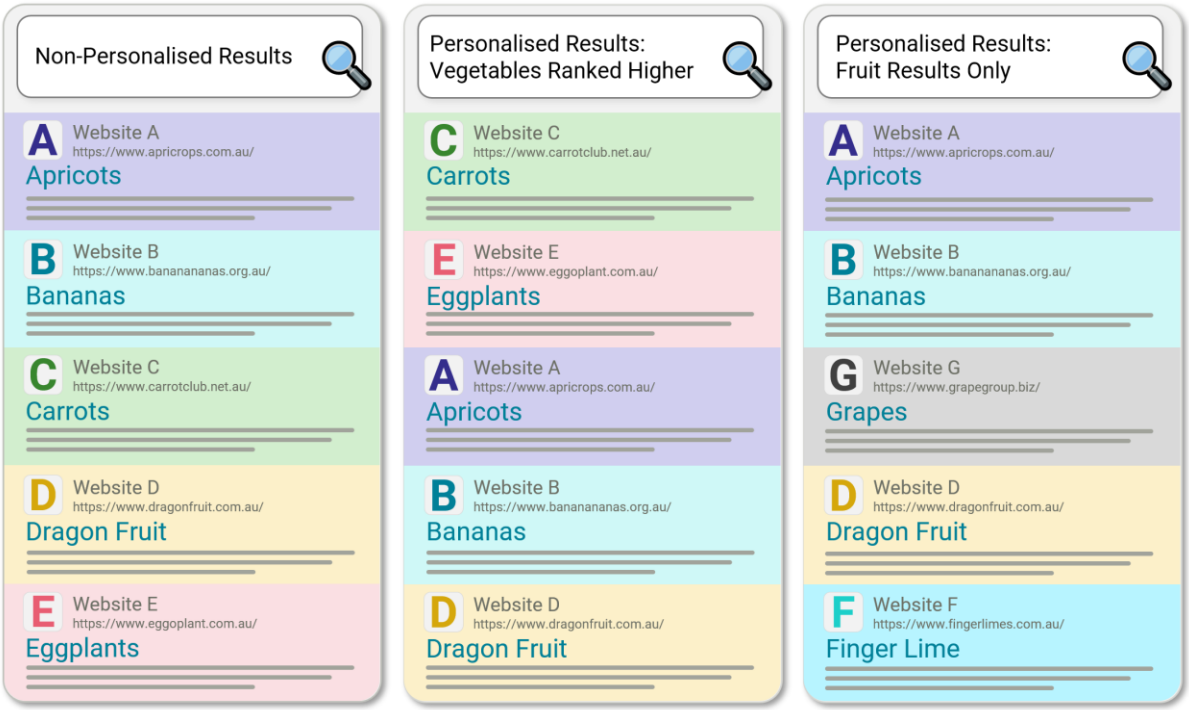
408 A Kumar and H Lakkaraju, Manipulating Large Language Models to Increase Product Visibility, *Harvard University*, 11 April 2024.

409 M Hines, Google takes searching personally, 29 March 2004, accessed 17 September 2024; P Lenssen, Google Labs Add Personalized Web Search, Web Alerts, *Blogoscoped.com*, 29 March 2004, accessed 17 September 2024.

users logged in to a Google account,[410] and extended to logged out users in 2009.[411] In 2011, Bing began introducing personalised search features.[412]

Personalisation may affect search results in several ways. Personalised results may be similar to non-personalised results, however certain results may be ranked higher. Alternatively, personalised results may be completely different to non-personalised results, particularly in response to location-based personalisation[413].

Figure 3.7 –Illustrations of personalisation: non-personalised results, results with adjusted ranking, and results with adjusted content



Why might consumers see different results when searching?

In addition to personalisation, there are other factors that influence the results presented to a consumer, including:

- updates to search engine indexes resulting in more recent or otherwise relevant information being ranked more highly
- search engines undertaking A/B testing, where different groups of users are served by different algorithms to inform which algorithm is better
- users phrasing their queries in slightly different ways, which can significantly impact results.[414]

410 News from Google, Personalized Search Graduates from Google Labs, *Google*, 10 November 2005, accessed 17 September 2024.

411 B Horling, Personalized Search for everyone, *Google Official Blog* 4 December 2009, accessed 17 September 2024.

412 A Crook and S Ahari, Making search yours, *Bing Search Blogs*, 10 February 2011, accessed 17 September 2024 via Archive.org.

413 See 'Concluding Discussion' in A Hannak et al., Measuring Personalization of Web Search, *arXiv preprint arXiv:1706.05011*, 15 June 2017, pp 26-27.

414 M Alaofi et al., Where Do Queries Come From?, *SIGIR '22: Proceedings of the 45th International ACM SIGIR Conference on Research and Development in Information Retrieva*l, July 2022, pp 2850-2862.

The extent of differences in how users construct search queries, and how those different impact what results a user is served, is the focus of the next stage of the ADM+S' Australian Search Experience project.[415]

Variation in results based on the construction of search queries is also an emerging issue that generative-AI based search may inherit from the behaviour of large language models, where slight variations in prompts can result in significantly different outputs.[416]

Consumer data and general search services

Most search engines advise users that some data is used to personalise the search results that are displayed, improve the overall service itself, and adapt targeted advertising.[417] For example, Google notes that 'when you search on Google, your past searches and other info are sometimes incorporated to help us give you a more useful experience.'[418] On both Google Search and Microsoft's Bing, some personal data (such as web history) is collected by default for account holders, while users are encouraged to opt-in to sharing other information (such as location history).[419] Google users can opt out of the collection and use of personal data for personalising search results, while both Google and Bing users can opt out of targeted search advertising.[420]

Search engines that position themselves as privacy-oriented may take different approaches to personalising results. For example, DuckDuckGo, which does not collect data or assign a search history to users, receives depersonalised location data when handling 'local' searches to provide users with location-relevant information.[421] As discussed in previous ACCC reports, the collection and use of consumer data may not align with consumer expectations.[422] Research papers from both Reset Australia and the Consumer Policy Research Centre (CPRC) in 2023 each suggested that many consumers are not comfortable with targeted advertising. The CPRC found that 46% of consumers were not comfortable with companies targeting advertising to them based on their online behaviour.[423] Reset Australia found that 84% of survey respondents would prefer ads not target them based on their online browsing history.[424]

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415 ARC Centre of Excellence for Automated Decision-Making and Society (ADM+S) QUT Node, The Australian Search Experience 2.0, *QUT*, accessed 17 September 2024.

416 A Salinas & F Morstatter, The Butterfly Effect of Altering Prompts: How Small Changes and Jailbreaks Affect Large Language Model Performance, *arxiv.org*, 9 January 2024, accessed 17 September 2024.

417 Google Search Help, Why your Google Search results might differ from other people, 2024, accessed 17 September 2024; Ecosia, How we protect your privacy, 15 July 2024, accessed 17 September 2024; Microsoft, Microsoft Privacy Statement, June 2024, accessed 17 September 2024.

418 Google, How Search works with your activity, *Google Search Help, Help Center*, 2024, accessed 17 September 2024.

419 Google, How Search works with your activity, *Google Search Help, Help Center*, 2024, accessed 17 September 2024; Microsoft, Microsoft Privacy Statement, June 2024, accessed 17 September 2024.

420 Google Safety Centre, Ad Controls and Personalization Settings, accessed 17 September 2024; Google Search Help, Personalization & Google Search results, accessed 17 September 2024; Microsoft, Ad settings| Privacy, accessed 17 September 2024.

421 DuckDuckGo, Privacy Policy, 11 May 2023, accessed 17 September 2024; DuckDuckGo, How DuckDuckGo Keeps Your Local Search Results Anonymous, Search Privacy, 2024, accessed 17 September 2024.

422 See, for example, ACCC, Digital Platforms Inquiry Final Report, 26 July 2019, Section 7.2; ACCC, Digital Platform Services Inquiry First Interim Report, 23 October 2020, Chapter 3; ACCC, Digital Platform Services Inquiry Third Interim Report, 28 October 2021, Section 2.3.2; ACCC, Digital Platform Services Inquiry Eighth Interim Report, 21 May 2024, Chapter 5.

423 Consumer Policy Research Centre, Not a fair trade: Consumer views on how businesses use their data, March 2023, p 12

424 Reset Australa, *Intrusive and Unhelpful: Targeted Advertising in Australia*, September 2023, p 2.

Extent of personalisation for relevance

The extent to which search services personalise search results is unclear. A 2017 study from Hannak et al. estimated that 11.7% of Google Search results and 15.8% of Bing results were personalised, mostly based on location.[425] There are also indications, including in public comments by Google and Microsoft, that general search services mostly rely on two types of information to personalise search results: location and recent search history.[426]

Further, a study conducted in 2022 in the UK found little evidence of news personalisation.[427] ADM+S' Australian Search Experience, which ran for over 12 months from July 2021 and collected over 350 million search results from 1000 volunteers, observed that personalisation of results for generic queries in major search engines was minimal, and generally limited to ensuring geographic relevance for users.[428]

Methods of search result personalisation

Location

Location appears to be the strongest factor used by search engines in personalising consumers' results, and is an important signal for determining relevant results. Google guidance states '[f]or most of your searches, you'll get the same results as anyone else who searches the same query from the same location.'[429]

Depending on the query, search engines may use varying levels of granularity to determine the most relevant results, such as the user's IP address[430] to determine their general location (e.g. country, region, or city).[431] This general level of location information may be suitable for many types of searches, such as news, weather, local laws, or certain purchases.

Some searches, such as for 'café near me', may benefit from more granular location information. Search engines may source this information from the user's browser (which the browser may determine using a number of on-device processes including GPS, nearby mobile towers, and databases of WiFi networks),[432] or may use other means to determine the user's location. For example, Google may also determine a user's location using saved activity (including previous search activity and the area a user was in when they previously

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425 A. Hannak et al., Measuring Personalization of Web Search, *arXiv preprint arXiv:1706.05011*, 15 June 2017, accessed 17 September 2024, p 26.

426 In a 2018 interview with CNBC, Google's lead for ranking Pandu Nayak noted that at that time, there was very little search personalisation, and the personalisation that existed focused on a user's location or immediate context from a prior search. See J D'Onfro, We sat in on an internal Google meeting where they talked about changing the search algorithm – here's what we learned, *CNBC*, 17 September 2018, accessed 17 September 2024. Similarly, when Microsoft launched Bing's personalised search in 2011, its personalisation focused on location and previous searches, with Microsoft noting that there are limitations to personalisation, noting that 'a person's history or profile often does not necessarily deliver better results across all types of queries'. A Crook, S Ahari, Making search yours, *Bing Search Blog*, 10 February 2011, accessed 17 September 2024.

