Comments to the Competition and Markets Authority on AI Foundation Models

On behalf of the Center for Data Innovation, the following are comments regarding the Competition and Markets Authority's (CMA) initial review of foundation models, their competitive market and use cases, and principles that can guide their development and adoption.

The Center for Data Innovation studies the intersection of data, technology, and public policy. With staff in Washington, London, and Brussels, the Center formulates and promotes pragmatic public policies designed to maximize the benefits of data-driven innovation in the public and private sectors. The Center is part of the Information Technology and Innovation Foundation (ITIF), a nonprofit, nonpartisan think tank.

THE CENTER'S POSITION

Foundation models are AI models, such as large-language models (LLMs), pre-trained on broad data sets to perform different tasks. This technology can already produce realistic text, high-quality images, entertaining music, and error-free code.[1] Regulatory frameworks like the UK's "Pro-Innovation Approach to AI Regulation" will be critical in ensuring the adoption of foundation models applications in health care, education, and entertainment.[2]

The Center would like to commend the CMA for investigating the potential impact of foundation models but also caution that the technology and market for this technology are still in their infancy and rapidly changing. To use an analogy, investigating market competition in AI foundation models today would be equivalent to the CMA investigating the search engine market in 1996when search engines like AltaVista, Excite, Lycos, and Infoseek were popular. As such, the CMA should go slow, not act now, and adhere to the light-touch spirit of the Government's pro-innovation approach to AI.

The following briefly addresses the three key themes of the CMA's initial review—competition in the development of foundation models, the impact foundation models may have on competition in other markets, and consumer protection—and provides other considerations to inform the CMA's approach to implementing the Government's AI white paper.

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[1] Daniel Castro, "Critics of Generative AI Are Worry About the Wrong IP Issues" (Center for Data Innovation, March 2023,) https://datainnovation.org/2023/03/critics-of-generative-ai-are-worrying-about-the-wrong-ip-issues/.

[2] Department for Science, Innovation, and Technology, "A pro-innovation approach to AI regulation," March 29, 2023, https://www.gov.uk/government/publications/ai-regulation-a-pro-innovation-approach/white-paper; Department for Science, Innovation, and Technology and The Rt Hon Michelle Donelan MP, "UK unveils world leading approach to innovation in first artificial intelligence white paper to turbocharge growth," March 29, 2023, https://www.gov.uk/government/news/uk-unveils-world-leading-approach-to-innovation-in-first-artificial-intelligence-white-paper-to-turbocharge-growth.

Competition in the Development of Foundation Models

Foundation models are AI models pre-trained on large amounts of data to perform various tasks.[3] These models can then be fine-tuned with smaller datasets for specific applications.[4] The size and complexity of these models have advanced rapidly: GPT-2 (released in October 2019) had 1.5 billion parameters, GPT-3 (released in June 2020) had 175 billion, and GPT-4 (released in March 2023) is rumored to have 1 trillion.[5] Open AI's ChatGPT has been immensely popular, gaining 100 million users in two months and became the most popular consumer product in history.[6] But despite ChatGPT's success, there are many other competing foundation models for natural language processing, including closed models like PaLM (Google) and Claude (Anthropic) and open models like LLaMa (Meta), YaLM (Yandex), and Dolly (Databricks). There are also a variety of foundation models for image generation (e.g., DALLE 2 and Stable Diffusion), code generation (e.g., Codex), speech recognition (e.g., Whisper), speech synthesis (e.g., VALL-E), music generation (e.g., MusicLM), and many others.[7] Developers are also creating foundation models for specific domains, such as BloombergGPT for the financial industry.[8]

There is significant competition between foundation models, and different models may optimize for different goals. For example, some may be better at producing factual responses, while others are better at understanding context, producing unbiased results, or maintaining consistency across responses. Competitors may also consider other factors, such as optimizing accuracy, speed, and computational costs. Competitors may also build their models around different principles, such as open versus closed models or proprietary versus public training data. Finally, firms may compete not around the product itself but other features, such as different business models, customer experiences, or brand reputations.

