

Prolog

AI services have become one of the main areas of attention for competition law enforcers, as well as for regulatory authorities and legislators, in recent time, as European citizens increasingly build their daily lives around these products and services. This might lead to entrenched market positions and potential harmful competition behavior which might be difficult to address afterwards. From a competitive perspective, what should the EU do to remain competitive in these digital markets?

One option is that the EU should adopt a proactive and holistic approach to regulating and promoting AI services, considering the specific characteristics and challenges of these markets. Some of the key aspects of such an approach are:

- a) Ensuring a level playing field for all market participants, by preventing unfair practices such as self-preferencing, data hoarding, predatory pricing, or exclusionary conduct by dominant platforms. This may require ex ante interventions, such as imposing interoperability or data portability obligations, or creating regulatory sandboxes for experimentation and innovation.
- b) Fostering innovation and diversity in AI services, by supporting research and development, facilitating access to data and infrastructure, encouraging collaboration and co-creation among stakeholders, and creating a favorable environment for start-ups and SMEs. This may involve investing in public-private partnerships, creating innovation hubs and networks, or providing financial incentives and subsidies. There is feasibility study available from the [LEAM initiative](#) in Germany to support such an initiative. The key finding is that none of the corporations in the EU on it's own can take the financial risk to invest in an infrastructure and services, like the megascaler can do today. The investment needed might be in the three digit billion euros or 100 billion euros a year.
- c) Protecting the rights and interests of consumers and citizens, by ensuring that AI services are trustworthy, transparent, accountable, and respectful of fundamental values and principles. This may entail setting ethical standards and guidelines, establishing oversight and enforcement mechanisms, or empowering users with information and choice.
- d) Enhancing the digital sovereignty and resilience of the EU, by developing its own capabilities and competencies in AI services, diversifying its sources and suppliers, and reducing its dependence on foreign actors. This may require strengthening its strategic autonomy and leadership, enhancing its digital infrastructure and security, or fostering its digital literacy and skills.

Questions

1. What are the main **components** (i.e., inputs) necessary to build, train, deploy and distribute generative AI systems?

Please explain the importance of these components by their importance.

Generative AI systems are a type of artificial intelligence that can create new content or data based on some input. To build, train, deploy and distribute generative AI systems, the main components are:

- a) **Data:** This is the input that the generative AI system uses to learn from and generate new content. Data can be in various forms, such as text, images, audio, video, etc. The quality and quantity of data affect the performance and diversity of the generative AI system.

- b) **Model:** This is the algorithm or architecture that defines how the generative AI system processes the data and creates the output. There are different types of models, such as generative adversarial networks (GANs), variational autoencoders (VAEs), transformers, etc. The choice of model depends on the task and the data domain.
- c) **Hardware:** This is the physical device or platform that runs the generative AI system. Hardware can be a computer, a server, a cloud service, a mobile device, etc. The hardware determines the speed and efficiency of the generative AI system. Most of the improvements in AI are possible due to the advances of computing power getting cheaper every year. By introducing a computing power tax this would help to reduce the impact on the environment.
- d) **Software:** This is the program or application that implements the generative AI system and provides the user interface. Software can be a library, a framework, a tool, a website, an app, etc. The software enables the user to interact with the generative AI system and customize its settings and parameters.

These components are important because they affect the quality, functionality, usability, and scalability of the generative AI system. A good generative AI system should have a balanced combination of these components to achieve its goals and meet its users' needs.

2. What are the main **barriers** to entry and expansion for the provision, distribution, or integration of generative AI systems and/or components, including AI models?

Please indicate to which components they relate.

Some of the main barriers to entry and expansion for the provision, distribution, or integration of generative AI systems and/or components, including AI models, are:

