

Artificial Intelligence (AI): New Developments and Innovations applied to E-Commerce

Challenges to the functioning of the Internal Market

The [original full study](#)¹ discusses the opportunities and challenges brought by the recent and the foreseeable developments of Artificial Intelligence into online platforms and marketplaces. The paper advocates the importance to support trustworthy, explainable AI (in order to fight discrimination and manipulation, and empower citizens), and societal-aware AI (in order to fight polarisation, monopolistic concentration and excessive inequality, and pursue diversity and openness).

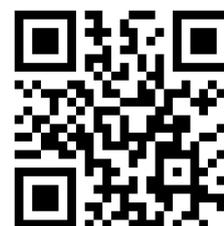
Background

Artificial Intelligence (AI) is becoming an essential component in all sectors of today's economy, with a significant impact on our private, social, and political lives. AI refers to an ecosystem of models and technologies for **perception, reasoning, interaction** and **learning**. The return of AI to the limelight is mainly related to *learning from data*, **Machine Learning (ML)**, that made a jump ahead with the emergence of **Big Data**. The mix is threefold: data reach the critical mass of examples to learn from, algorithms discover predictive patterns hidden in the data, the high-performance architectures succeed to provide the computing and storage resources needed. Based on this mix, AI managed to successfully tackle **long-standing open challenges**, such as understanding of texts and speech, recognition of the content of images and video, and other tasks believed to require intelligence. Approximately ten years ago, it was noticed that some long-known learning models, hitherto ineffective to the mentioned tasks, if generalised and trained on large sets of example data, can make a qualitative leap and learn, from the pixels of the example images or from the words of the example texts, the general "concepts" to recognise and classify accurately new images and new texts.



The current stage of development of AI exhibits strengths and weaknesses. On the one hand, the learning capacity of AI models is growing, bringing extraordinary progress in robotic vision and autonomous driving, in automated text and speech translation, in medical diagnosis, in risk assessment, in predictive maintenance. On the other hand, the gap with other aspects of AI is growing, in particular, with **reasoning** and **person-machine interaction**, central aspects for the development of a human, ethical, and anthropocentric AI, that is the focus of the European approach. The opacity and nature of black boxes of AI models are growing, together with the risk of creating systems exposed to biases in training data, systems that even experts fail to understand. **Tools are missing** to allow AI developers to certify the **reliability** of their models.

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It is crucial to inject into AI technologies, ethical values of **fairness** (how to avoid unfair and discriminatory decisions), **accuracy** (how to provide reliable information), **confidentiality** (how to protect the privacy of the involved people) and **transparency** (how to make models and decisions comprehensible to all stakeholders). This **value-sensitive design** approach, yet to be fully operationalised, is strongly needed for boosting widespread social acceptance of AI, without inhibiting its power.

Furthermore, as increasingly complex sociotechnical systems emerge, consisting of many interacting people and intelligent and autonomous systems, AI acquires an important **societal dimension**. A key observation is that **a crowd of intelligent individuals (assisted by AI tools) is not necessarily an intelligent crowd**. On the contrary, it can be stupid in many cases, because of undesired, unintended **network effects** and **emergent aggregated behaviour**. Examples abound in contemporary society. For example, using a car navigation to avoid a traffic jam on the main route can cause additional jams in the local alternative routes. In the field of opinion formation and diffusion, a crowd of citizens using **social media** as a source of information is subject to the **algorithmic bias of the platform's recommendation mechanisms** suggesting personalised content. This bias will create echo chambers and filter bubbles, sometimes induced in an artificial way, in the sense that without the personalisation bias the crowd would reach a common shared opinion. Recommendations provided by AI systems may make sense at an individual level but they may result in undesired collective effects of information disorder and radicalisation.

