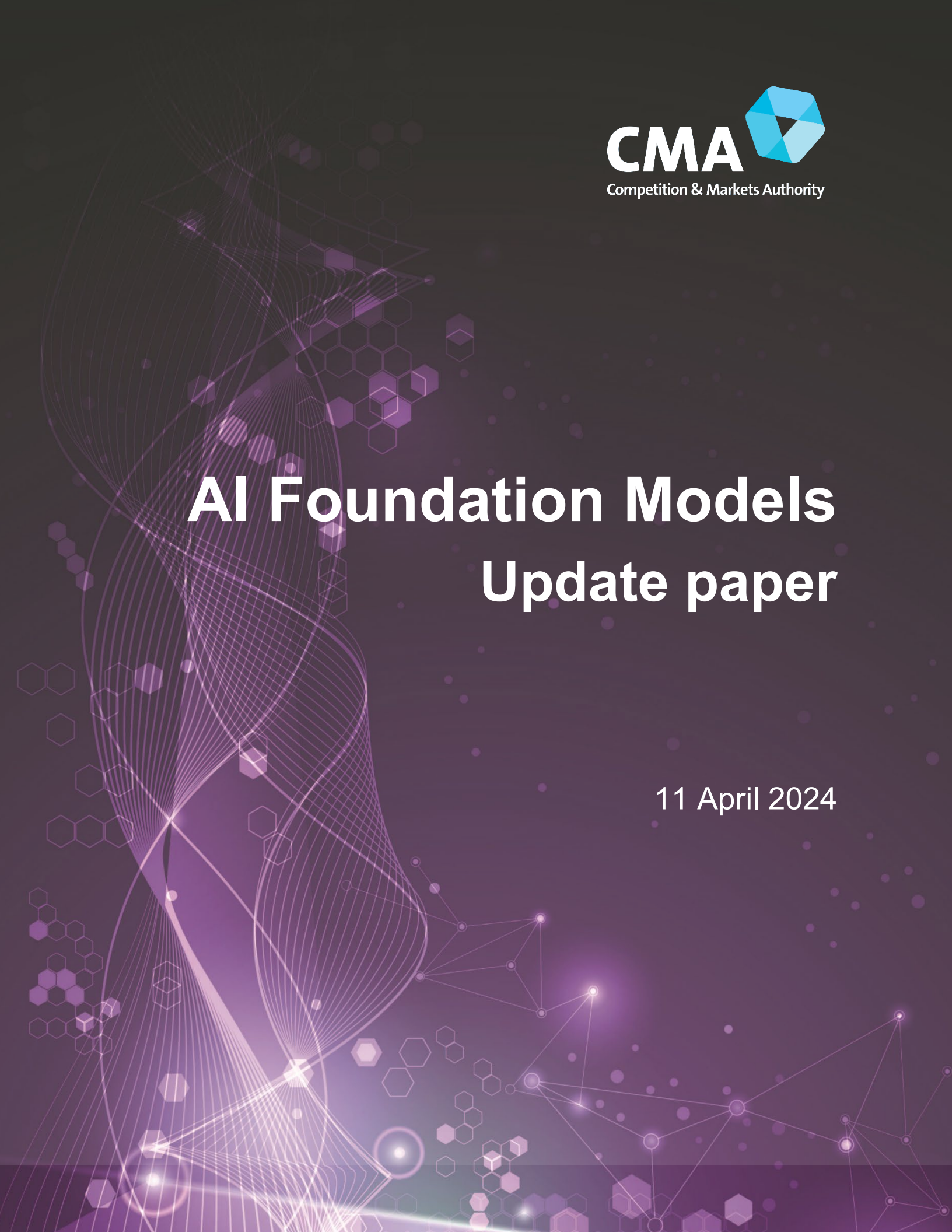


AI Foundation Models

Update paper

11 April 2024

AI Foundation Models: update paper

1. In September 2023, we published a report as part of our initial review of Foundation Models (FMs). In the report, we considered potential impacts on competition and consumer protection and proposed a set of principles to guide the sector towards positive outcomes in both areas.

2. There have since been a range of developments across the FM ecosystem, and we have deepened our understanding of the sector through our own research and continued engagement with stakeholders. We would like to thank all the stakeholders who have engaged with us during this phase of our work. We will shortly publish a separate more detailed technical update report including further detail on market developments since our initial report, along with feedback received from stakeholders as part of this phase of our work.

3. This short update paper provides an overview of how the sector has developed since our report in September 2023 and sets out our updated principles following feedback from stakeholders. We also set out **three key risks to fair, open and effective competition** that we see arising from current and potential developments. **We are concerned that the FM sector is developing in ways that risk negative market outcomes**.

4. In particular, the growing presence across the FM value chain of **a small number of incumbent technology firms, which already hold positions of market power in many of today's most important digital markets, could profoundly shape FM-related markets to the detriment of fair, open and effective competition, ultimately harming businesses and consumers, for example by reducing choice and quality, and by raising prices**.

5. We recognise that today's largest technology firms likely have an important role to play as FM-related markets evolve. These firms can contribute a huge wealth of resources and expertise and, in some cases, have themselves been drivers of innovation in this space.

6. However, the benefits flowing from FM technology for businesses and consumers, in terms of quality, choice, price and the very best innovations, are much more likely in a world where those firms are themselves subject to fair, open and effective competition, rather than one where they are simply able to leverage FMs to further entrench and extend existing positions of power in digital markets.

7. Further, diversity and choice underpin resilience in our economy and avoids over-dependence on a handful of major firms. This is a particularly critical concern considering the breadth of potential use cases for FMs and potentially impacted sectors such as finance, healthcare, education, defence, transport and retail. It is essential to preserve fully independent, competing offerings between different model developers. It is equally important to protect genuine diversity and choice in the deployment of models in any given use case. We think that means encouraging, protecting and preserving sharp-edged competition both from innovative independent players but also, importantly, between the largest incumbents.