- a) **Data availability and quality:** Generative AI systems require large amounts of high-quality data to train and fine-tune their models, which may not be easily accessible or affordable for some providers, distributors, or integrators. Moreover, data privacy, copyright restrictions and security issues may limit the sharing and use of sensitive or personal data for generative AI purposes. Data availability and quality affect all components of generative AI systems.
 - b) **Technical expertise and resources:** Generative AI systems involve complex and sophisticated algorithms and architectures that require advanced technical skills and knowledge to develop, deploy, and maintain. Additionally, generative AI systems may demand high computational power and storage capacity, which may not be available or affordable for some providers, distributors, or integrators. Technical expertise and resources affect all components of generative AI systems.
 - c) **Ethical and social implications:** Generative AI systems have the potential to generate realistic and convincing content that may be used for malicious or deceptive purposes, such as misinformation, fraud, or identity theft. Moreover, generative AI systems may raise ethical and social concerns regarding the ownership, authorship, and accountability of the generated content, as well as the potential biases, harms, or risks that may arise from the use or misuse of generative AI systems. Ethical and social implications affect mainly the provision and distribution of generative AI models and content.
3. What are the main drivers of **competition** (i.e., the elements that make a company a **successful** player) for the provision, distribution, or integration of generative AI systems and/or components, including AI models?

The provision, distribution, or integration of generative AI systems and/or components, including AI models, is a highly competitive market that requires several factors to succeed. Some of the main drivers of competition are:

- a) The **quality** and **diversity** of the generated **content**: The ability to produce realistic, novel, and relevant content that meets the needs and expectations of the customers is essential for attracting and retaining them. The content should also be original, creative, and ethical, avoiding plagiarism, bias, or harm.
- b) The **scalability** and **efficiency** of the generative AI systems: The ability to handle large volumes of data and requests, as well as to optimize the use of resources and reduce costs, and minimizing the environmental impact is crucial for maintaining a competitive edge. The generative AI systems should also be adaptable and flexible, allowing for customization and personalization of the content according to the customers' preferences and goals.
- c) The **accessibility** and **usability** of the generative AI systems and/or components, which influence their adoption, satisfaction, and retention among potential customers and users.
- d) The **security** and **reliability** of the generative AI systems: The ability to protect the data and the content from unauthorized access, manipulation, or theft, as well as to ensure the availability and functionality of the generative AI systems, is vital for building trust and loyalty among the customers. The generative AI systems should also be transparent and accountable, providing clear explanations and evidence of the content generation process and outcomes.
- e) The security and ethics of the generative AI systems and/or components, which ensure their **compliance** with legal, social, and moral standards and expectations.

These drivers of competition are interrelated and dynamic, as they depend on the state of the art, the customer demand, and the regulatory environment of the generative AI market.

4. Which **competition issues** will likely emerge for the provision, distribution, or integration of generative AI systems and/or components, including AI models?

Please indicate to which components they relate.

Some competition issues for generative AI systems and/or components are:

- a) The risk of market concentration or dominance by a few large providers of generative AI models or platforms, which could limit the diversity, quality, and innovation of generative AI applications.
- b) The potential for unfair or discriminatory practices by generative AI providers or users, such as manipulating or biasing the data, models, or outputs to favor certain outcomes or groups over others.
- c) The challenges of ensuring interoperability and compatibility among different generative AI systems and components, which could affect the efficiency, reliability, and security of generative AI applications.
- d) The difficulties of establishing clear and consistent standards and regulations for the development, deployment, and evaluation of generative AI systems and components, which could create uncertainty, confusion, or barriers for generative AI providers and users.

5. How will generative AI systems and/or components, including AI models likely be monetized, and which components will likely capture most of this **monetization**?

Generative AI systems and/or components, including AI models, can be monetized in various ways, such as:

- a) **Licensing fees:** charging users for accessing or using the system or component, either per use, per time period, or per feature. A licensing fee for using the model if the model would be protected by copyrights or patents.
- b) **Subscription fees:** offering users a recurring payment plan to access or use the system or component, usually with different tiers of features or benefits.
- c) **Advertising fees:** displaying ads to users within or alongside the system or component, either based on user preferences, system output, or external factors.
- d) **Data fees:** selling or sharing the data collected or generated by the system or component, either to other users, third parties, or the public.
- e) **Service fees:** providing users with additional services related to the system or component, such as customization, maintenance, support, training, or consulting.

The components that will likely capture most of this monetization are those that are:

- f) **Unique:** offering a novel or distinctive functionality, quality, or experience that is not easily replicated by competitors or substitutes.
- g) **Valuable:** delivering a high level of value, utility, or satisfaction to users, either by solving a problem, fulfilling a need, or enhancing a situation.
- h) **Scalable:** capable of serving a large number of users, either by expanding the capacity, reach, or scope of the system or component, or by reducing the cost, complexity, or risk of its operation.