427 R Evans et al, Google News and Machine Gatekeepers: Algorithmic Personalisation and News Diversity in Online News Search, *Digital Journalism,* 11:9 (2022), p 1682.

428 ARC Centre of Excellence for Automated Decision-Making and Society (ADM+S) QUT Node, The Australian Search Experience 2.0, *QUT*, accessed 17 September 2024.

429 Google, How Search works with your activity, *Google Search Help*, accessed 17 September 2024.

430 A user's IP address is provided by the user's browser to a website when requesting access to the website.

431 Google Search Help, Understand & manage your location when you search on Google, *Google*, accessed 17 September 2024; DuckDuckGo, How DuckDuckGo Keeps Your Local Search Results Anonymous, *Search Privacy*, 2024, accessed 17 September 2024.

432 Google Privacy and Terms, How Google uses location information, Google, accessed 17 September 2024; Microsoft Support, Location and privacy in Microsoft Edge, *Microsoft*, accessed 17 September 2024; Mozilla Support, Does Firefox share my location with websites?, *Mozilla*, updated 9 July 2023, accessed 17 September 2024; Apple Support, About privacy and Location Services in iOS, iPadOS and watchOS, *Apple*, 11 April 2024, accessed 17 September 2024.

used a Google service), addresses for home and work saved to a user's Google Account, and from apps on a user's phone.[433]

However, some search engines provide localised search results without using and retaining highly specific location information. DuckDuckGo notes it runs code locally in the browser on the user's device which uses the precise location provided by the web browser to generate a random nearby location, and sends the randomised location data to DuckDuckGo, which then provides localised results.[434] This location information is then deleted once used for a single time. It is unclear whether this process reduces the quality of local search results relative to using a more precise location.

The 2017 study from Hannak et al. found that a small proportion of results were personalised based on information from a user's accounts when logged in to the search service. For personalised results that were not location-based, most of the personalisation impacted the ranking of the top 10 search results, rather than the composition of results presented on the first results page.[435]

Previous Searches

Search engines may also use a user's previous searches to personalise results. Search engines can use recent search history to better understand the context and intent behind a user's series of searches. Google Search Help provides the following example of this: 'if you search for chocolate cake, and then search again for "how to make," Google might be more likely to predict that you're searching for "how to make chocolate frosting."'[436] It is unclear how long this short term 'carry-over' window lasts – a 2012 study suggested that for Google queries with a 10-minute gap between queries, the second query did not appear to be personalised based on the first query.[437] It is less clear whether search engines refer to users' longer-term history when personalising results. A 2017 study on Google and Bing's personalisation observed no personalisation based on 30 days of search history.[438]

It is unclear, based on Google's public communications on personalisation, the extent to which long term browsing history is used to personalise search results, noting that personalisation is based upon 'your activity'.[439] Google does retain data on users' search activity after the 10 minute carry-over period noted above.[440] In 2019, Google introduced a setting which enabled users to choose to have their 'Web and App Activity' (which includes search data) automatically removed from their account after 3 or 18 months.[441] New Google accounts created after 24 June 2020 are set by default to delete Web and App Activity from user accounts after 18 months.[442]

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433 Google Privacy and Terms, How Google uses location information, *Google,* accessed 17 September 2024.

434 DuckDuckGo, How DuckDuckGo Keeps Your Local Search Results Anonymous, *Search Privacy*, 2024, accessed 17 September 2024.

435 A Hannak et al, Measuring Personalization of Web Search, *arXiv preprint arXiv:1706.05011*, 15 June 2017, pp 13-14, 17.

436 Google, How Search works with your activity, *Google Search Help*, accessed 17 September 2024.

437 A Hannak et al, Measuring Personalization of Web Search, *arXiv preprint arXiv:1706.05011*, 15 June 2017, pp 6-7. Note: This 2017 research article is an updated edition, and includes studies performed in 2012.

438 A Hannak et al, Measuring Personalization of Web Search, *arXiv preprint arXiv:1706.05011*, 15 June 2017, p 19.

439 Google Search Help, How Search works with your activity, *Google*, accessed 17 September 2024.

440 Google Account Help, How do I access & control my Google activity?, *Google*, accessed 17 September 2024.

441 D Monsees and M McGriff, Introducing auto-delete controls for your Location History and activity data, *The Keyword (Google Blog)*, 1 May 2019, accessed 17 September 2024.

442 S Pichai, Keeping your private information private, The Keyword (Google Blog), 24 June 2020, accessed 17 September 2024.

Other uses of personalisation data

As noted above, significant amounts of user data are collected and retained through Google Search and Bing. Search engines are one of the many points across Google and Microsoft's ecosystem where data can be collected about a user's preferences and interests.

- Advertising – both Google and Microsoft use search history to personalise advertising on first-party platforms. For example: Google uses Web and App Activity (which includes search history and location history) to personalise ads on Google Search, YouTube and Discover.[443]
- Other uses across the ecosystem – some of Google's features, beyond search engine results, use both search and non-search data to personalise consumer results, including 'what to watch recommendations'[444], past activities,[445]and autocomplete suggestions'.[446]

New ways of personalising search

Some emerging competitors (in both standard search and AI-search) are experimenting with new ways to enable consumers to personalise their experience. For example:

- Kagi enables users to manually rank their preferred websites across searches. A user might set Kagi to rank abc.net.au results higher than all other websites.[447]
- Some search engines, including Kagi and AI search engine Perplexity, enable users to choose certain filters, such as academic or smaller publishers, that rank those types of results more highly.[448]
- AI search engines including Perplexity allow users to personalise results by pre-prompting the model with additional information that the model refers to each time it responds to a query, such as by describing their characteristics (e.g. 40 year old male who likes sports) and searching preferences (e.g. results relevant to Australia).[449]

Some AI services, such as ChatGPT, have also introduced memory features enabling information to be retained across multiple conversations.[450]

3.2.4. Result diversity

Search engines present relevant results to users from many different sources in response to queries. However, some websites or sources rank more highly in an algorithm than others more often, for a variety of reasons.

'Result diversity' considers how varied the sources of the results presented to users are as part of individual searches, and in aggregate across all searches.[451] Search algorithms that

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443 My Ad Centre, Web & App Activity, Google, accessed 29 August 2024. Note: This text is available to users who are signed in, as part of their management panel. See also Google Safety Centre, Google Ads Data and Privacy, Google, accessed 17 September 2024.

444 Google Search Help, Search for TV shows & movies on Google, *Google*, accessed 17 September 2024.

445 A Moore, Pick up where you left off on Search, *The Keyword (Google Search)*, 9 January 2019, accessed 17 September 2024.

446 Google Search Help, Manage Google autocomplete predictions, *Google*, accessed 17 September 2024.

447 Kagi's Docs, Website Info & Personalized Results, *Kagi*, accessed 17 September 2024.

448 Kagi's Docs, Lenses, accessed 17 September 2024; Perplexity, What is Focus?, accessed 17 September 2024.

449 Perplexity, Profile, settings and languages, accessed 17 September 2024.

450 OpenAI, Memory and new controls for ChatGPT, 13 February 2024, accessed 17 September 2024; OpenAI Help Centre, Memory FAQ, accessed 17 September 2024.

451 See, for example, H Wu et al., Result Diversification in Search and Recommendation: A Survey, *IEEE Transactions on Knowledge and Data Engineering,* 19 February 2024, pp 2-3.

have low levels of result diversity present information to users from a limited range of sources and domains, while algorithms that demonstrate high levels of result diversity present information to users from a broad range of sources and domains.[452] A search engine that presents results to users that are based on a larger number sources may not necessarily provide consumers with the highest quality or most relevant results, as in many instances users may be seeking a single answer or result, or information from a specific set of sources, or from a single domain.

The importance of ranking

The positioning of a result in a search engine's results page has a significant impact on whether it will be selected by a user. A 2023 study suggested that 27.6% of organic clicks on Google Search are on the first result, with the top 3 results accounting for 54.4% of all clicks, and only 0.63% of Google Search users clicking on something on the second page.[453] This study suggests that not only is it important for results to appear at the top of a results page for it to be selected by a user, but it appears the visibility of results that don't appear in the top 10 results is very limited.

The prevalence of other Search Engine Results Page features can also affect the likelihood that a result is chosen by a user. A 2023 study found that where a result is included with an element, such as a featured snippet, image pack, or knowledge panel, it was more likely to be chosen by a user. In comparison, if a page included a feature and the result wasn't included in the element, it was less likely to be selected across all positions.[454] This may also be exacerbated by the prominence of non-result elements of a search engine results page, where these elements will often push the majority of organic results off screen.

For many searches, consumers will only review a small subset of search results before deciding whether their search was successful, even though search engines may offer a greater result diversity for the search term. Research in 2021 suggests that this largely occurs when the relevant result isn't in the first three or four results.[455] For these consumers, if relevant information doesn't appear in this subset of results, consumers will often make a subsequent search and refine their query further. As a result, result diversity may be considered from the perspective of the diversity of results within the first page, or within a defined number of results.

The increase in zero-click searches and search engine results page features (discussed in section 1.1.2) may also influence how search engines consider the diversity of results provided to consumers. This may result in an information environment where consumers may be even less likely to consider multiple results, particularly when featured snippets and knowledge panel information may draw from a single, or small set of, providers.