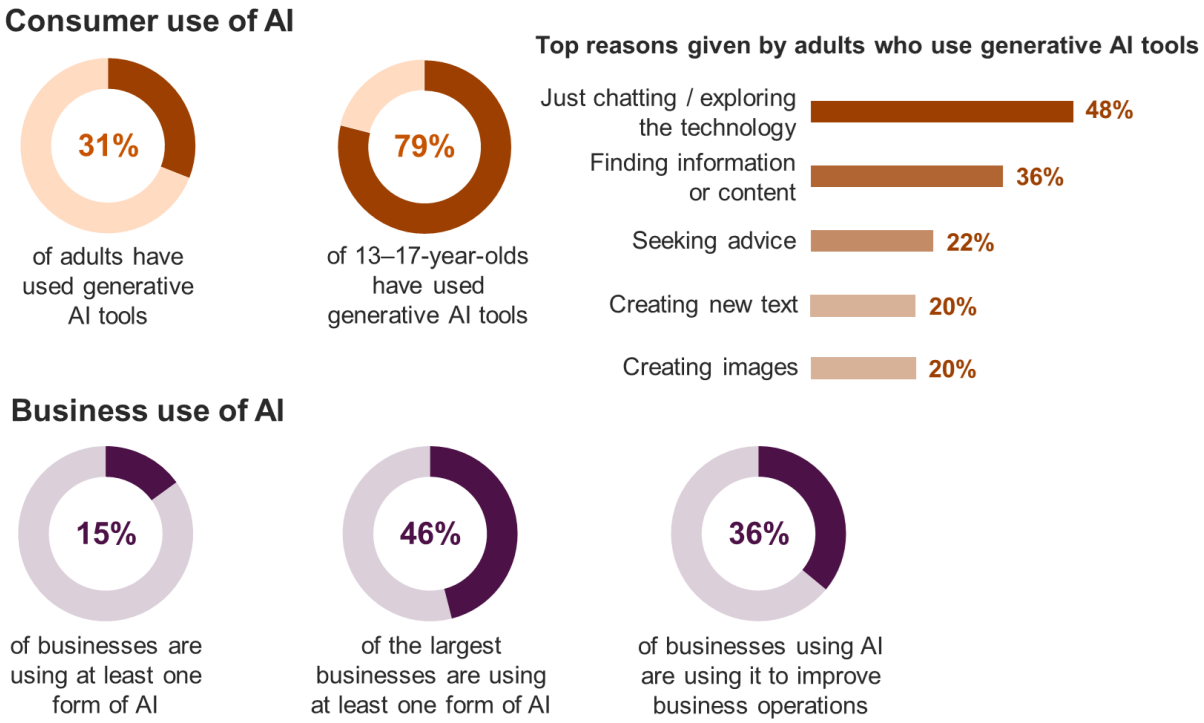
8. We set out in the remainder of this update paper the underlying principles we consider as necessary conditions to ensure fair, open and effective competition, to protect consumers, and to shape positive market outcomes. We also set out the action we are and will consider taking to address the risks we have identified and in light of these underlying principles.

The sector continues to move at pace: key developments since September 2023

Consumers and businesses are increasingly using generative AI

9. **Many people in the UK have tried using generative AI** – research by Ofcom shows that 31% of adults and 79% of 13–17-year-olds in the UK have used a generative AI tool, such as ChatGPT, Snapchat My AI, or Bing Chat (now called Copilot), including in a personal, educational, or professional capacity.[1]

Figure 1 – Summary of research into consumer (Ofcom)[2] and business (ONS)[3] use of AI



10. Recent ONS data shows that around 15% of UK businesses are currently using at least one form of AI cited in the survey, rising to 46% among the largest businesses (250+ staff).[4] The main reason given by businesses using AI was to 'improve business operations', followed by 'provide or personalise a product or service' and 'develop a new product or service or explore a new market.' In

[1] Ofcom (2023) Online Nation 2023 Report
[2] Ofcom (2023) Online Nation 2023 Report
[3] ONS (2024) Business insights and impact on the UK economy, Wave 98 (published in February 2024, reference period of November 2023)
[4] ONS (2024) Business insights and impact on the UK economy, Wave 98 (published in February 2024, reference period of November 2023)

McKinsey's 2023 'State of AI' survey of businesses globally, three-quarters of respondents said they expect generative AI to cause significant or disruptive change in the nature of their industry's competition in the next three years.[5]

There are more FMs available publicly than in September 2023, and they are increasingly complex and capable

11. The number of FMs and capabilities of leading FMs continues to increase. According to the Stanford Center for Research on FMs, over 120 FMs have been released between our initial report in September 2023 and March 2024, bringing the overall number of known FMs globally to over 330.[6]

12. Models are increasingly capable and complex, with many now able to take in and produce text, audio, images, and video outputs ('multimodal' FMs)[7] or process increasing amounts of data (via longer 'context windows').[8] FM developers are also releasing models that are highly specialised for certain tasks, such as coding or mathematics,[9] or are much smaller in size yet potentially equally capable relative to larger models at performing a range of tasks including, in some cases, on consumer devices.[10]

13. OpenAI's GPT-4 is still widely regarded as a leading FM, but new releases from Google and Anthropic claim to match or outperform GPT-4 on a number of benchmarks.[11] However, there is press speculation that OpenAI will release a more capable model later this year.[12] Meanwhile, open-source FMs continue to be developed and released. Notable releases since September 2023 include

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[5] McKinsey (2023) The state of AI in 2023: Generative AI's breakout year

[6] This is a count of FMs that are in the public domain, there may be others that are private. Stanford CRFM (2023) Ecosystem Graphs for Foundation Models.

[7] Google (2024) Introducing Gemini 1.5, Google's next-generation AI model. Apple (2023) Ferret: Refer and Ground Anything Anywhere at Any Granularity. OpenAI (2024) Sora: Creating video from text. Adept (2024) Adept Fuyu-Heavy: A new multimodal model.

[8] Anthropic's Claude 3 has a context window length of 200 thousand tokens (approximately 150 thousand words) – Anthropic (2024) Models overview. Google's Gemini 1.5 has a context window of up to 1 million tokens (over 700 thousand words or 1 hour of video) – Google (2024) Introducing Gemini 1.5, Google's next-generation AI model.

[9] Stability AI (2024) Stability AI (2024) Stable Code 3B: Coding on the Edge. Microsoft (2024) Orca-Math: Demonstrating the potential of SLMs with model specialization

[10] Microsoft (2023) Phi-2: The surprising power of small language models. The H4 Team (2023) Zephyr: Direct Distillation of LM Alignment. Google (2024) Gemma: Open Models Based on Gemini Research and Technology. Stability AI (2023) Introducing Stable LM Zephyr 3B: A New Addition to Stable LM, Bringing Powerful LLM Assistants to Edge Devices.

[11] Google (2023) Gemini: A Family of Highly Capable Multimodal Models. Anthropic (2024) Introducing the next generation of Claude \ Anthropic.

[12] Business Insider (2024) OpenAI Expected to Launch 'Better' GPT-5 for Chatbot Mid-Year

Mistral's Mixtral 8x7b, Google's Gemma, and Cohere's Aya. Open-source FMs remain an important force for competition and innovation.

FM development still hinges on availability of compute, data, and expertise – to which large technology companies typically have greater access

14. **The availability of AI accelerator chips remains constrained, but there are some signs that the market may be diversifying**. There have been numerous reports of difficulties in accessing state-of-the-art AI accelerator chips due to long lead times and constraints in manufacturing capacity. Nvidia continues to be the lead supplier but, since our initial report, a range of competitors (including established chip suppliers Intel and AMD and cloud service providers such as Amazon, Microsoft, and Google) have released or announced the future release of AI chips.[13]

15. **FM developers predominantly access compute via the cloud, including through partnerships**. Access to substantial compute remains critical for developing highly capable FMs. Cloud service providers (including Amazon, Microsoft, and Google) remain a key route to access scarce compute resources required for FM development, and partnerships and strategic investments continue to play an important role in securing access to compute for FM developers.