6. Do **open-source** generative AI systems and/or components, including AI models, compete effectively with proprietary AI generative systems and/or components?

Please elaborate on your answer.

Open-source generative AI systems and/or components, such as GPT-4, Hugging Face, and TensorFlow, have some advantages over proprietary AI generative systems and/or components, such as Microsoft Azure, IBM Watson, and Amazon Lex.

Some of these advantages are:

- a) **Accessibility:** Open-source generative AI systems and/or components are usually free or low-cost and can be accessed by anyone with an internet connection and a compatible device. Proprietary generative AI systems and/or components may require a subscription fee, a license agreement, or a specific hardware configuration to use.
- b) **Transparency:** Open-source generative AI systems and/or components allow users to inspect, modify, and share the source code, data, and algorithms behind the generation process. Proprietary generative AI systems and/or components may not disclose how they generate content, what data they use, or what biases they may have.
- c) **Innovation:** Open-source generative AI systems and/or components foster a collaborative and diverse community of developers, researchers, and users who can contribute to the improvement, extension, and evaluation of the generation capabilities. Proprietary generative AI systems and/or components may limit the participation and feedback of external stakeholders or protect their intellectual property rights.

However, open-source generative AI systems and/or components also face some challenges in competing with proprietary generative AI systems and/or components. Some of these challenges are:

- d) **Quality:** Open-source generative AI systems and/or components may not have the same level of quality assurance, testing, or support as proprietary generative AI systems and/or components. Proprietary generative AI systems and/or components may have more resources, expertise, and incentives to ensure the reliability, accuracy, and safety of their generation outputs.
- e) **Security:** Open-source generative AI systems and/or components may be more vulnerable to hacking, misuse, or abuse by malicious actors who can exploit the openness of the code, data, or algorithms. Proprietary generative AI systems and/or components may have more robust security measures, such as encryption, authentication, or monitoring, to protect their generation assets.
- f) **Regulation:** Open-source generative AI systems and/or components may face more legal and ethical issues in complying with the laws and norms of different jurisdictions, sectors, or domains that regulate the generation of content. Proprietary generative AI systems and/or components may have more leverage, influence, or flexibility in negotiating with regulators, policymakers, or stakeholders on the acceptable use of their generation services.

7. What is the role of **data** and what are its relevant characteristics for the provision of generative AI systems and/or components, including AI models?

Data is the **raw material** that feeds generative AI systems and/or components, such as text, images, audio, video, etc.

- a) As data is the most important asset for generative AI, today there is very little or no reward for content publishers if their data is being reused by generative AI systems. The EU could create a law which protects the intellectual properties by ensuring a reward model for the creators of the content. This model could be like GEMA fee for music today. A legal framework for all internet content needs to be developed to incentivize content creators in a fair and effective way. This way all the following aspects might be easier to accomplish, as more people will participate in the value creation process, not only the large companies providing the necessary compute power for AI systems. This could lead to a democratization of the AI systems globally. A legally backed [reward based crowdfunding](#) model might have the best acceptance option worldwide.
- b) Another way of reusing content is by providing digital rewards for the content creators whenever their content is being used for training of AI models plus the content is being exposed via the algorithm to the customers of the AI service. This would create a reverse model of the [digital rewards](#) as they exist today in the marketing industry.
Furthermore:
- c) Data needs to be relevant, representative, diverse, and unbiased for the intended domain and task of the generative AI system and/or component.
- d) Data needs to be high-quality, accurate, complete, consistent, and reliable to ensure the validity and reliability of the generative AI system and/or component.
- e) Data needs to be secure, ethical, and compliant with the applicable laws and regulations to protect the privacy and rights of the data owners and users.
- f) Data needs to be processed, cleaned, labeled, augmented, and transformed to make it suitable for the generative AI system and/or component.
- g) Data needs to be analyzed, explored, visualized, and understood to discover patterns, insights, and features that can enhance the generative AI system and/or component.

8. What is the role of **interoperability** in the provision of generative AI systems and/or components, including AI models?

Is the lack of interoperability between components a risk to effective competition?

Interoperability is the ability of different AI systems and/or components to exchange and use information effectively.