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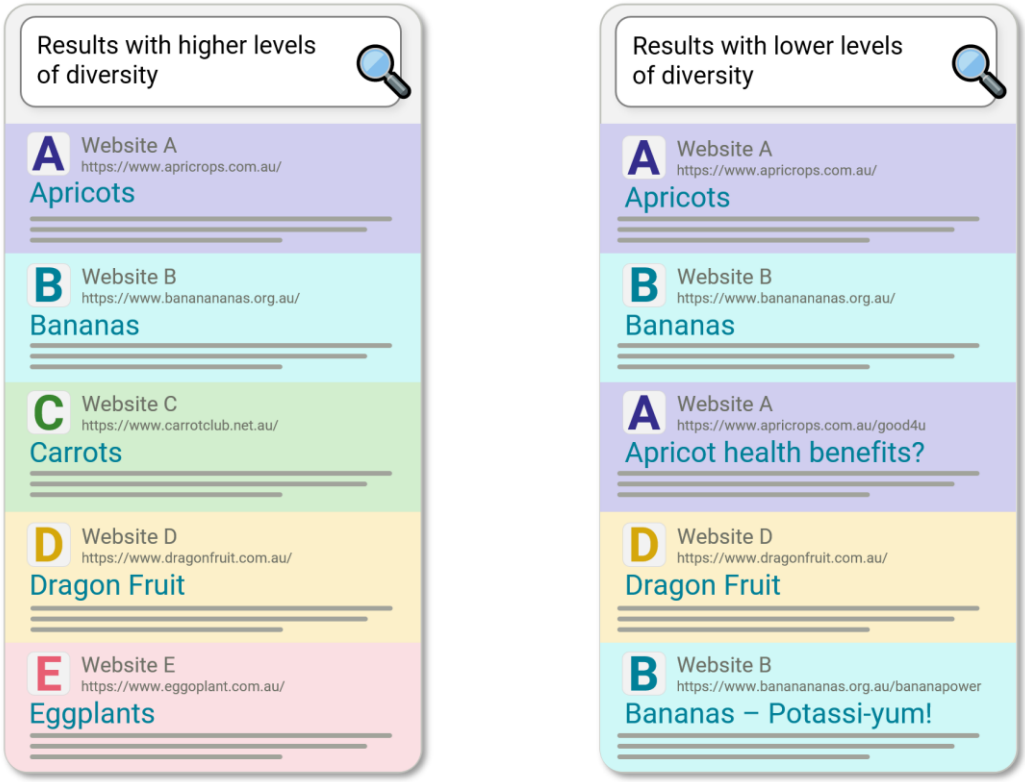
452 Result diversity is not limited to what is shown on a single search engine results page; rather it refers to the diversity of information overall.

453 B Dean, We Analyzed 4 Million Google Search Results. Here's What We Learned About Organic CTR , *Backlinko*, 28 May 2023, accessed 17 September 2024.

454 E Fubel et al., Beyond Rankings: Exploring the Impact of SERP Features on Organic Click-through rates, *arXiv preprint, arXiv:2306.01785,* 31 May 2023, p 10.

455 M Abualsaud, *Users, Queries, and Bad Abandonment in Web Search*, *Doctoral Dissertation, University of Waterloo*, 2021, p 49.

Figure 3.8: An illustration of result diversity vs limited result diversity



Some users may benefit from accessing results from a larger range of sources or domains, particularly where users are researching topics and intend to browse results from multiple sources. For example, users that are seeking information or news from a range of viewpoints, or who may wish to compare products or services from a range of businesses. The joint submission from the RMIT's School of Computing Studies and ADM+S notes that when evaluating the quality of general search services, diversity of search results is valued by searchers.[456]

Result diversity can also improve the likelihood that users receive search results that are relevant to their queries, particularly where it is not easy for a search engine to determine their intent. Users often input queries into search engines that are ambiguous or imprecise, and may not provide sufficient information for a search engine to determine a single intent – for example a consumer searching 'Jaguar' may be looking for information about the animal or the car manufacturer.[457] In these circumstances, providing a range of results increases the chance a result will be relevant to a user.[458]

Search engines that provide a greater variety of results may be more helpful to users by helping them to search more effectively and efficiently, and by reducing the potential for search algorithms to favour certain results. Research suggests users who use search systems that present more diverse results tend to more successfully identify relevant

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456 School of Computing Technologies, RMIT University and the ARC Centre of Excellence for Automated Decision-Making and Society (ADM+S), Submission to the ACCC Digital Platform Services Inquiry Ninth Interim Report, 29 May 2024, p 11.

457 H Wu et al., Result Diversification in Search and Recommendation: A Survey, *IEEE Transactions on Knowledge and Data Engineering,* 19 February 2024, p 1.

458 H Wu et al., Result Diversification in Search and Recommendation: A Survey, *IEEE Transactions on Knowledge and Data Engineering,* 19 February 2024, pp 2-3; M Welch Et Al, Search result diversity for informational queries, *WWW '11: Proceedings of the 20th international conference on World wide web*, 28 March 2011, p 1.

documents, and become more aware of the topics they research.[459] However, search engines that have very high levels of variety may not be effectively sorting through non-relevant results, leading to a greater concentration of non-relevant results in response to a query.

How search engines approach result diversity

Result diversity is considered by search engines when designing and evaluating the quality of their search algorithms. Google has made public references to this in the past. For example, in June 2019, Google announced that it was adjusting its search algorithms to increase the diversity of result sources on each search engine results page, noting that following the change users 'usually won't see more than two listings from the same site in our top results' unless the system determines its relevant to do so.[460]

Prior to 2023, Google would group results from a single domain together. In 2023 it was reported that Google stopped this practice.[461] Google has also made other updates to increase the diversity of 'view points' presented. In February 2018, Google announced that it planned to introduce multiple 'snippet boxes' on search results to present additional perspectives.[462]

Information provided to the ACCC by Google suggests that Google actively considers result diversity across its search verticals as a factor when evaluating algorithmic changes, including merchant diversity, and aims to direct users to a diverse range of websites.[463]

Diversity in size of publishers and businesses

Many websites and businesses rely on traffic from search engines. Ranking on search engines is a key way websites and businesses compete with each other so that they rank highly on a search engine for any given query. Google is an important source of traffic to many websites,[464] with January 2024 analysis conducted by Datos for Sparktoro, suggesting that it is responsible for 63.41% of all US web traffic referrals to the top 170 sites, compared to Microsoft & Bing's 7.21%, YouTube's 3.57%, and Facebook's 3.54%.[465] This effect is even more pronounced for smaller websites, with Google responsible for 72.48% of traffic to websites outside of the top 170.[466]

As a result, search ranking algorithms are important to the ability of websites to compete with one another, particularly for smaller websites. An algorithm with a high level of result diversity may facilitate competition by promoting a range of websites within and across search queries, enabling consumers to compare options and use the best service, or purchase the best product for them.

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459 D Maxwell et al, The impact of result diversification on search behaviour and performance, *Information Retrieval Journal*, 22 (2019), p 444.

460 Google Search Liaison, Post on X on 7 July 2019 at 6:58am, accessed 17 September 2024; E Newton, Google Emphasizes Diversity in Search Results: What This Means for You, 2019, accessed 17 September 2024.

461 B Schwartz, Google Search officially stops indented results, Search Engine Land, 12 October 2023, accessed 17 September 2024.

462 D Sullivan, A reintroduction to Google's featured snippets, The Keyword (Google Blog), 30 January 2018, accessed 17 September 2024.

463 Information provided to the ACCC.

464 Including subdomains like images.google.com, news.google.com, docs.google.com, and mail.google.com.

465 R Fishkin, Who Sends Traffic on the Web and How Much? New Research from Datos & SparkToro, *SparkToro*, 11 March 2024, accessed 17 September 2024.

466 R Fishkin, Who Sends Traffic on the Web and How Much? New Research from Datos & SparkToro, *SparkToro*, 11 March 2024, accessed 17 September 2024.

There are some indications that results from larger websites and brands are being ranked more highly than smaller websites, which may be influenced by the consolidation of websites into a smaller group of key digital publishers. For example, in January 2024, search engine optimisation firm Detailed analysed the affiliate marketing performance of 16 large online publishing companies who together operate at least 588 individual brands. Across a sample of 10,000 affiliate search terms, 85% of searches included a result from at least one of these companies in the top 10 organic links, with 15.8% of these searches returning 4 or more results from these companies in the top 10 links. Reddit and Quora accounted for many of the remaining links in each top 10 results.[467]

As discussed above, the websites of larger businesses may rank highly because they provide the most relevant results in many cases. Users may prefer and seek out websites and brands they are familiar with, and may consider these websites to be the best and most relevant result. In the case of online publishers, larger and more well known publishers may have greater capacity to produce high quality content, which may reduce the likelihood that a user encounters misinformation or low-quality content.

However, any preferencing of larger websites and brands can have implication for smaller websites. A search algorithm which favours larger websites or websites of larger businesses may affect the ability for smaller businesses or new entrants to organically rank high enough for consumers to be aware of and engage with the website. This may inadvertently affect competition in downstream markets unrelated to search, and risks reinforcing the dominance of small sets of businesses in these downstream markets.

The prominence of larger websites may also affect relevance when those websites are not providing uniformly high quality results. On 5 March 2024, Google announced a collection of Core and Spam updates. This included reducing the ranking of low-quality, unoriginal results, and taking measures against 'site reputation abuse', which Google describes as content hosted by a website that is 'low-quality content provided by third parties with the goal of capitalizing on the hosting site's strong reputation'.[468]

3.3. Generative AI and search quality

This section considers the potential implications for search quality as generative AI is integrated into search services, and as generative AI models become more widely used. This includes the potential for generative AI to dramatically improve user satisfaction with search, and other markers of quality.

The displacement of blue links with AI-generated summaries is changing how consumers experience and use search. Microsoft submits that generative AI-augmented search has some clear advantages over blue link results and may ultimately lead to vast improvements in the quality of search services.[469] Search users may be able to find answers to their queries with fewer clicks and, as information is summarised in ways that are more useful and richer,

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467 G Allsopp, How 16 Companies are Dominating the World's Google Search Results (2024 Edition), *Detailed.com*, 10 May 2024, accessed 17 September 2024.

468 E Tucker, Google Search: New updates to address spam and low-quality results, *The Keyword (Google Blog)*, 5 March 2024, accessed 17 September 2024.

469 Microsoft submits that, by summarising the information in a more useful way for the user, the user can digest information more quickly and get a more complete picture. See Microsoft, Submission to the ACCC Digital Platform Services Inquiry Ninth Interim Report, 29 May 2024, p 3.

digest more complex information more quickly.[470] A 2023 study of consumers globally found high levels of satisfaction with AI-powered search insights.[471]

However, it is not clear that these developments will lead to consistent, sustained benefits for consumers. This is partly because how the technology is being integrated into search continues to change. For example, it has been reported by BrightEdge that, while after the initial roll out of AI Overviews, AI-generated summaries were produced in response to 84% of Google Search queries, this reduced significantly to 15% of queries in June 2024.[472] Microsoft submits that Microsoft and others will continue to experiment with features, and how to provide the best user experiences as it relates to search.[473] Some experts consider that these systems, where integrated into services used by most Australians daily, may not currently be 'ready for prime time'.[474] This uncertainty is also due to the technological limitations of generative AI systems that can negatively impact their use in general search, and which may not be entirely solvable. It also appears to be becoming much easier and cheaper to produce large volumes of content using generative AI systems.[475] This appears to be increasing the volumes of AI-generated content, including low-quality AI-generated content, online.