16. **FM developers are accessing data through partnerships, licensing deals and synthetic routes**. There have been deals between FM developers and owners of proprietary data sources, such as publishers and online forums.[14] We also note that FM developers continue to employ synthetic data in pre-training or fine-tuning.[15] Meanwhile, some FM developers have introduced mechanisms aimed at enabling website owners to control whether their content is accessed by or used to train FMs.[16]

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[13] CNBC (14/12/2023) Intel unveils Gaudi3 AI chip to compete with Nvidia and AMD; AMD (2023) AMD Delivers Leadership Portfolio of Data Center AI Solutions with AMD Instinct MI300 Series; Microsoft (2023) With a systems approach to chips, Microsoft aims to tailor everything 'from silicon to service' to meet AI demand; Google (2023) Introducing Cloud TPU v5p and AI Hypercomputer; Amazon (2023) AWS Unveils Next Generation AWS Designed Chips

[14] Stack Overflow (2024) Stack Overflow and Google Cloud Announce Strategic Partnership to Bring Generative AI to Millions of Developers. OpenAI (2023) Partnership with Axel Springer to deepen beneficial use of AI in journalism.

[15] Microsoft (2023) Phi-2: The surprising power of small language models. Anthropic (2024) Model Card Claude 3. Google (2024) Gemma Report.

[16] Microsoft (2023) Announcing new options for webmasters to control usage of their content in Bing Chat. Google (2023) An update on web publisher controls. OpenAI (2023) GPTBot - OpenAI API.

17. **Firms are fighting to attract expertise.** We are increasingly seeing companies (and often those with the deepest pockets) offering very large financial rewards to attract technical expertise. For example, reports claim that OpenAI offered annual compensation worth up to $10 million to attract AI researchers from Google and that Google responded by offering select researchers stock worth millions of dollars.[17] Furthermore, during a short period of uncertainty around the future of OpenAI's leadership in November 2023, FM developers and deployers took the opportunity to offer jobs to OpenAI staff.[18] The battle for talent has been further demonstrated by Microsoft's recent appointment of the Inflection AI CEO (and other staff) to lead Microsoft's new consumer AI team.[19]

FMs are being released on a range of platforms and integrated in an increasing number of digital products and services, often involving the largest technology firms

18. Distribution of FMs, via release of the models themselves and their integration into other products, is becoming increasingly prevalent as the market evolves towards greater monetisation. Examples of platforms supporting model release include:

    - **Amazon's Bedrock** provides access (both open-source and via APIs) to FMs including from Meta, Anthropic, Stability AI and its own 'Titan' models.[20]
    - **Microsoft's Azure Machine Learning** studio provides access to a range of open-source models as well as exclusive third-party access to OpenAI models.[21]
    - **Google's Vertex AI Model Garden** provides access to FMs developed by Google and Anthropic in addition to many open-source models, including from Mistral and Meta.[22]
    - **Hugging Face**, **GitHub**, and **Kaggle** all host open-source FMs.

19. **FMs continue to be integrated in commonly used digital products and services, including by the largest technology firms** – such as search,

[17] The Information (16/01/2024) Google's Defense Against OpenAI Talent Grab: Special Stock
[18] TechCrunch (21/11/2023) Chaos at OpenAI adds fuel to the AI talent poaching war
[19] Inflection AI (2024) The new Inflection: An important change to how we'll work
[20] Amazon (2024) Build Generative AI Applications with Foundation Models - Amazon Bedrock
[21] Microsoft Azure (2024) Model Catalog and Collections - Azure Machine Learning
[22] Google Cloud (2024) Model Garden

productivity software, social media, and mobile ecosystems. Examples include Google's integration of Gemini into Google Workspace[23] and Microsoft's integration of Copilot (powered by LLMs including OpenAI's GPT-4) into Microsoft 365 and Windows.[24] The largest technology firms are starting to build interconnected ecosystems of FM-powered services across downstream markets where they already hold substantial market power.

20. Future integration of FMs into digital products and services may also involve 'autonomous AI', if developed, in which AI systems complete complex tasks with limited human supervision.[25]

The FM value chain is becoming more interconnected, through a combination of vertical integration, partnerships, and strategic agreements between firms

21. The largest and most established technology firms (many of whom already hold a strong position in related activities) are becoming increasingly active across multiple levels of the FM value chain, including in the upstream supply of critical inputs such as data, compute and technical expertise, model development, and the downstream provision of products and services (such as apps and platforms) to businesses and consumers, allowing them to access and deploy models.

22. This interconnectedness is growing due to greater levels of vertical integration (ie the same firm operating at multiple levels of the value chain) as well as through an increasing number of partnerships, investments and strategic agreements deepening the relationships between firms operating at different levels. These partnerships and agreements may entail direct financial investment, provision of access to key inputs such as data or compute, and/or distribution agreements (in some cases, on an exclusive or priority basis).

23. Figure 2 below shows how Google, Amazon, Microsoft, Meta and Apple (GAMMA) are active across different levels of the FM value chain to varying degrees, including through partnerships and agreements with FM developers.[26]

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[23] Google (2024) Announcing Gemini for Google Workspace

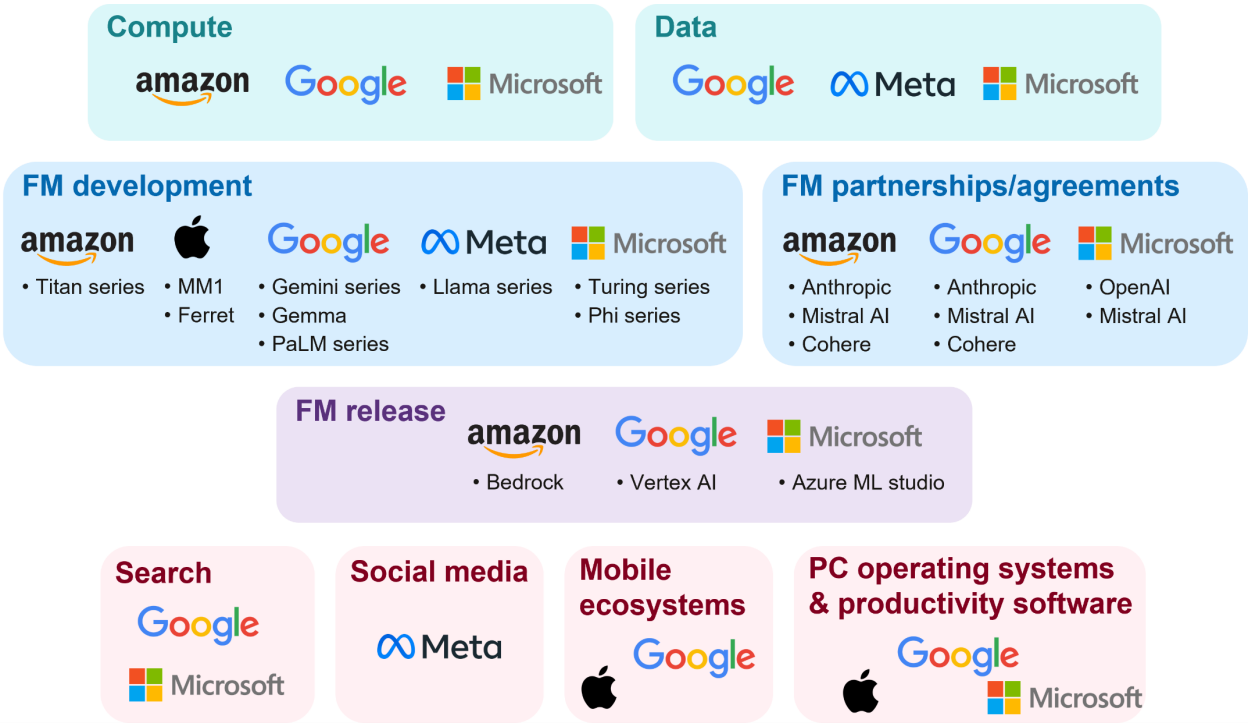
[24] Microsoft (2023) Introducing Microsoft 365 Copilot – your copilot for work, Microsoft (2024) Microsoft Copilot improvements for Windows 11.