- a) Interoperability can facilitate the provision of generative AI systems and/or components by enabling reuse, integration, and adaptation of existing AI models and data sources.
- b) Interoperability can also enhance the quality, reliability, and performance of generative AI systems and/or components by allowing for validation, verification, testing, and benchmarking across different platforms and environments.
- c) Interoperability can foster innovation, collaboration, and competition in the generative AI domain by lowering the barriers to entry, reducing the costs of development and deployment, and increasing the diversity and availability of generative AI solutions.
- d) The lack of interoperability between components can pose a risk to effective competition by creating lock-in effects, increasing switching costs, reducing consumer choice, and hindering market access for new entrants and smaller players.

9. Do the **vertically integrated** companies, which provide several components along the value chain of generative AI systems (including user facing applications and plug-ins), enjoy an advantage compared to other companies? Please elaborate on your answer.

Vertically integrated companies have an advantage in generative AI systems because:

- a) They can **control** the quality and compatibility of the components along the value chain.
- b) They can **reduce** the costs and risks of outsourcing or relying on third-party providers.
- c) They can **leverage** their data and expertise to create more innovative and customized solutions.
- d) They can capture more **value** and market share by offering end-to-end services.

10. What is the rationale of the **investments** and/or **acquisitions** of large companies in small providers of generative AI systems and/or components, including AI models?

How will they affect competition?

Here are my bullet points:

- a) Large companies may invest in or acquire small providers of generative AI systems and/or components to gain access to their innovative technologies, talent, data, or customers.
- b) Large companies may also seek to consolidate their market position, diversify their product portfolio, or preempt potential competitors by acquiring small providers of generative AI systems and/or components.
- c) The effects of these investments and/or acquisitions on competition may vary depending on the market structure, the degree of innovation, and the regulatory environment.

Some possible effects are:

- d) Increased barriers to entry for new entrants or smaller rivals who may face higher costs, reduced access to data or customers, or lower incentives to innovate.

- e) Reduced consumer choice or quality as large companies may have more market power, less pressure to innovate, or less incentive to protect consumer privacy or security.
- f) Enhanced consumer welfare or social benefits as large companies may have more resources, scale, or expertise to improve the quality, reliability, or accessibility of generative AI systems and/or components.

11. Do you expect the **emergence** of generative AI systems and/or components, including AI models to trigger the need to adapt EU legal antitrust concepts?

Generative AI systems and/or components, such as AI models, are likely to have a significant impact on the competitive dynamics of various markets and sectors.

- a) The emergence of these technologies may pose new challenges and opportunities for the enforcement of EU antitrust law, which aims to prevent and sanction anti-competitive practices and mergers that distort the internal market.

Some of the possible issues that may arise from the use of generative AI systems and/or components include:

- b) The creation of dominant positions or market power by firms that own or control large datasets or AI models that are essential for innovation or competition.
- c) The coordination or collusion among competitors through the use of AI models that generate prices, outputs, strategies or other market parameters.
- d) The exclusion or foreclosure of rivals or potential entrants by firms that leverage their AI capabilities to create barriers to entry or expansion, or to engage in predatory or discriminatory practices.
- e) The exploitation or abuse of consumers or other stakeholders by firms that use AI models to manipulate preferences, behaviors, choices, or outcomes.

Therefore, it is possible that the emergence of generative AI systems and/or components will trigger the need to adapt EU legal antitrust concepts, such as the definition of relevant markets, the assessment of market power, the identification of anti-competitive agreements or conduct, and the evaluation of efficiencies and consumer welfare effects.

12. Do you expect the emergence of generative AI systems to trigger the need to adapt EU antitrust **investigation tools** and practices?

The emergence of generative AI systems poses new challenges and opportunities for EU antitrust investigation tools and practices.

- a) Generative AI systems can create, modify, or optimize content, products, or services that may affect the competitive dynamics of the market.
- b) EU antitrust authorities need to adapt their investigation tools and practices to ensure that they can effectively detect, assess, and remedy any anticompetitive conduct or harm caused by generative AI systems.

Some possible adaptations include:

- c) Developing new methods and criteria to identify and measure the market power and impact of generative AI systems.
- d) Enhancing the technical capabilities and expertise of the antitrust staff to understand and evaluate the functioning and performance of generative AI systems.

- e) Establishing clear and consistent rules and guidelines for the use and disclosure of generative AI systems by market participants.
- f) Cooperating and coordinating with other regulators and stakeholders to ensure a coherent and consistent approach to generative AI systems across different sectors and jurisdictions.