3.3.1. Some potential effects of generative AI on search

Website links may be less prominent

Search providers using generative AI in their services are introducing different ways of presenting search results. On some search interfaces that incorporate generative AI, the prominence of links may be reduced while generative AI summaries take up space these links previously held.[476] While search results which incorporate AI-generated content may not negatively impact how consumers interact with website links, the impact of these summaries on click-through-rates remains uncertain. It is well-established that high ranking (and therefore more prominent) search positions are a key driver of traffic to websites.[477] Further, research has found that, although search engine results page features can influence click-through-rates in different ways, the main determinant of click-through-rates is the position of a search result.[478]

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470 Microsoft, Submission to the ACCC Digital Platform Services Inquiry Ninth Interim Report, 29 May 2024, p 3.

471 Capgemini Research Institute, Why consumers love generative AI, June 2023, p 13, accessed 17 September 2024. Survey of 10,000 consumers over the age of 18 in 13 countries across the US, Europe, and Asia-Pacific. The survey took place in April 2023.

472 BrightEdge, BrightEdge Releases Post Google I/O Data on The Impact of AI Overviews, 4 June 2024, accessed 17 September 2024.

473 Microsoft, Submission to the ACCC Digital Platform Services Inquiry Ninth Interim Report, 29 May 2024, p 4.

474 For example, internet studies scholar Dr Safiya Noble, who has written about racist and sexist algorithmic harm in commercial search engines, has stated that "[t]he companies that are producing generative AI have released products that are not ready for prime time." – Julia Busiek, University of California, How AI discriminates and what that means for your Google habit: A conversation with internet studies scholar Safiya Noble, 28 March 2024, accessed 17 September 2024.

475 Use of OpenAI's most advanced multimodal model, GPT-4o, is priced at USD5 per 1 million input tokens and USD15 per 1 million output tokens. 1 million tokens equates to approximately 750,000 words.; A US-based journalist set up a local news site capable of producing thousands of articles per day for approximately USD213, with minimal ongoing costs, associated with paying for a ChatGPT subscription (USD3 monthly) and website hosting. See – Jack Brewster, *The Wall Street Journal*, How I Built an AI-Powered, Self-Running Propaganda Machine for $105, 12 April 2024, accessed 17 September 2024.

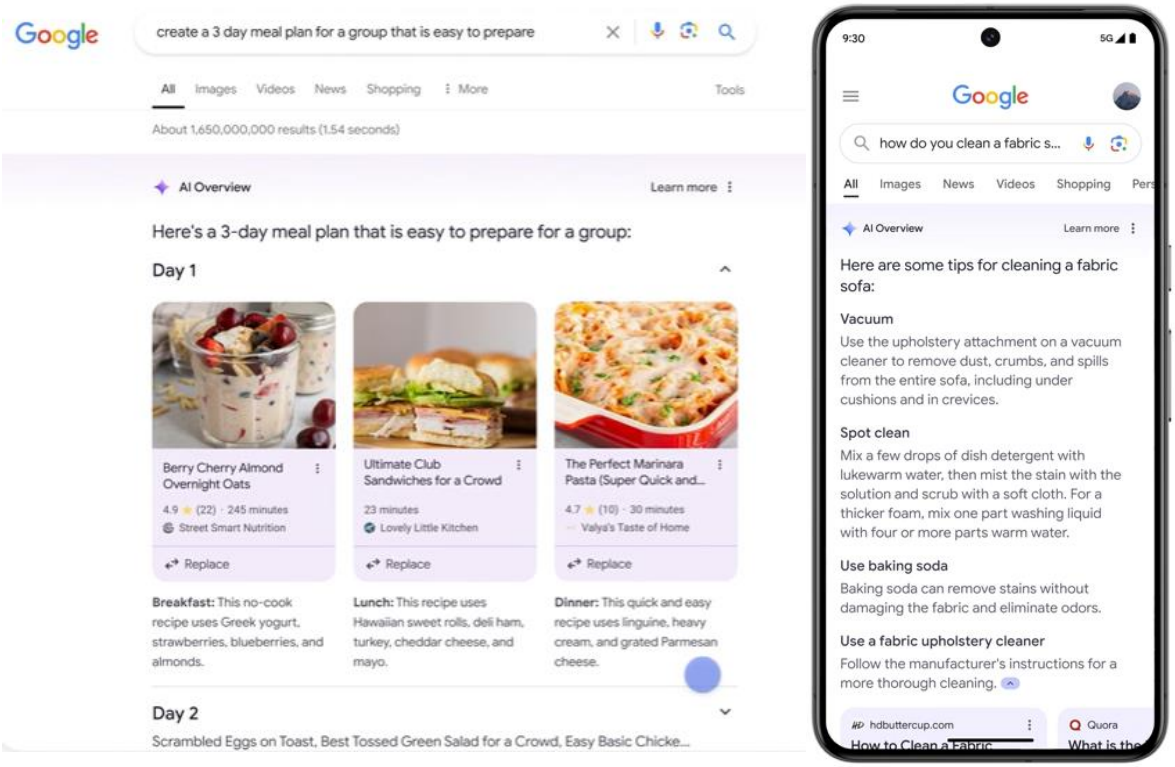
476 See, for example: D Pierce, Google is overhauling its search results page with AI overviews and Gemini organization, *The Verge*, 15 May 2024, accessed 17 September 2024; E Roth, Google's AI Overviews gives cited pages their own list, *The Verge*, 16 August 2024, accessed 17 September 2024.

477 E Fubel et al, Beyond Rankings: Exploring the Impact of SERP Features on Organic Click-through Rates, *ArXiv preprint arXiv:2306.01785*, 31 May 2023, p 1.

478 E Fubel et al, Beyond Rankings: Exploring the Impact of SERP Features on Organic Click-through Rates, *ArXiv preprint arXiv:2306.01785*, 31 May 2023, p 12.

Soon after AI Overviews launched, it was reported that Google had indicated that click-through rates to sourced websites increased.[479] However, analysis from other sources, based on searches undertaken after AI Overviews was rolled out, suggests that AI Overviews may have reduced click-through-rates to sourced websites and that, at the time the analysis was undertaken, many AI Overviews observed did not contain links to websites.[480] As shown in Figure 3.9, Google's AI Overviews results may take up most of a mobile screen, and most of a desktop screen, pushing other linked search results further down the page.

Figure 3.9: Google AI Overviews search result on desktop and mobile[481]



Microsoft submits that its AI-generated summary results present another way to drive traffic to content sources,[482] and Microsoft has said that total traffic to suggested websites grew after the introduction of AI-generated search.[483] However, Bing's Principal Program Manager, Fabrice Canel, was reported in May 2024 as saying that content creators should expect less click volume but more 'qualified clicks',[484] which satisfy a user's immediate query while also encouraging them to stay engaged and explore further.[485] Microsoft's more recent announcement of 'Bing generative search' in late July 2024 emphasised that the search results page had been designed to maintain the number of clicks to websites, including by

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479 B Schwarz, Google AI Overviews Launch In US Search Results, *Search Engine Roundtable*, 15 May 2024, accessed 17 September 2024.

480 R Hudgens, AI Overviews SEO Impact Report [New Data], *Siege Media*, updated 20 May 2024, accessed 17 September 2024; K Indig, The traffic impact of AI Overviews, *Growth Memo*, 27 May 2024, accessed 17 September 2024.

481 Screen captures from videos in Google blog post. Desktop image has been cropped to remove predominantly white space to right of search results. L Reid, Generative AI in Search: Let Google do the searching for you, *The Keyword (Google Blog)*, 14 May 2024, accessed 17 September 2024.

482 Microsoft, Submission to the ACCC Digital Platform Services Inquiry Ninth Interim Report, 29 May 2024, p 3.

483 S Pastis, Bing's search chatbot is increasing click-throughs to websites rather than stealing traffic, says Microsoft VP, *Yahoo! Finance*, 12 July 2023, accessed 17 September 2024. Comment attributed to Head of Product for Copilot and Bing, Jordi Ribas.

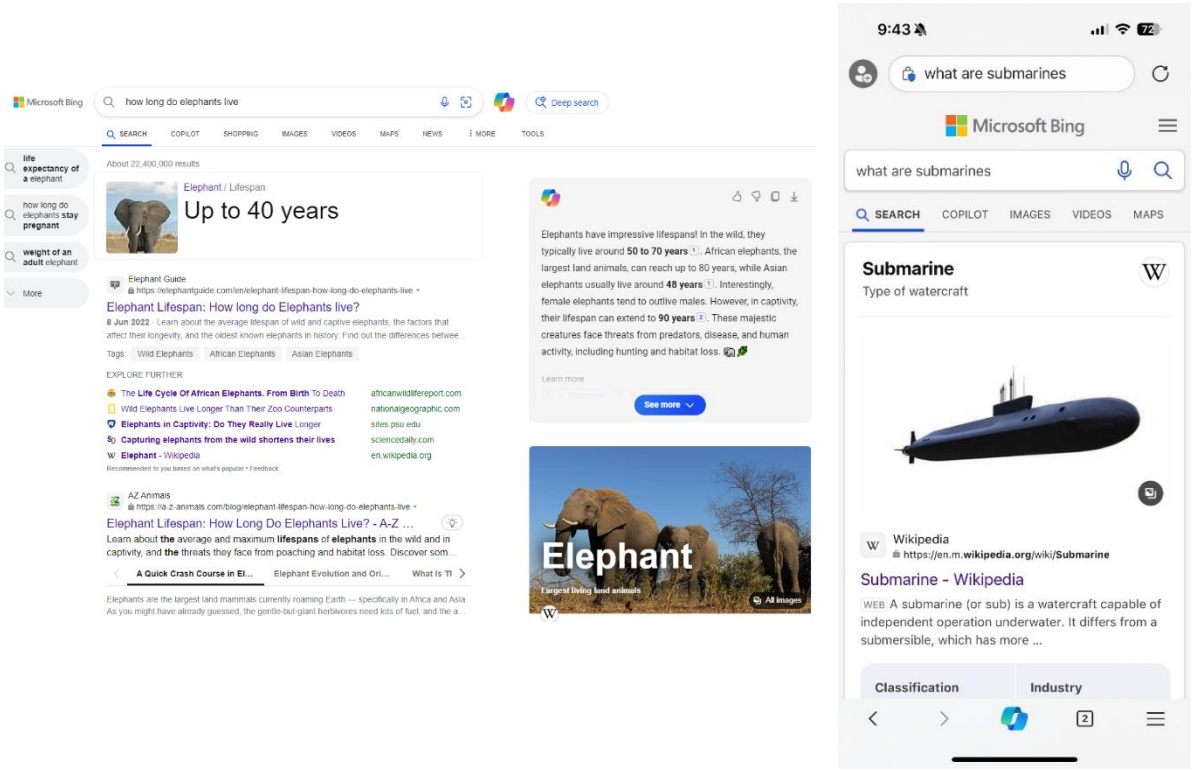
484 D Goodwin, Google Ads VP dodges questions on AI Search impact to publishers, *Search Engine Land*, 22 May 2024, accessed 17 September 2024.