[25] These kinds of more autonomous AI systems are also referred to as 'agentic systems' (see OpenAI, December 14 2023, Practices for Governing Agentic AI Systems), 'Agent AI' (see Microsoft, Agent AI - Microsoft Research: Overview), or 'Agentic AI or AI Agents' (see A pro-innovation approach to AI regulation: government response).

[26] Note this diagram is intended to be illustrative of the presence of GAMMA, rather than exhaustive. It includes references to the following partnerships and agreements: Microsoft (2023) Microsoft and OpenAI extend partnership.

These firms often have strong positions in critical inputs for FM development – such as large data sets or AI compute infrastructure at significant scale – and/or key access points or routes to market for FM release and deployment. We are therefore concerned that the largest incumbent technology firms could profoundly shape the development of FM-related markets to the detriment of fair, open and effective competition and ultimately harm businesses and consumers.

Figure 2 - Illustration of the presence of GAMMA firms across the FM value chain[27]



24. Without fair, open and effective competition and strong consumer protection, underpinned by these principles, we see a real risk that the full potential of organisations or individuals to use AI to innovate and disrupt will not be realised, nor its benefits shared widely across society. That is why we have set out the underlying principles that we consider critical to safeguard those conditions. In the remainder of this update paper, we discuss why the principles we propose

Microsoft (2024) Introducing Mistral-Large on Azure in partnership with Mistral AI. Google (2023) Google Announces Expansion of AI Partnership with Anthropic. PYMNTS (13/12/2023) Mistral AI Partners With Google Cloud to Distribute AI Solutions. Cohere (2022) Cohere Is Available on the Google Cloud Marketplace. Amazon (2024) Amazon completes $4B Anthropic investment to advance generative AI. Amazon (2024) Amazon Bedrock adds Mistral AI models. Cohere (2023) Cohere Brings its Enterprise AI Offering to Amazon Bedrock.

[27] This figure is illustrative and non-exhaustive – it is not representative of all possible presence of these firms across the FM value chain nor the deployment markets in which they are active.

are necessary to shape positive market outcomes, as well as the action we are, and will consider, taking to safeguard the conditions for fair, open and effective competition and to protect businesses and consumers in line with those principles. It is essential for competition agencies to work with market participants and other interested stakeholders to shape these positive outcomes.

The CMA's AI Principles are designed to help guide the FM sector towards positive outcomes for consumers, businesses, and the UK economy

25. In our initial report, we proposed a set of principles to guide the FM sector towards positive outcomes for competition and consumer protection. Since publication, we have continued to engage with a range of stakeholders and to reflect on our proposed principles. We set out below our updated principles that take into account stakeholder feedback and the evolution we have seen in the FM sector.

26. **We urge firms to align their business practices with the principles, and to work with us to shape positive market outcomes. In this way, fair, open and effective competition can thrive, and consumers, businesses and wider society can reap the full benefits of this transformative technology.**