Firms may also compete on building foundation models for different tasks (e.g., text generation versus image generation) and for different sectors. For example, a recent review found 80 different clinical foundation models for use in healthcare.[9] These foundation models are

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[3] Rishi Bommasani et.al, "On the Opportunities and Risks of Foundation Models" ArXiv, 2021, https://crfm.stanford.edu/report.html.

[4] Jacob Devlin and Ming-Wei Chang, "Open Sourcing BERT: State-of-the-Art Pre-training for Natural Language Processing," Google Research, November 2, 2018, https://ai.googleblog.com/2018/11/open-sourcing-bert-state-of-art-pre.html; Will Douglas Heaven, "OpenAI's new language generator GPT_3 is shockingly good—and completely mindless," *MIT Technology Review*, July 20, 2020, https://www.technologyreview.com/2020/07/20/1005454/openai-machine-learning-language-generator-gpt-3-nlp/.

[5] Reed Albertgotti, "The Secret History of Elon Musk, Sam Altman, and Open AI," *Semafor*, March 24, 2023, https://www.semafor.com/article/03/24/2023/the-secret-history-of-elon-musk-sam-altman-and-openai.

[6] Krystal Hu, "ChatGPT Sets Record for Fastest-Growing User Base – Analyst Note," Reuters, February 2, 2023, sec. Technology, https://www.reuters.com/technology/chatgpt-sets-record-fastest-growing-user-base-analyst-note-2023-02-01/.

[7] "Ecosystem Graphs," Center for Research on Foundation Models, Stanford University, n.d., https://crfm.stanford.edu/ecosystem-graphs/index.html?mode=table (accessed May 22, 2023).

[8] Shijie Wu et al, "BloombergGPT: A Large Language Model for Finance," arXiv, March 30, 2023, https://arxiv.org/abs/2303.17564.

[9] Michael Wornow, et al., "The Shaky Foundations of Foundation Models in Healthcare," Human-Centered Artificial Intelligence, February 27, 2023, https://hai.stanford.edu/news/shaky-foundations-foundation-models-healthcare.

fundamentally different because they train on different data types, such as electronic health records, clinical notes, insurance claims, and medical images.

Taking preemptive action to regulate competition on foundation models at this stage is premature and could stifle competition between foundation models and hinder the development and adoption of these models for various use cases.

Foundation Models Provide a Building Block for AI in Other Markets

Foundation models provide the building blocks for deploying AI within many different industries, much like cloud computing provides the building blocks for deploying digital services across different sectors.[10] To date, competition in the market has led to quality improvements and low prices through constant innovation. As various sectors begin deploying AI, the UK government should use its multi-regulator sandbox to allow innovators to work with regulators, support the development and adoption of future AI innovations, and promote competition across the UK economy.

Consumer Protection

The CMA should not intervene in the market for foundation models unless it finds evidence of harm to economic welfare. The government's light-touch approach should identify and rectify harmful effects without imposing costs or penalties on harmless actions. Market forces, such as public reputation and civil legal action, as well as existing sector-based regulations, provide strong incentives and accountability measures for companies to ensure that their AI is safe and beneficial to the public interest. While the government's pro-regulatory framework for AI correctly acknowledges the need for sectoral regulation that focuses on the outcomes of AI, it presumes that regulation needs to be the driving force to make safe AI. Promoting market forces to help aid the growth of responsible AI in the UK, as public reputation and private incentives will also be crucial for ensuring safe and effective AI.