485 B Brusola, How Does Generative AI in Search Work, *Kalicube*, accessed 17 September 2024.

retaining standard search results and increasing the number of clickable links, like the references in the results, and that early data indicated click-through-rates were maintained.[486]

Figure 3.10 below shows sample generative AI search results on Bing desktop and mobile. If the searcher hovers over information in the results, additional information is displayed, such as additional content, and information and a link to the sourced website.

Figure 3.10: Microsoft Bing search results – generative search result on desktop[487] and Bing search result on mobile [488]



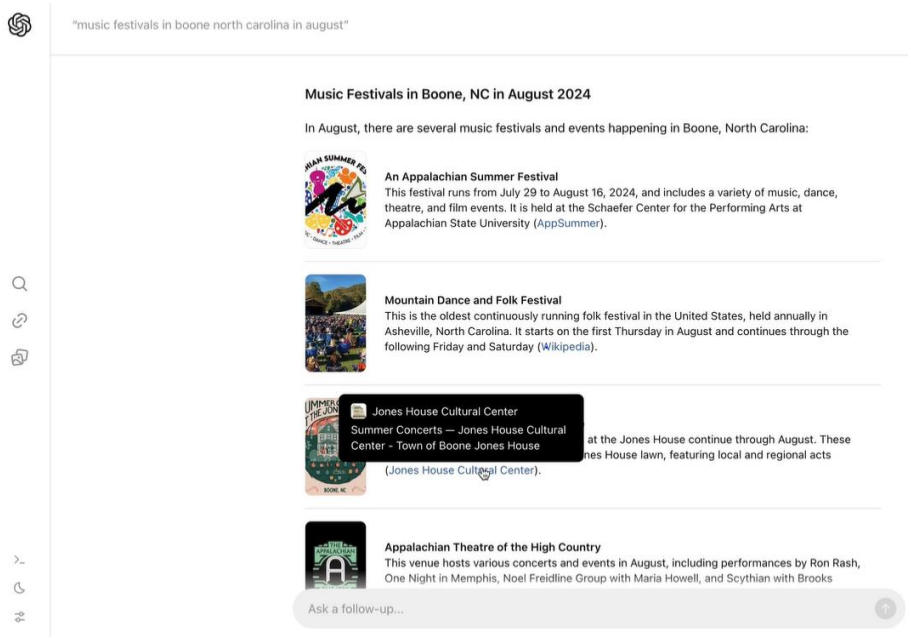
OpenAI's 'prototype' search service SearchGPT includes links stating the name of the sourced website interspersed in the AI-generated search results, with additional information displayed if the searcher hovers over the link.

486 Microsoft Bing Blogs, Introducing Bing generative search, *Microsoft*, 24 July 2024, accessed 17 September 2024.

487 Screen capture from Bing search on Chrome browser on desktop, 29 July 2024. Image has been cropped to remove predominantly white space to right of search results.

488 Screen capture from Bing search on Edge browser on mobile, 14 August 2024.

Figure 3.11: OpenAI SearchGPT result [489]



Signals of information provenance may degrade

AI-generated search results have the potential to put curated, concise summaries that accurately reflect the sources they reference in front of consumers. However, search engines that provide AI-generated answers or summaries reportedly tend to obscure the provenance of the information on which they are based.[490] This may include results attributing information to incorrect or made-up sources, which may make it difficult for consumers to evaluate the credibility of online sources. Research conducted in 2023 found search results across Copilot for Bing, NeevaAI, Perplexity AI, and YouChat 'frequently contain unsupported statements and inaccurate citations: on average, a mere 51.5% of generated sentences are fully supported by citations and only 74.5% of citations support their associated sentence'.[491] A 2024 study found that, while the responses of Copilot for Bing and Perplexity seek to establish cognitive authority by making claims and providing evidence, the strength of claims made are undermined by sources of questionable quality, and by ambiguous language.[492]

Levels of consumer trust and confidence in search results may change

Because generative AI systems excel at producing grammatically correct, convincing text, which is usually contextually relevant to a user's query, AI-generated search may increase consumer trust and confidence in the quality of highly ranked search results. While consumer perceptions of generative AI are likely to shift over time as consumers engage with this technology in different ways, a 2023 study found 72% of Australians trust AI-

489 Screen capture of initial (one click) search results page from video in OpenAI blog post announcing SearchGPT prototype. OpenAI, SearchGPT Prototype, 25 July 2024, accessed 17 September 2024.

490 N Hirvonen et al, Artificial intelligence in the information ecosystem: Affordances for everyday information seeking, *Journal of the Association for Information Science and Technology*, 29 December 2023, p 7, accessed 17 September 2024.

491 N Liu et al, Evaluating verifiability in generative search engines. *arXiv preprint arXiv:2304.09848*, 23 October 2023, p 2, accessed 17 September 2024.

492 A Li and L Sinnamon, Generative AI Search Engines as Arbiters of Public Knowledge: An Audit of Bias and Authority, *arXiv preprint arXiv:2405.14034*, 22 May 2024, p 10, accessed 17 September 2024.

generated written content.[493] A Microsoft study reported in June 2024 found 74% of daily users of generative AI platforms have high trust in the technology and results generated, leading Microsoft to conclude increased use of generative AI will lead to higher trust in both AI platforms and search results.[494] Whether search users will engage more or less critically with AI-generated search results compared to previous iterations of search results remains an open question, with potentially significant implications for the value they provide.

Synthetic content is difficult to trace and detect

Consumers tend to find it difficult to differentiate between AI-generated content and human-generated content. A study published in 2023 found artificially generated samples were almost indistinguishable from human-generated media, with the average detection accuracy of participants below 50% for images, and never exceeding 60% for text and audio.[495] There appears to be no highly reliable methods for automating the detection, authentication or labelling of synthetic content at scale, as discussed below, which is likely to have implications for the ability of search engines to surface trustworthy, original and high-quality content.

Methods for tracing or identifying AI-generated content

There are 2 methods commonly used to trace or identify AI-generated content, focusing either:

- broadly on content provenance, where the AI software ecosystem facilitates encoding of basic information about a piece of digital content, such as who created it and how, when, and where it was created or edited, or
- more narrowly on content detection, where software is used to identify whether content is synthetic or not.[496]

There are technical challenges associated with both approaches, and no silver bullet solutions. Methods for encoding content provenance can have limitations.[497] For example, some forms of watermarking, where hidden patterns are inserted into content enabling automated detection of its origins, can be tampered with or removed.[498]

Similarly, while some content detection systems have performed well at detecting content generated by currently available generative AI models, content detection also has limitations.[499] These systems vary in their accuracy,[500] the US Federal Trade Commission

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493 The study also found high levels of consumer trust in generative AI globally, even for financial, medical, and relationship advice, and that the endorsements of large tech firms such as Microsoft and Alphabet increase consumer trust levels. Capgemini Research Institute, Why consumers love generative AI, June 2023, pp 19-20, accessed 17 September 2024.

494 K Kemery and T A'Zary, Consumer trust and ad potential in conversational search, *Microsoft Advertising*, 18 June 2024, accessed 17 September 2024. The study also found most consumers have a moderate level of trust in 'AI platforms' (59%) and the results they receive (54%).

495 J Frank et al, A Representative Study on Human Detection of Artificially Generated Media Across Countries, 10 December 2023, *arXiv preprint arXiv:2312.05976*, pp 1, 6.

496 A Knott and D Pedreschi, Human, or human-like? Transparency for AI-generated content, *OECD.AI*, 4 December 2023, accessed 17 September 2024; Coalition for Content Provenance and Authenticity, FAQs, accessed 17 September 2024.

497 R M Vasse'i and G Udoh, In Transparency We Trust?: Evaluating the Effectiveness of Watermarking and Labeling AI-Generated Content, Mozilla, 26 February 2024, accessed 17 September 2024, pp 25-27, 33-35.

498 M Heikkilä, It's easy to tamper with watermarks from AI-generated text, *MIT Technology Review*, 29 March 2024, accessed 17 September 2024; M Saleh, Researchers say current AI watermarks are trivial to remove, Engadget, 4 October 2023, accessed 17 September 2024.

499 For example, see J Gillham, AI Detection Accuracy Studies — Meta-Analysis of 7 Studies, *Originality.ai*, 8 August 2024, accessed 17 September 2024.

500 C Chaka, Reviewing the performance of AI detection tools in differentiating between AI-generated and human-written texts: A literature and integrative hybrid review, *Journal of Applied Learning and Teaching*, February 2024, p 1, accessed 17 September 2024.

has criticised some suppliers for making unsubstantiated claims about their reliability,[501] and OpenAI has stated 'it is impossible to reliably detect all AI-written text'.[502] Some content detection tools also exhibit bias against non-English speakers, more frequently misclassifying non-native English writing as AI generated.[503] In addition, tools designed to make AI-generated content undetectable may further increase some technical challenges associated with content detection.[504]

Some firms in the AI-generated search supply chain are taking steps to address risks posed by undisclosed AI content. The Coalition for Content Provenance and Authenticity, of which Microsoft, Google and OpenAI are members, seeks to address misleading information online through technical standards for certifying the provenance of content.[505] Google's AI Overviews are labelled as AI and are accompanied by a message stating generative AI is experimental. Google has also added functionality to Google Search to help users identify images labelled as AI-generated,[506] and Google Search guidance for AI-generated content suggests content creators should disclose the use of AI or automation where it would be 'reasonably expected'.[507] Microsoft states it notifies users of Copilot for Bing's use of AI at multiple touchpoints, and that this can 'help them avoid over-relying on AI'.[508]

Synthetic content appears to be proliferating online

The increasing accessibility of foundation models, and consumer-facing generative AI models, as discussed in section 2, is likely contributing to greater volumes of synthetic and AI-altered content online.[509] However, there are no foolproof AI content detection systems, and estimates of the amount of this content online vary significantly. Analysis by content detection firm Copyleaks estimated 1.57% of web pages sampled in March 2024 contained AI-generated content.[510] Analysis by another AI content detection firm, Originality.ai, estimated there was AI-generated content in 13.08% of the top 20 Google Search results in response to 500 keywords sampled in August 2024, compared to less than 3% of sampled websites in 2019.[511]

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501 Federal Trade Commission, Watching the detectives: Suspicious marketing claims for tools that spot AI-generated content, 6 July 2023, accessed 17 September 2024; K Hines, Should You Trust An AI Detector?, *Search Engine Journal*, 18 July 2023, accessed 17 September 2024.