Figure 3 - CMA's AI Principles

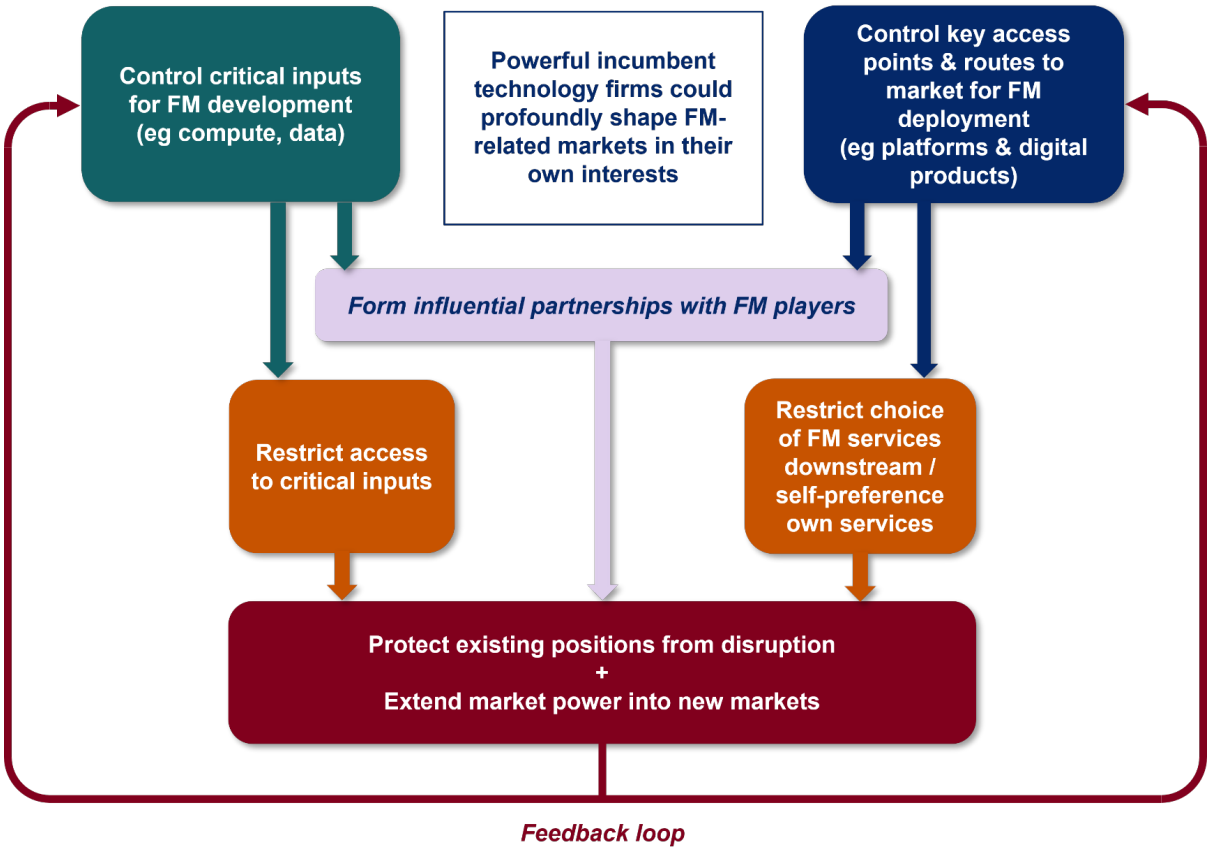
ACCESS *Ongoing ready access to inputs*	• Access to AI data, compute, expertise and funding without undue restrictions • Continuing effective challenge to early movers from new entrants • Successful FM developers do not gain an entrenched and disproportionate advantage by being the first to develop a FM, having economies of scale or benefitting from feedback loops • Powerful partnerships and integrated firms do not reduce others' ability to compete
DIVERSITY *Sustained diversity of business models and model types*	• There are a variety of models available for businesses and consumers to choose from that suit their needs, whether that be for a general purpose or a highly specialised task • Open-source models can help reduce barriers to entry and expansion • Both open and closed source models push the frontier of new capabilities • The market sustains a range of business models • Powerful partnerships and integrated firms do not reduce others' ability to compete
CHOICE *Sufficient choice for businesses and consumers so they can decide how to use FMs*	• A range of deployment options, including in-house FM development, partnerships, APIs or plug-ins • Consumers and businesses can switch and/or use multiple services and are not locked into one provider or ecosystem • Services are interoperable and consumers and businesses can easily extract and port their data between services • Powerful partnerships and integrated firms do not reduce others' ability to compete
FAIR DEALING *No anti-competitive conduct*	• Confidence that the best products and services will win out, and that firms are playing by the rules • No anti-competitive conduct, including anti-competitive self-preferencing, tying or bundling • Vertical integration and partnerships are not used to insulate firms from competition • Competition can counteract any data feedback or first mover effects
TRANSPARENCY *Consumers and businesses have the right information about the risks and limitations of FMs*	• People and businesses are informed of FMs' use and limitations • Developers give deployers the right information to allow them to manage their responsibilities to consumers • Deployers provide the right information to users of FM-based services to allow them to make informed choices, including being clear when an FM-based service is being used
ACCOUNTABILITY *FM developers and deployers are accountable for FM outputs*	• All firms take responsibility for ensuring they help foster the development of a competitive market that gains the trust and confidence of consumers and businesses • Developers and deployers take responsibility for what they control in the value chain and take positive action necessary to ensure consumers are adequately protected. This includes the provision of sufficient transparency to enable others in the value chain to remain accountable and protect consumers

We see three key risks for fair, open and effective competition

27. **We are concerned that the FM sector is developing in ways that risk negative market outcomes**. FMs, and AI more generally, have the potential to boost productivity in many sectors across the economy, to drive innovation in existing markets, and to allow entirely new products and services to be created. FM development so far has been characterised by rapid innovation, with several players pushing technological frontiers and competing intensely to attract investment and talent. However, some of the market trends and developments we have seen may put the sustainability of this competitive process at risk.

28. Our strongest concerns arise from the fact that a small number of the largest incumbent technology firms, who already have market power in many of today's most important digital markets, could profoundly shape the development of FM-related markets to the detriment of fair, open and effective competition and ultimately harm businesses and consumers, for example by reducing choice and quality, and by raising prices. Some of these firms have strong upstream positions in one or more critical inputs for FM development as well as control over key access points or routes to market for downstream FM deployment (either through their firm's own activities or through a network of partnerships and investments). This may pose a particular risk in enabling firms to leverage power through the value chain. At the same time, where firms have market power in other digital markets, this may be threatened by disruption and innovation from AI. This combination could mean that these incumbents have both the ability and incentive to shape the development of FM-related markets in their own interests, which could allow them both to protect existing market power and to extend it into new areas.

Figure 4 - Incumbent technology firms could shape FM-related markets in their own interests



29. Based on our work to date, we see the following three key interlinked risks to fair, open and effective competition:

1. **Firms that control critical inputs for developing FMs may restrict access to them to shield themselves from competition.**
2. **Powerful incumbents could exploit their positions in consumer or business facing markets to distort choice in FM services and restrict competition in FM deployment.**
3. **Partnerships involving key players could reinforce or extend existing positions of market power through the value chain.**

30. We consider each of these risks in turn below, assessing how they would be mitigated by the CMA's principles and identifying the actions we are taking now, and are considering taking in the near future to seek to address these risks.

1. Firms that control critical inputs for developing FMs may restrict access to them to shield themselves from competition

31. Where firms control key inputs for developing FMs, such as compute, data or expertise, they could restrict access to them. They could do this to: (1) prevent other firms from building new, competitive FMs that might challenge their own (or their partners', where relevant); and/or (2) protect their position in related markets, by making it harder for potential rivals in those markets to develop or deploy capable FMs. For example, materially restricting access to key inputs such as compute, data or expertise would prevent challengers from building effective, competitive models. It might also reinforce incumbents' positions in related markets such as search and productivity software, by making it harder for potential rivals there to develop or deploy capable models that could provide the building blocks for a next generation competitive alternative, which could result in reduced choice and quality, as well as increased prices for downstream business customers and consumers.

32. To secure access to compute, we have seen some FM developers form partnerships with major cloud providers (discussed further below); meanwhile, only a handful of firms can rely on their own compute resources. These constraints are exacerbated in a context in which the availability of AI accelerator chips remains limited. We would be concerned if incumbent firms could use control over access to compute to shape FM-related markets in their own interests. In addition, we are increasingly seeing a battle for technical expertise where those with the deepest pockets may win out, making it challenging for non-partnered or non-vertically integrated firms to survive.

33. The CMA's '**Access**' principle reflects the fact that the market is more likely to flourish if there is ongoing ready access to data, compute and expertise, without undue restriction, and if powerful partnerships and integrated firms do not reduce others' ability to compete. The '**Access'** principle can help fair, open and effective competition to flourish for the benefit of businesses and consumers, by facilitating sufficient plurality in FMs, as set out under the '**Diversity'** principle. This includes diversity in the types of FMs being developed, how they are released to consumers and businesses, and the business models that firms may employ.

34. In light of the risk that access to critical inputs could be restricted or used to shape the development of FM-related markets in the interests of incumbent firms, which could also reduce diversity in FM development and deployment, we are:

- Examining the conditions of **competition in the provision of public cloud infrastructure services as part of our ongoing Cloud Market Investigation**. The CMA's independent group of panel experts appointed to conduct that market investigation is considering how the market for cloud services is operating in practice, including assessing the market positions of the main cloud service providers and the characteristics of customers. In addition to analysing a number of indicators, such as shares of supply and barriers to entry and expansion, the investigation will include a forward-looking assessment on the potential impact of FMs on how competition works in the provision of cloud services.