ADDITIONAL CONSIDERATIONS FOR REGULATING AI

The CMA should address three additional considerations when implementing the UK's pro-innovation approach for AI to help the UK to benefit from competition in AI and foundation models.[11]

Regulation is Unlikely to Produce Trust or Drive Adoption

Contrary to conventional wisdom, past research illustrates how, beyond a baseline, higher levels of consumer trust have little effect on technology adoption and how regulations designed to

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[10] Patrick Grady and Daniel Castro, "Tech Panics, Generative AI, and the Need for Regulatory Caution" (Center for Data Innovation, May 2023,) https://datainnovation.org/2023/05/tech-panics-generative-ai-and-regulatory-caution/.
[11] Kir Nuthi, "An Overview of the UK's New Approach to AI" (Center for Data Innovation, April 2023,) https://datainnovation.org/2023/04/an-overview-of-the-uks-new-approach-to-ai/.

increase consumer trust are unlikely to result in more innovation and adoption.[12] Rather than assume that more trust is necessary to drive adoption and that regulation spurs trust, the Government and regulators should find ways to benefit their other AI research, development, and adoption strategies in conjunction with implementing the pro-innovation approach to AI.

Lower-Quality Models Do Not Benefit the UK

Because the accuracy and effectiveness of many foundation models can be assessed by measuring outcomes, developing an AI system capable of explaining and justifying its decisions is often unnecessary.[13] Requiring firms to meet an explainability standard would create a barrier to deploying AI, especially foundation models, due to technical challenges. Such a standard could also lead to the UK only having foundation models that are less internationally competitive, less complex, less accurate, and of lower quality.

AI Should Not Be Held to a Higher Standard Than Humans

When benchmarking AI's safe and robust performance, regulators should focus on minimizing risk—not achieving error-free or perfect safety—before over-regulating or over-managing AI risk and holding AI to a higher standard than other technologies and products on the market.[14] When implementing the pro-innovation approach, regulators should develop and enforce minimum safety requirements that do not stifle the adoption of AI technologies.

Recognize Limits to Regulatory Interventions in a Global Market

Many foundation models will be freely available as open source for anyone to modify and use. Others will be developed in foreign countries, outside of the jurisdiction of domestic regulators. As a result, there will be practical limits on how national regulators can unilaterally shape the global market for foundation models or limit the availability of this technology to users.

FURTHER RESOURCES FROM THE CENTER

For further information about the Center's position on generative AI and resources analyzing the UK's pro-innovation approach to AI, please see the following resources:

- Patrick Grady and Daniel Castro, "Tech Panics, Generative AI, and the Need for Regulatory Caution," Center for Data Innovation, May 2023, https://datainnovation.org/2023/05/tech-panics-generative-ai-and-regulatory-caution/.

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[12] Alan McQuinn and Daniel Castro, "Why Stronger Privacy Regulations Do Not Spur Increased Internet Use" (ITIF, July 2018,) https://itif.org/publications/2018/07/11/why-stronger-privacy-regulations-do-not-spur-increased-internet-use/.
[13] Patrick Grady, "The EU Should Clarify the Distinction Between Explainability and Interpretability in the AI Act," Center for Data Innovation, August 31, 2022, https://datainnovation.org/2022/08/the-eu-should-clarify-the-distinction-between-explainability-and-interpretability-in-the-ai-act/.
[14] Daniel Castro, "Ten Principles for Regulation That Does Not Harm AI Innovation" (Center for Data Innovation, February 2023,) https://datainnovation.org/2023/02/ten-principles-for-regulation-that-does-not-harm-ai-innovation/.

- Patrick Grady and Kir Nuthi, "The EU Should Learn From How the UK Regulates AI to Stay Competitive," Center for Data Innovation, April 21, 2023, https://datainnovation.org/2023/04/the-eu-should-learn-from-how-the-uk-regulates-ai-to-stay-competitive/.
- Kir Nuthi, "An Overview of the UK's New Approach to AI" (Center for Data Innovation, April 2023) https://datainnovation.org/2023/04/an-overview-of-the-uks-new-approach-to-ai/.
- Kir Nuthi, "Future-Focused UK Strategy Is a Positive Step for its Tech Regulation," Center for Data Innovation, April 4, 2023, https://datainnovation.org/2023/04/future-focused-uk-strategy-is-a-positive-step-for-its-tech-regulation/.