502 OpenAI, New AI classifier for indicating AI-written text, 31 January 2023, updated 20 July 2023, accessed 17 September 2024. This comment was made in the context of OpenAI announcing the company's AI classifier would no longer be available due to its low rate of accuracy.

503 W Liang et al, GPT detectors are biased against non-native English writers, *ScienceDirect* 4(7), 14 July 2023, p 1, accessed 17 September 2024.

504 Examples of tools that claim to make synthetic content undetectable include Undetectable.ai, Stealthwriter.ai and AIHumanizer.ai.

505 Coalition for Content Provenance and Authenticity, C2PA Overview, 2024, accessed 17 September 2024. C2PA considers content provenance approaches to be preferable to content detection because '[d]etecting whether or not digital content is fake is currently impossible at internet scale and speed because manipulation software is increasingly more sophisticated, [and] metadata can easily be manipulated and provides no proof of its origins.' See – C2PA, FAQs, 2024, accessed 17 September 2024.

506 Google, Submission to the Digital Platform Services Inquiry Ninth Interim Report, 29 May 2024, p 15.

507 Google Search Central Blog, Google Search's guidance about AI-generated content, 8 February 2023, accessed 17 September 2024.

508 Microsoft, The new Bing: Our approach to Responsible AI, April 2023, p 8, accessed 17 September 2024.

509 N Hirvonen et al, Artificial intelligence in the information ecosystem: Affordances for everyday information seeking, *Journal of the Association for Information Science and Technology*, 29 December 2023, p 7.

510 Copyleaks, Copyleaks Analysis Reveals Explosive Growth of AI Content Across the Web, 30 April 2024, accessed 17 September 2024. The study analysed a sample of 1 million web pages during each specified time period sourced from the common crawl dataset.

511 Originality.ai, Amount of AI Content in Google Search Results - Ongoing Study, updated 26 August 2024, accessed 17 September 2024.

How do Google and Microsoft address low quality AI-generated content?

The major search providers appear to predominantly address low quality AI-generated content in similar ways to how they address other forms of low-quality content.

Google: Spam policies do not allow the use of 'generative AI tools or other similar tools to generate many pages without adding value for users' or '[s]craping feeds, search results, or other content to generate many pages (including through automated transformations like synonymizing, translating, or other obfuscation techniques), where little value is provided to users'.[512] Google has also implemented general measures to address low-quality content, such as Google's 'helpful content' update of August 2022, and changes to its core ranking systems to reduce search results with low-quality, unoriginal content in March 2024.[513]

Microsoft: Content guidelines discourage scraping or copying content from other more reputable websites, including slightly modifying and republishing content.[514] The guidelines also discourage the use of automatically generated content, 'generated by an automated computer process, application, or other mechanisms without any active intervention of a human', which is 'considered malicious and usually contains garbage text only created to garnish a higher ranking.'[515]

3.3.2. Some potential implications for consumers' search experience

These developments may have implications for the quality of general search services used by consumers in Australia. There may be opportunities for helpful and efficient new ways of finding and engaging with different types of information, for different purposes. These developments may also change how Australians engage with information online, and the types of information available to them in ways that, in some instances, result in a worse search experience. The potential implications discussed below also highlight some of the current shortcomings of generative AI search as a technology, when compared to general search which does not rely on generative AI to serve results. These shortcomings could impact the potential for newer AI-generated search services to effectively compete with standard general search services.

Potential impacts on speed of finding search results

Consumers seem to highly value search results with low latency (i.e. delay before data is transferred).[516] The joint submission from the RMIT University's School of Computing Technologies and the ARC Centre of Excellence for Automated Decision-Making and Society (ADM+S) noted that a key consumer demand of a search service is that 'it responds very quickly to any query issued.'[517] Yet generative AI-powered search summaries may have significantly longer load times than blue link search results. Research from 2023 found that Google SGE, Copilot for Bing and Perplexity respectively had latency of 4 seconds,

512 Google Search Central, Spam policies for Google web search, Google, 31 July 2024, accessed 17 September 2024.

513 Google, Submission to the Digital Platform Services Inquiry Ninth Interim Report, 29 May 2024, pp 14-15.

514 Microsoft, Bing Webmaster Guidelines, accessed 17 September 2024.

515 Microsoft, Bing Webmaster Guidelines, accessed 17 September 2024.

516 X Bai et al, Understanding and Leveraging the Impact of Response Latency on User Behaviour in Web Search, *ACM Transactions on Information Systems*, 9:4 (2017), p 39:2.

517 School of Computing Technologies, RMIT University and the ARC Centre of Excellence for Automated Decision-Making and Society (ADM+S), Submission to the ACCC Digital Platform Services Inquiry Ninth Interim Report, 29 May 2024, p 10.

13 seconds and 6.5 seconds.[518] In comparison, more than a decade ago, Google Search frequently produced results in less than a tenth of a second.[519] Where a search produces an AI-generated result, and a user clicks through to one or more sourced websites, their total searching time may increase, potentially decreasing their satisfaction for that search.

Potential impacts on diversity of results

For some searches, consumers may benefit from result diversity, as discussed earlier in section 3.2.4. Answer engines and other search interfaces that use generative AI for the presentation of results may reduce the diversity of results consumers are presented with, potentially hindering them from assessing and comparing information across multiple sources. This could occur if information is repackaged and summarised into a prominent result or answer based on one source, or a very small number of sources, and the prominence of links is also reduced. However, this will depend on how content and links are displayed, as search engines continue to introduce new layouts and features to their search interfaces. For example, in August 2024, a Google blog post indicated that with AI Overviews 'we're seeing that people have been visiting a greater diversity of websites for help with more complex questions', and that users were more likely to spend more time on the sites they visit.[520]

Increased exposure to low-quality AI-generated content

The volume of low-quality synthetic content – broadly, any synthetic content, across all forms of media, including text, images and video, that also does not add value for consumers – appears to be increasing online. This content, which is often mass produced and may contain factual inaccuracies, perpetuate negative biases, be misrepresented as human authored, or be duplicative or degraded versions of other content, has been termed 'slop'.[521]

This type of content appears to be present on many websites and on social media platforms. One study found AI-generated images on 120 Facebook pages collectively received hundreds of millions of engagements and exposures, with a post including an AI-generated image one of the 20 most viewed pieces of content on Facebook in the third quarter of 2023, gaining 40 million views.[522] The researchers' anecdotal experience was consistent with media coverage suggesting engaging with AI-generated images often results in users receiving recommendations for more AI-generated image content.[523]

Internationally, some content providers have reportedly used generative AI tools to write articles, or have hosted AI-generated articles containing inaccuracies on their curated news

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518 B Kinsella, This One Factor Could Kill Bing Chat. Google SGE and Perplexity AI are in a Different League., *Synthedia*, 26 June 2023, accessed 17 September 2024. Note Microsoft significantly reduced Bing Chat's latency from 12/06/2023 to 19/06/2023.

519 U Hoelzle, The Google Gospel of Speed, *Think with Google*, January 2012, accessed 17 September 2024. When Google trialled 'Google zero' results in 2018 (called condensed view), for calculator, unit converter & local time, Google's Search Liaison Danny Sullivan indicated it was doing so to further speed up load time. See Danny Sullivan, Twitter Post, 14 March 2018, accessed 17 September 2024.

520 H Budaraju, , New ways to connect to the web with AI Overviews, The Keyword (Google Blog), 15 August 2024, accessed 17 September 2024.

521 A Hern and D Milmo, Spam, junk … slop? The latest wave of AI behind the 'zombie internet', *The Guardian*, 19 May 2024, accessed 17 September 2024.

522 R DiResta and J A Goldstein, How Spammers and Scammers Leverage AI-Generated Images on Facebook for Audience Growth, *Stanford Internet Observatory, Stanford University, Center for Security and Emerging Technology, Georgetown University*, March 2024 (draft pre-print), p 1, accessed 17 September 2024.

523 R DiResta and J A Goldstein, How Spammers and Scammers Leverage AI-Generated Images on Facebook for Audience Growth, *Stanford Internet Observatory, Stanford University, Center for Security and Emerging Technology, Georgetown University*, March 2024 (draft pre-print), p 1, accessed 17 September 2024.

sites.[524] Many of the sites reportedly appeared to be generating revenue through programmatic advertising, predominately Google Ads, and were serving ads from major brands.[525] Generative AI has also been used to alter articles to facilitate unauthorised reproductions; with the revised, potentially degraded versions passed off as original new content. For example, an entity operating a sports news website in Australia reportedly published over 10,000 articles, which appeared to be altered versions of articles published by Australian and international news sites, across a network of websites.[526]

Consumers also tend to rate their ability to use search engines as high, despite generally low knowledge of search engine functionality and business models.[527] Further, a 2023 study found that most Australians do not tend to double-check information found via search engines results most of the time.[528] The ACCC has previously noted trust and confidence underpin effective markets.[529] Increased consumer trust in search results has the potential to benefit Australians and businesses in the digital and wider economy.[530] Conversely, misplaced trust in AI-generated search results could have far-reaching negative impacts, given the importance of search services to the daily lives and economic success of Australians, and the high trust consumers have in the search results of Google,[531] which is the largest search provider in Australia.

Persistence of errors

It has been reported that generative AI systems cannot have regard to truth,[532] and tend to produce incorrect or misleading results some of the time, often called 'hallucinations'[533]. Research by generative AI platform Vectara has found that although hallucination rates have become lower for some newer models, no LLMs surveyed had a hallucination rate below 1%.[534] Hallucinations may result from factors such as biases in training data, or a model's limitations in comprehending and generating contextually accurate responses.[535] Factual errors have been identified even in demonstrations of generative AI search features

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524 B Kinsella, Gizmodo the Latest Media Publisher to Notch a Generative AI Fail, *Synthedia*, 10 July 2023, accessed 17 September 2024; M H Dupré, Futurism, USA TODAY OWNER PAUSES AI ARTICLES AFTER BUTCHERING SPORTS COVERAGE, 29 August 2023, accessed 17 September 2024; M H Dupré,, Sports Illustrated Published Articles by Fake, AI-Generated Writers, *Futurism*, 27 November 2023, accessed 17 September 2024; M H Dupré, Meet AdVon, the AI-Powered Content Monster Infecting the Media Industry, *Futurism*, 8 May 2024, accessed 17 September 2024. The content providers reported include Microsoft's MSN News Portal, Gizmodo, Sports Illustrated and USA Today.