- Examining **Microsoft's partnership with OpenAI** to understand how it could affect competition in various parts of the ecosystem.

- Examining the competitive landscape in **AI accelerator chips** and the impact on the FM value chain as part of the next phase of work on our FMs initial review.

35. As well as using our current range of legal powers, we will take account of developments in FM-related markets as part of our consideration of which digital activities to prioritise for investigation under new powers anticipated in the Digital Markets, Competition and Consumers Bill. Areas of potential consideration could include those digital activities that are critical inputs for developing FMs such as compute, although we are yet to take any provisional decisions on which areas to prioritise for investigation, any designation would be subject to a prior investigation, and in considering compute we would take account of the findings of the Cloud Market Investigation.

2. Powerful incumbents could exploit their positions in consumer or business facing markets to distort choice in FM services and restrict competition in FM deployment

36. Businesses and consumers should be able to exercise free choice over which FM services they use. But their choice could be shaped by the existing digital products they use (such as mobile and other devices, search engines, or productivity software) and which FMs are or become integrated with those

existing products. This is why firms that control such access points and routes to market could gain significant influence over FM deployment.[28] Unchecked control over these access points and routes to market could result in reduced choice, reduced quality, lower levels of innovation and higher prices in FM-powered products and services for business customers and consumers.

37. We have seen that incumbent firms are rapidly integrating FMs into their ecosystems of products and services. For example, Microsoft is deploying its own FMs and those of its partner OpenAI in the Copilot feature integrated in its productivity software (Microsoft Office), PC operating system (Windows) and search (Bing); Google is using its own FM for its Search Generative Experience. These integrations can bring benefits – such as innovation and efficiencies – to businesses and consumers. However, we are concerned about the possibility of restricting businesses' and consumers' ability to choose alternatives and making it harder for rival FMs or downstream applications to compete.

38. In terms of FM development, firms controlling important routes to market may be able to give their own FM services or those of their partners an advantage, through pre-installation, technical bundling, accessibility, integration, and compatibility.

39. In terms of FM deployment, if firms deploying FMs within their products and services gain access to particular leading FMs on exclusive or advantageous terms (for example, through partnerships), this could entrench their positions and impede challenge from rival FM deployers or allow them to extend any market power into new markets. In some cases, this may become exacerbated by feedback loops. For example, if a firm's exclusive or advantageous access to an FM allows it to strengthen its position within a digital domain that generates rich data sets, this could lead it to have greater access to data required for building or improving FMs. For fair, open and effective competition to flourish for the benefit of businesses and consumers, it is vital that there is sufficient diversity in the market. As set out in the CMA's '**Diversity**' principle, this includes the plurality in the types of FMs being developed, how they are released to consumers and businesses, and the business models that firms may employ.

40. For businesses and consumers to enjoy the full benefits of a diversity of FMs and FM services, the CMA's '**Choice**' principle sets out that businesses and

[28] FM platforms or marketplaces (such as Amazon's Bedrock or Google's Vertex AI) are still relatively nascent features of the market; it is possible that in future these are established as mechanisms of control over FM distribution for the firms operating the platforms.

consumers should be able to choose how they use FMs and switch between different options without being locked into one provider or ecosystem. The '**Fair Dealing**' principle emphasises that the best products should win out and not be restricted by anti-competitive bundling, tying or self-preferencing. Together, these principles help ensure that businesses and consumers can freely and fairly choose the best products and services for their particular use case. They are not forced to settle for inferior FMs because they are locked into one provider or ecosystem. Nor are they pushed into using inferior complements with their desired FM through anti-competitive bundling, tying or self-preferencing.

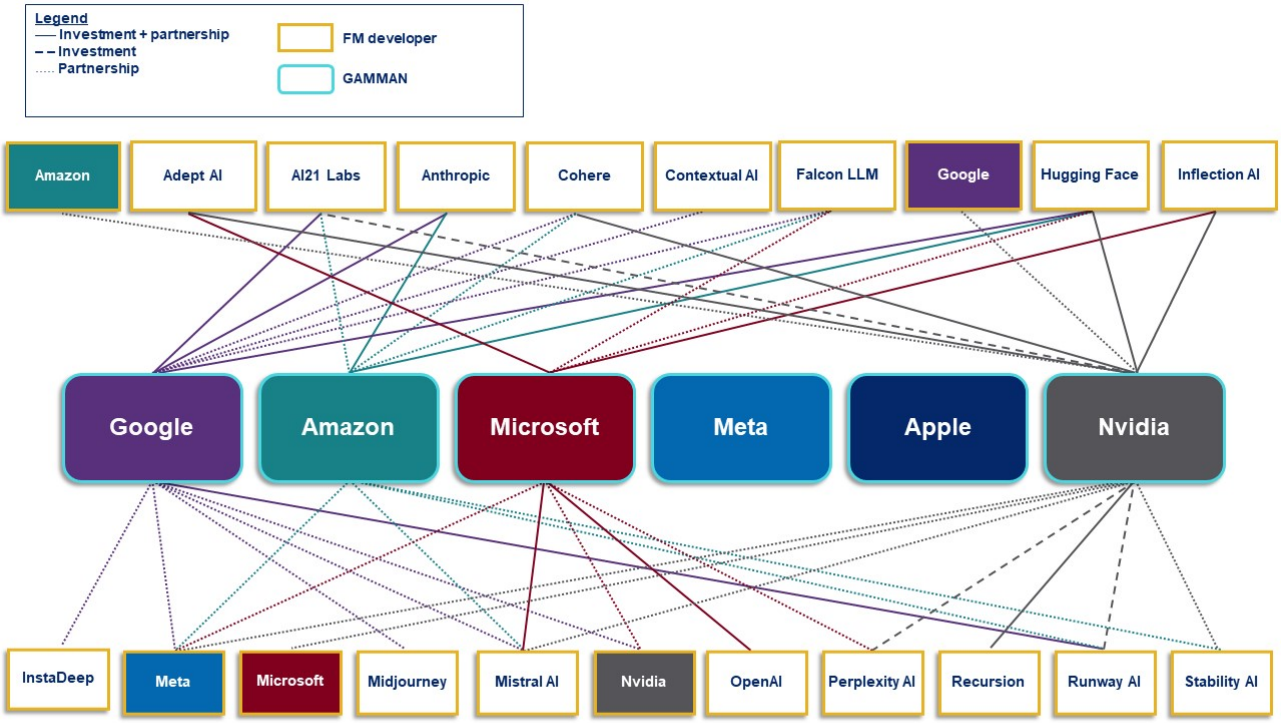
41. In light of the risk that choice in FM services and competition in downstream deployment could be restricted, we will take account of developments in FM-related markets as part of our consideration of which digital activities to prioritise for investigation under new powers anticipated in the Digital Markets, Competition and Consumers Bill. Areas of potential consideration could include those digital activities that are critical access points or routes to market for FM deployment, such as mobile ecosystems, search, and productivity software, although we are yet to take any provisional decisions on which areas to prioritise for investigation and any designation would be subject to a prior investigation.

3. Partnerships involving key players could reinforce or extend existing positions of market power through the value chain

42. In addition to the increasing levels of vertical integration in the FM value chain, we are also seeing a proliferation of partnerships and strategic investments in the FM value chain by the GAMMA firms, as well as Nvidia, the leading supplier of AI accelerator chips (together, "**GAMMAN**"). The GAMMA firms are also making strategic hires of key talent in the sector. The positions of these firms in relation to key inputs for FM development and/or access points or routes to market for FM deployment may give them significant leverage when agreeing partnerships with FM developers and deployers.

43. We have identified an interconnected web of over 90 partnerships involving GAMMAN firms. The diagram below sets out a subset of these partnerships, focusing on relationships between GAMMAN firms and FM developers.

Figure 5 – Relationships between GAMMAN and FM developers[29]



44. We are aware that such partnerships typically form part of the development and investment ecosystem in the technology space – and indeed may be an essential ingredient for the success of independent developers. We understand that they can potentially bring pro-competitive benefits. And each partnership must be assessed on its individual facts and merits.

45. However, we are also vigilant against the possibility that incumbent firms may try to use partnerships and investments to quash competitive threats, even where it is uncertain whether those threats will materialise. In this context it is notable that not all such partnerships and investments will fall within the scope of merger control rules and some may have been structured to seek to avoid them. We consider it important that competition agencies are suitably equipped to take action where these arrangements give rise to competition concerns.

46. In this context, we believe the application of our principles are essential to safeguard fair, open and effective competition. The CMA's '**Access', 'Diversity'** and '**Choice'** principles stipulate that powerful partnerships and integrated firms should not reduce others' ability to compete or steer markets away from a

[29] The relationships mapped here show a partnership and/or investment between a GAMMAN firm and an FM developer partner, where the relationship involves the latter's development or provision of FMs. That FM developer could also be a GAMMAN firm. This is not an exhaustive list of the partnerships which exist in this space.

sustained diversity of business models and model types. Our '**Fair Dealing**' principle makes it clear that vertical integration and partnerships should not be used to insulate firms from competition.

47. In light of the risks arising from strategic partnerships and investments, we are:

- **Monitoring current and emerging partnerships closely**, especially where they relate to important inputs and involve firms with strong positions in their respective markets and FMs with leading capabilities. We will carefully consider current and future investments in, and partnerships with, leading FM developers and assess whether they could give rise to negative outcomes for competition and consumers.

- **Stepping up our use of merger control** to examine whether such arrangements fall within the current rules and, if so, whether they give rise to competition concerns. It may be that some arrangements falling outside the rules are problematic even if not ultimately remediable through merger control. Equally some arrangements may not give rise to competition concerns. We consider it is appropriate to step up our review more generally so that we can start to identify more clearly and coherently which types of partnerships fall within the merger rules and the circumstances in which they may give rise to competition concerns. That will also be of benefit to the businesses involved.

- As one example of that, we are currently **examining Microsoft's partnership with OpenAI**[30] to understand how it could affect competition in various parts of the ecosystem. More generally, we will consider the application of UK merger control to other partnerships and arrangements in this sector in line with the approach outlined above.

48. We have set out below some indicative factors which may drive greater concern, with a focus on partnerships that involve some of these features:[31]

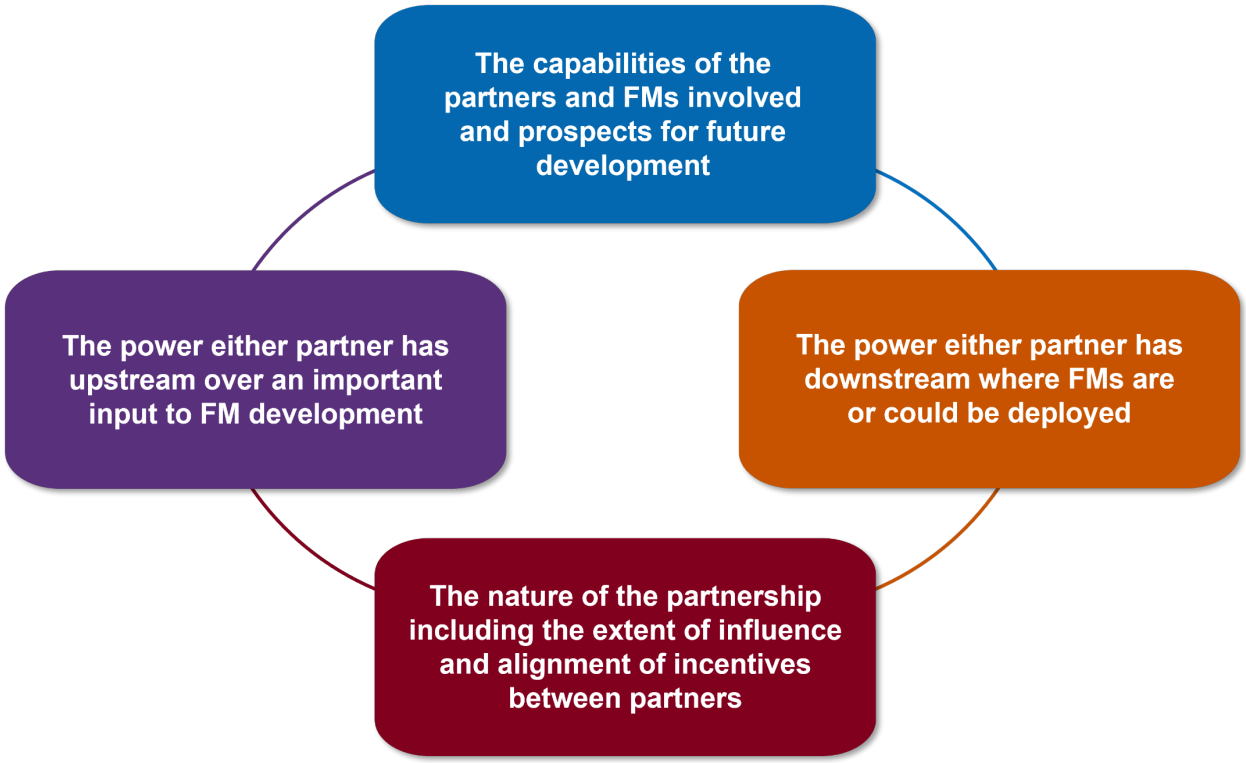
- Either party has existing power upstream over an input critical to model development;

[30] CMA (08/12/2023) CMA seeks views on Microsoft's partnership with OpenAI

[31] These are indicative factors which are likely to evolve as we gain more experience from our review of current and future arrangements.