525 NewsGuard, Misinformation Monitor: June 2023, accessed 17 September 2024. Also see NewsGuard, Tracking AI-enabled Misinformation: 831 'Unreliable AI-Generated News' Websites (and Counting), Plus the Top False Narratives Generated by Artificial Intelligence Tools, updated 13 May 2024, accessed 17 September 2024.

526 J Fell, Lawyer linked to 'parasitic' AI content network identified, *ABC News*, 14 May 2024, accessed 17 September 2024.

527 S Schultheiß and D Lewandowski, Misplaced trust? The relationship between trust, ability to identify commercially influenced results, and search engine preferences, *Journal of Information Science* 49:3 (2021), p 1.

528 GetApp, Australian consumer search behaviour: A study of privacy concerns and trust, 11 April 2023, accessed 17 September 2024.

529 ACCC, Digital Platform Services Inquiry Fifth Interim Report, 11 November 2022, p 9.

530 The ACCC notes the CPRC's comments on the importance of trust in relation to accuracy and accessibility to ensure consumers can reap the benefits of generative AI in search. – See CPRC, Submission to the ACCC Digital Platform Services Inquiry Ninth Interim Report, 29 May 2024, p 10.

531 S Schultheiß and D Lewandowski, Misplaced trust? The relationship between trust, ability to identify commercially influenced results, and search engine preferences, *Journal of Information Science*, 49:3, 14 May 2021, p 1.

532 M Townsen Hicks et al, ChatGPT is bullshit, *Ethics and Information Technology*, 26(38) (2024), p 2, accessed 17 September 2024. The paper refers specifically to LLMs rather than generative AI systems more broadly.

533 Google Cloud, What are AI hallucinations?, *Google*, accessed 17 September 2024. OpenAI researchers distinguish between open domain and closed domain hallucinations - Closed domain hallucinations refer to instances in which the model is instructed to use only information provided in a context, but then makes up extra information that was not in that context. Open domain hallucinations, in contrast, are when the model confidently provides false information about the world without reference to any input context. - OpenAI, GPT-4 Technical Report, March 2023, p 46.

534 Vectara, HHEM Leaderboard Hughes Hallucination Evaluation Model (HHEM) leaderboard, *Hugging Face,* accessed 17 September 2024. Vectara is a Retrieval Augmented Generation as-a-Service (RAGaaS) platform.

535 V Rawte et al, Hughes Hallucination Evaluation Model (HHEM) leaderboard, *ArXiv:2309.05922v1,* 12 September 2023, p 1.

that were pre-recorded by the search providers to promote their service, such as for Google's launch of Gemini (formerly Bard) and OpenAI's announcement of SearchGPT.[536]

Both Google and Microsoft have acknowledged the presence of errors in some of their AI-generated search products. Following the initial rollout of Google's AI Overviews, Google's head of Search stated that while 'AI Overviews generally don't "hallucinate" or make things up', 'some odd, inaccurate or unhelpful AI Overviews certainly did show up'.[537]

How do Google and Microsoft assist users to detect errors in AI-generated search results?

Google:

- **Gemini** chatbot has a double-check feature intended to assist users to identify potentially inaccurate responses. However, guidance for Gemini states this feature can also make mistakes, such as by showing the user that Google Search found content making a similar statement to Gemini's (i.e. supporting the initial AI-generated search result), where that content may actually contradict Gemini.[538]
- A guidance webpage on generative AI states users should '[t]hink critically' about responses from generative AI tools and use Google and other resources to check information presented as fact.[539]

Microsoft:

- **Copilot for Bing** search homepage includes a disclaimer stating 'Copilot uses AI. Check for mistakes'.[540] No guidance about verifying information provided is included on the search results page. Copilot Guidance states AI can make mistakes and that 'Copilot will sometimes misrepresent the information it finds, and you may see responses that sound convincing but are incomplete, inaccurate, or inappropriate'. Copilot guidance encourages users to use judgment and double check facts presented.[541]

As discussed in section 3.3.1, content produced by generative AI systems can appear authoritative, and lack obvious markers of being inaccurate, which may reduce consumer detection of errors, even where users are advised to check the result against source materials.[542] This poses a problem in search given the tendency of these systems to generate or reproduce errors some of the time. OpenAI researchers have stated the tendency of generative AI models to hallucinate 'can be particularly harmful as models

536 J Vincent, Google's AI chatbot Bard makes factual error in first demo, *The Verge*, 9 February 2023, accessed 17 September 2024; M Wong, OopsGPT, 25 July 2024, *The Atlantic*, accessed 17 September 2024.

537 L Reid, AI Overviews: About last week, The Keyword (Google Blog), 30 May 2024, accessed 17 September 2024. Ms Reid further stated that these issues related to "…queries that people don't commonly do" that Google had addressed these issues "through improvements intended to reduce those types of erroneous results", and also pointed to the "large number of faked screenshots shared widely"; J Vincent, Microsoft's Bing is an emotionally manipulative liar, and people love it, The Verge, 16 February 2023, accessed 17 September 2024. A Microsoft representative is quoted in the article as stating "Bing is powered by AI, so surprises and mistakes are possible" and "The new Bing tries to keep answers fun and factual, but given this is an early preview, it can sometimes show unexpected or inaccurate answers for different reasons, for example, the length or context of the conversation."

538 Google, Gemini Apps FAQ, accessed 17 September 2024.

539 Google, Learn about generative AI, accessed 17 September 2024.

540 Bing, Microsoft Copilot in Bing, accessed 17 September 2024.

541 Microsoft, What will you do with Copilot?, accessed 17 September 2024; Microsoft, Bing Webmaster Guidelines, accessed 17 September 2024.

542 For example, Copilot in Bing users are also provided with explicit notice that that they are interacting with an AI system and advised to check the web result source materials to help them use their best judgment. See Microsoft, Copilot in Bing: Our approach to Responsible AI, May 2024, accessed 17 September 2024.

become increasingly convincing and believable, leading to overreliance on them by users'.[543] Further, research by Huang et al of Google's DeepMind indicates that LLMs struggle to self-correct responses without external feedback, and in some instances their performance degrades after self-correction.[544] However, Google, Microsoft and OpenAI have each indicated their ability to detect and prevent errors in AI-generated search results summaries is improving.[545]

Increased difficulties verifying sources

Both online and offline, consumers often benefit from being informed about the origin of the content they are assessing. In many contexts, it is useful to assess AI-generated content differently than human-authored content – for example, when considering a comparison of two different products, which only a human author could have tested.[546] If synthetic content continues to proliferate online, given the challenges associated with automating the tracing and detecting AI-generated content, consumers may increasingly be tasked with determining whether content they encounter was produced by a person or synthetically, yet lack the tools to do so.

Amplification of negative biases

Generative AI systems, including those integrated with general search services, are only as good as the data on which they are trained. Search engines have been known to reproduce negative societal biases and stereotypes.[547] Generative AI systems also tend to amplify negative biases in training data.[548] The integration of AI systems into search services may reproduce or amplify negative biases in AI-generated search summaries. This may also reduce the perceived quality of search results, in particular the perceived relevance of search results, for some consumers.

Further, generative AI can simultaneously obscure the presence of negative biases, and amplify them.[549] This could have additional implications for efforts to minimise bias in search results. A 2024 study found LLMs, particularly those trained with human feedback, hold covert negative associations about speakers of African American English, similar to stereotypes about African Americans that existed before the civil rights movement.[550] The study found these negative associations were not evident when the race of the speaker was made overt, suggesting 'human feedback training teaches language models to conceal their

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543 OpenAI, GPT-4 Technical Report, March 2023, p 46.

544 J Huang et al, Large Language Models Cannot Self-Correct Reasoning Yet, *arXiv preprint arXiv:2310.01798*, 14 March 2024, pp 1-2.

545 V Ho, Why AI sometimes gets it wrong — and big strides to address it, *Source (Microsoft Blog)*, 20 June 2024, accessed 17 September 2024; L Reid, AI Overviews: About last week, *Google*, 30 May 2024, accessed 17 September 2024; OpenAI, GPT-4 Technical Report, March 2023, pp 61-65.

546 A Knott et al, Generative AI models should include detection mechanisms as a condition for public release, *Ethics and information Technology*, 25(55) (2023), p 2.

547 B Han et al, Users' Perception of Search Engine Biases and Satisfaction, *International Workshop on Algorithmic Bias in Search and Recommendation,* 6 May 2021, p 1.

548 For example, see R. Bommasani et al, On the Opportunities and Risks of Foundation Models, *Center for Research on Foundation Models (CRFM) Stanford Institute for Human-Centered Artificial Intelligence (HAI) Stanford University*, July 2022, pp 5 and 19, accessed 17 September 2024; International Research Centre on Artificial Intelligence, Challenging systematic prejudices: an investigation into bias against women and girls in large language models, *UNESCO*, 2024, accessed 17 September 2024.

549 R Slaughter, Algorithms and Economic Justice: A Taxonomy of Harms and a Path Forward for the Federal Trade Commission, *Yale Journal of Law & Technology*, August 2021, p 1. Comments in source were made in relation to AI and algorithms broadly.

550 V Hofmann et al, Dialect prejudice predicts AI decisions about people's character, employability, and criminality, *arXiv preprint arXiv:2403.00742*, 1 March 2024, pp 2 and 6.

racism on the surface, while racial stereotypes remain unaffected on a deeper level'.[551] This suggests that, depending on the specific method used, using human input in the training of foundation models to reduce the likelihood of objectionable outputs, can have unintended negative consequences. These consequences could potentially apply in the search context.

There are also other significant risks associated with generative AI and general search services that are beyond the scope of the Inquiry, such as potential harms to individuals resulting from deepfakes, harms to democratic processes resulting from bad actors creating and disseminating fake news at scale,[552] and potential harms to content creators and websites hosting human-authored content if traffic from search engines to those websites declines.[553]

3.3.3. Potential longer-term developments that may impact quality

As AI-generated content proliferates online, closed ecosystems, or pockets of the web where real humans interact, and which are not overrun by AI-generated content and chatbots, are likely to become more valuable to consumers. This may include, for example, the student message boards of educational institutions, private messaging services, and social media services that are good at limiting synthetic content and agents.