- Some or all of the models involved are highly capable, with significant future potential;
- Either partner has existing power in downstream markets where models are, or could be, deployed;
- Either party gains influence over the other's development of models and/or deployment downstream, particularly where there is information exchange and scope for incentive alignment between the firms.

Figure 6 – Factors the CMA may consider when assessing the potential impact of partnerships



The market may also develop 'winner-takes-all' dynamics

49. The scale of the threat posed by the three key risks we set out above will also be influenced by structural features present in the FM sector. For instance, if FM-related markets are characterised by high returns to scale of data, high levels of personalisation, or network effects, markets could tip to a single provider or small number of providers, and market power could become entrenched. This could prevent entry or expansion by firms that could offer superior technology or a more attractive customer proposition. Such structural features may not be

present in all FM-related products and services, but some domains in which FMs are being deployed already exhibit these sorts of features.

50. It is therefore important that competition agencies closely monitor developments in the FM sector, including firms' approaches to monetising FMs, the ways in which they are integrating FMs into existing digital products and services, and how they are developing and commercialising entirely new FM-powered products and services. Monitoring such developments will inform our understanding of the structural features of FM-related markets and how these are evolving over time, and will inform the urgency of any action needed to preserve competition, including through our anticipated powers under the Digital Markets, Competition and Consumers Bill.

AI and consumer protection

51. While FMs may benefit consumers by providing higher quality, lower priced and potentially more personalised products and services, they also have significant scope to facilitate unfair consumer practices. Firms could do this deliberately through existing unfair practices such as subscription traps, hidden advertising, or fake reviews, or could develop new ways of acting unfairly towards consumers. Or it could be inadvertent, due to hallucinations or flaws in the technology that produce outputs that mislead consumers and prevent them from making informed choices. We are building our understanding of how consumer protection issues might map on to AI-based products and services, and we are undertaking joint research with fellow Digital Regulation Cooperation Forum (DRCF) members to explore consumers' understanding and use of FM services.

52. One means of addressing the risks to consumers posed by AI is through preventative steps. Our '**transparency'** and '**accountability'** principles make it clear that if consumers and businesses have sufficient information on the benefits and risks of AI products, and if every firm in the value chain takes responsibility for what they control, we are more likely to see positive outcomes for consumers. We will also consider issuing proactive guidance to firms on how to comply with consumer law in AI-related markets if we see uncertainty or particular issues that need clarification.

53. Prevention of consumer harm is not just in the consumer interest – it is also in the interest of business. If consumers lack trust and confidence in AI and AI-driven services, they are less likely to use them and benefit from what they offer, and the innovative and disruptive benefits of organisations or individuals using AI

may not reach its full potential. We have already seen concerning arguments made by businesses that they are not responsible for the outputs of AI-powered tools used on their websites,[32] and similar developments in future could damage consumer trust in AI-related markets.

54. If unfair practices in AI-powered markets emerge, we can also tackle them through enforcement action. The Digital Markets, Competition and Consumers Bill anticipates new powers for the CMA directly to enforce consumer protection law against infringing firms and envisages significant penalties for non-compliance. These penalties may be up to 10% of a firm's worldwide turnover. We are ready to use these new powers to raise standards in the market and, if necessary, to tackle firms that do not play by the rules through enforcement action.

Fair, open and effective competition and consumer protection are key parts of the broader regulatory landscape in relation to AI

55. In the UK, the government recently published its response to the consultation on its AI White Paper including its own proposed cross-sectoral principles.[33] In that response, the UK government called on regulators to outline their strategic approach to AI by 30 April 2024. We will publish a separate response that will draw on the work we have done to date by the end of the month.

56. Our principles are intended to complement the UK Government's approach but are focused (per the CMA's remit) on the development of well-functioning economic markets that work well from a competition and consumer perspective. We are also monitoring key international developments since our initial report, including the White House Executive Order,[34] the EU AI Act,[35] and the Bletchley Declaration.[36]

57. Ongoing regulatory and policy debates on AI cover a range of areas such as safety, data protection and intellectual property which are not directly within the

[32] BBC (22/02/2024) Airline held liable for its chatbot giving passenger bad advice - what this means for travellers
[33] Department for Science, Innovation & Technology (06/02/2024) A pro-innovation approach to AI regulation: government response
[34] White House (30/10/2023) FACT SHEET: President Biden Issues Executive Order on Safe, Secure, and Trustworthy Artificial Intelligence
[35] Provisional agreement announced by the European Council Press (9/12/2023) Artificial intelligence act: Council and Parliament strike a deal on the first rules for AI in the world; MEPs adopted the AI Act on 13 March 2024 - Artificial Intelligence Act: MEPs adopt landmark law.
[36] UK Government (1/11/2023) AI Safety Summit 2023: The Bletchley Declaration

CMA's remit of competition and consumer protection. But we also have an important role to play in these broader debates to ensure the connections with competition and consumer protection concerns are recognised and understood. For example, in its response the consultation on its AI White Paper, the government acknowledged the benefits of open-source for innovation, transparency, and accountability but noted that there is a balance to strike to mitigate potential risks. We consider that there are risks associated with both proprietary and open-source models and that both need effective technical and policy mitigations to be put in place. For competition to flourish and consumer protection to be maintained, however, it remains vital that there is sufficient diversity of products, and we would be concerned if the market did not sustain a range of FMs, including open-source models, over time if that resulted in less choice for consumers and businesses.

58. In our conversations with government and our fellow regulators, we have been exploring and will continue to explore how future policy or regulatory interventions might impact fair, open and effective competition. We see a risk of chilling effects on competition if interventions are so burdensome that only larger firms can comply and raise barriers to entry for smaller firms or for those with disruptive business models. With this in mind, we fully endorse the House of Lords Communications and Digital Committee recommendation that 'market competition' should be an explicit policy objective of the UK Government's work on AI.[37] In line with our principles, any policy interventions should not come at the expense of diversity and choice which are also critical to resilience. We will also be particularly mindful of the risks any interventions might pose to effective consumer protection.

59. At the same time, wider policy or regulatory interventions and competition and consumer objectives can be mutually reinforcing as long as they are targeted and proportionate. Interventions that improve the safety, reliability and accountability of FMs can help foster consumer confidence and stimulate fair, open and effective competition in FM markets. Healthy competition can also help ensure that firms are incentivised to innovate on elements such as safety, accuracy and reliability.

[37] House of Lords Communication and Digital Committee (2024) Large language models and generative AI

We will continue to examine the impact of FMs on competition and consumer protection

60. In addition to the actions set out above to mitigate the risks AI may pose for competition and consumer protection, we will continue our dedicated programme of work to consider the impact of FMs on markets throughout 2024, including:

- A forthcoming paper on AI accelerator chips, which will consider their role in the FM value chain;
- Joint research in the DRCF on consumers' understanding and use of FM services, and participation in the DRCF AI and Digital Hub pilot due for launch in Spring 2024; and
- A joint statement with the ICO on the interaction between competition, consumer protection and data protection in FMs.

61. We will publish a further update on our work in **Autumn 2024.**