Over the longer-term, increased volumes of AI-generated content online may contribute to the degradation of future foundation models. This is because as synthetic content becomes increasingly prevalent in training data, through inadvertent or deliberate use by model developers, models have been shown to get worse. One study found training LLMs on synthetic data causes them to degrade and collapse, with irreversible defects in resulting models.[554] Given the challenges associated with identifying synthetic data, this may further reduce the quality of content produced by new and pre-existing generative AI systems, although unsophisticated models may be more susceptible to model collapse than advanced models.[555]

The use of foundational models in general search services may have additional implications for the quality of search results that have not yet been predicted, partly because foundation models can be hard to understand.[556]

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551 V Hofmann et al, Dialect prejudice predicts AI decisions about people's character, employability, and criminality, *arXiv preprint arXiv:2403.00742*, 1 March 2024, p 2.

552 I Fried, OpenAI says its tools were used in foreign influence campaigns, *Axios*, 30 May 2024, accessed 17 September 2024.

553 O Darcy, News publishers sound alarm on Google's new AI-infused search, warn of 'catastrophic' impacts, *CNN*, 15 May 2024, accessed 17 September 2024; J Biggs, Google's AI Search Is a Death Blow to Publishers, *The Media Copilot*, 15 May 2024, accessed 17 September 2024.

554 I Shumailov et al, The Curse of Recursion: Training on Generated Data Makes Models Forget, *arXiv preprint arXiv:2305.17493*, 14 April 2024, p1-3, accessed 17 September 2024. The authors describe 'model collapse' as: 'a degenerative process affecting generations of learned generative models, where generated data end up polluting the training set of the next generation of models; being trained on polluted data, they then mis-perceive reality'. Similar model degradation has been found in relation to AI generated images. Also see: G Martinez et al, Towards Understanding the Interplay of Generative Artificial Intelligence and the Internet, *International Workshop on Epistemic Uncertainty in Artificial Intelligence,* 8 June 2023, p 8. The authors evaluate potential 'worst case' effects of AI generated data populating the Internet and becoming part of training sets for future versions of generative AI. The results show that, based on the simple interaction model used, the interaction can lead to degeneration.

555 G Noone, How real is the threat of data poisoning to generative AI?, *Tech Monitor*, 15 November 2023, accessed 17 September 2024.

556 R Bommasani et al, On the Opportunities and Risks of Foundation Models, *Center for Research on Foundation Models, Stanford Institute for Human-Centered Artificial Intelligence, Stanford University*, 12 July 2022, pp 6-7.

3.4. Conclusion

As noted above, search quality is challenging to define. The specific metrics search engines and researchers use as a proxy for search quality shed light on the current state of general search, and how it has changed over time and the ACCC sought to examine a selection of these metrics to assess how they feed into general search.

Some features have clearly changed over time, feeding into what consumers see when they use search. For example, incentives to serve ads likely degrades the search experience for users, at least some of the time. In particular, search providers dependent on advertising for revenue appear to have been incentivised to change their search interfaces over time in ways that have made ads both more prominent, and less distinguishable from non-sponsored content.

Similarly, optimising for search engine algorithms can affect what results appear at the top of a user's results. Through their decisions about what website characteristics are preferable, and how and to what extent those characteristics should influence the ranking of a given website, the major search providers (particularly Google) have huge influence over the websites consumers see. Website operators are incentivised to optimise the appearance and content of their sites to conform to those characteristics.

Personalisation of search results appears to have a limited effect on what consumers see. Most search engines collect some data from consumers for a variety of purposes, including for personalising search result; however personalisation mostly occurs in relation to location. While currently personalisation does not appear to be a significant input in search, some emerging search providers are innovating based on the ways search results can be personalised.

The effect of (and desirability of) diversity in search is a more complex consideration. In many cases users are often best served by a single result, or by a small set of results, in response to their query. However, users can benefit from receiving a diverse set of results for some types of searches; and the trend towards results that do not require going to other webpages (discussed in section 3.2.4). Users and websites may be negatively affected if search engine algorithms only show a narrow set of results.

The ACCC has considered the effect of increased use of generative AI in general search, including what this means for quality. The implications for search quality remain uncertain. As search engines incorporate this technology into their services in different ways, generative AI may lead to a new era of more relevant, efficient and intuitive search. It could also raise new challenges for consumers seeking credible, reliable, unbiased and verifiable information.

Given that Australians routinely use general search services, changes in the quality of general search services have the potential to considerably affect their daily lives, even if these impacts, whether positive or negative, are not always easily discerned. There is more work to be done to understand whether markers of search quality are changing over time and across different search engines. This applies particularly in the context of emerging technologies.

Competition and Consumer (Price Inquiry—Digital Platforms) Direction 2020

I, Josh Frydenberg, Treasurer, give the following direction to the Australian Competition and Consumer Commission.

Dated: 10 February 2020

Josh Frydenberg
Treasurer

Contents

Part 1—Preliminary

1 Name

This instrument is the *Competition and Consumer (Price Inquiry—Digital Platforms) Direction 2020*.

2 Commencement

(1) Each provision of this instrument specified in column 1 of the table commences, or is taken to have commenced, in accordance with column 2 of the table. Any other statement in column 2 has effect according to its terms.

Commencement information		
Column 1	**Column 2**	**Column 3**
Provisions	**Commencement**	**Date/Details**
1. The whole of this instrument	The day after this instrument is registered.	

Note: This table relates only to the provisions of this instrument as originally made. It will not be amended to deal with any later amendments of this instrument.

(2) Any information in column 3 of the table is not part of this instrument. Information may be inserted in this column, or information in it may be edited, in any published version of this instrument.

3 Authority

This instrument is made under the *Competition and Consumer Act 2010*.

4 Definitions

Note: Expressions have the same meaning in this instrument as in the *Competition and Consumer Act 2010* as in force from time to time—see paragraph 13(1)(b) of the *Legislation Act 2003*.

In this instrument:

Australian law means a law of the Commonwealth, a State, or a Territory (whether written or unwritten).

data broker means a supplier who collects personal or other information on persons, and sells this information to, or shares this information with, others.

digital content aggregation platform means an online system that collects information from disparate sources and presents it to consumers as a collated, curated product in which users may be able to customise or filter their aggregation, or to use a search function.

digital platform services means any of the following:

(a) internet search engine services (including general search services and specialised search services);

(b) social media services;
(c) online private messaging services (including text messaging; audio messaging and visual messaging);
(d) digital content aggregation platform services;
(e) media referral services provided in the course of providing one or more of the services mentioned in paragraphs (a) to (d);
(f) electronic marketplace services.

electronic marketplace services means a service (including a website, internet portal, gateway, store or marketplace) that:

(a) facilitates the supply of goods or services between suppliers and consumers; and
(b) is delivered by means of electronic communication; and
(c) is *not* solely a carriage service (within the meaning of the *Telecommunications Act 1997*) or solely consisting of one of more of the following:
  (i) providing access to a payment system;
  (ii) processing payments.

exempt supply has the meaning given by subsection 95A(1) of the Act.

goods has the meaning given by subsection 95A(1) of the Act.

inquiry has the meaning given by subsection 95A(1) of the Act.

services has the meaning given by subsection 95A(1) of the Act.

State or Territory authority has the meaning given by subsection 95A(1) of the Act.

supply has the meaning given by subsection 95A(1) of the Act.

the Act means the *Competition and Consumer Act 2010*.

Part 2—Price inquiry into supply of digital platform services

5 Commission to hold an inquiry

(1) Under subsection 95H(1) of the Act, the Commission is required to hold an inquiry into the markets for the supply of digital platform services. The inquiry is *not* to extend to any of the following:
  (a) the supply of a good or service by a State or Territory authority;
  (b) the supply of a good or service that is an exempt supply;
  (c) reviewing the operation of any Australian law (other than the Act) relating to communications, broadcasting, media, privacy or taxation;
  (d) reviewing the operation of any program funded by the Commonwealth, or any policy of the Commonwealth (other than policies relating to competition and consumer protection).

(2) For the purposes of subsection 95J(1), the inquiry is to be held in relation to goods and services of the following descriptions:
  (a) digital platform services;
  (b) digital advertising services supplied by digital platform service providers;
  (c) data collection, storage, supply, processing and analysis services supplied by:
    (i) digital platform service providers; or
    (ii) data brokers.

(3) Under subsection 95J(2), the inquiry is not to be held in relation to the supply of goods and services by a particular person or persons.

6 Directions on matters to be taken into consideration in the inquiry

Under subsection 95J(6) of the Act, the Commission is directed to take into consideration all of the following matters in holding the inquiry:
  (a) the intensity of competition in the markets for the supply of digital platform services, with particular regard to:
    (i) the concentration of power in the markets amongst and between suppliers; and
    (ii) the behaviour of suppliers in the markets, including:
      (A) the nature, characteristics and quality of the services they offer; and
      (B) the pricing and other terms and conditions they offer to consumers and businesses; and

    Example: Terms and conditions relating to data collection and use.

    (iii) changes in the range of services offered by suppliers, and any associated impacts those changes had or may have on other markets; and
    (iv) mergers and acquisitions in the markets for digital platform services; and

(v) matters that may act as a barrier to market entry, expansion or exit, and the extent to which those matters act as such a barrier;

(b) practices of individual suppliers in the markets for digital platform services which may result in consumer harm, including supplier policies relating to privacy and data collection, management and disclosure;

(c) market trends, including innovation and technology change, that may affect the degree of market power, and its durability, held by suppliers of digital platform services;

(d) changes over time in the nature of, characteristics and quality of digital platform services arising from innovation and technological change;

(e) developments in markets for the supply of digital platform services outside Australia.

7 Directions as to holding of the inquiry

(1) Under subsection 95J(6) of the Act, the Commission is directed to do the following in holding the inquiry:

(a) regularly monitor the markets for the supply of digital platform services for changes in the markets, particularly focussing on the matters referred to in section 6 of this instrument; and

(b) give to the Treasurer an interim report on the inquiry by 30 September 2020, and then further interim reports every 6 months thereafter, on:

(i) any changes observed by the Commission in the markets since the last report; and

(ii) any other matter, within the scope of the inquiry, the Commission believes appropriate.

(2) Under subsection 95P(3) of the Act, the Commission is directed not to make available for public inspection, copies of any interim report until the Treasurer, in writing, authorises the Commission to do so.

8 Period for completing the inquiry

For the purposes of subsection 95K(1) of the Act, the inquiry is to be completed, and a report on the matter of inquiry given to the Treasurer, by no later than 31 March 2025.