The flow of information reaching us via the online media platforms and ecommerce marketplaces is optimised not by the information content or product quality but by **popularity** and **proximity to the target**. This is typically performed in order to maximise platform usage. The **recommendation algorithms** suggest the interlocutors, the products and the contents at which we get exposed, based on matching profiles, promoting the most popular choices for people similar to us. As a result, we observe the appearance of the "**rich get richer**" phenomenon: popular users, contents and products get more and more popular. In the online marketplaces this would mean that a few businesses get the biggest share of the market while many have to share the rest. These businesses become the hubs of the network, gathering most of users' purchases to the detriment of the vast majority. In the social media, that would mean that certain popular peers or contents gather all the user's attention, becoming the hubs of the social network. As a consequence of **network effects** of AI recommendation mechanisms for online marketplaces, search engines and social networks, the **emergence of extreme inequality** and **monopolistic hubs** is artificially amplified, while **diversity of offers** and easiness of **access to markets** are artificially impoverished.

Key findings

There is a wide consensus that AI will bring forth changes that will be much more profound than any other technological revolution in human history. Depending on the course that this revolution takes, AI will either empower our ability to make more informed choices or reduce human autonomy; expand the human experience or replace it; create new forms of human activity or make existing jobs redundant; help distribute well-being for many or increase the concentration of power and wealth in the hands of a few; expand democracy in our societies or put it in danger. Our generation carries the responsibility of shaping the AI revolution. The choices we face today are related to fundamental ethical issues about the impact of AI on society, in particular, how it affects labour, social interactions, healthcare, privacy, fairness, security and markets.

The current technological advancements and developments of AI that can occur in the near future, if driven along the path of a **human-centric AI**, could represent an important transformation factor for ecommerce/digital services and for the Internal Market. Novel AI platforms for ecommerce and digital services based on human-centric AI interaction mechanisms have the potential to **mitigate monopolistic concentration**, deliver more **open and resilient markets**, and better connect the diverse demands of European consumers to the diverse offer of European products and services, by fostering **diversity "by-design"**. A new generation of AI-based recommendation and interaction mechanisms may help departing from the current purely "advertisement-centric" model, focusing on the interests of platforms in maximising intermediation revenues, to a systemic approach where focus is on the interest of citizens in accessing and sharing of high quality contents, the interest of consumers to broaden their choices and opportunities, and the interest of advertisers in broadening their audience and customer base.

Within this landscape, the European strategy for the next-generation digital services and online platforms is of utmost importance, with impacts that will go far beyond consumer protection, towards shaping the digital society that will emerge.

Coherently with the recent strategic white paper of the European Commission “*On Artificial Intelligence – A European approach to excellence and trust*”, we recommend to develop the European provisions on Artificial Intelligence in the area of e-commerce and digital services - in the context of reforming the E-commerce Directive and introducing the Digital Services Act - with the aim to address and exploit the transformative impact of upcoming human-centric AI developments, to the purpose of social progress. Accordingly, our proposed **recommendations to EU policymakers** follow a double line of reasoning and interventions: **topic-wise**, and **instrument-wise**.

Topic-wise, it is crucial to address and operationalise the following challenges,

- **trustworthy, explainable AI** in order to **fight novel forms of discrimination and manipulation** and **empower citizens**;
- **societal-aware AI** in order to **fight polarisation and inequality** and **pursue diversity and openness**.

Instrument-wise, it is important to realise that the scientific and technological landscape is not yet fully mature to address all the open challenges discussed here. Therefore a mix of policies is needed, that tackle the problem at three levels,

- a bold **EU investment in fundamental and applied research in human-centric AI**;
- a bold **EU investment in creating novel online platforms and digital services** embodying human-centric AI mechanisms (and/or supporting the scaling of existing coherent initiatives);
- a coherent set of **EU regulations concerning AI, big data and digital services**, designed not only to seize the opportunities and mitigate risks, but also to inspire research and development in AI, big data and digital platforms towards an inclusive, equal and diverse society.



¹ [https://www.europarl.europa.eu/RegData/etudes/IDAN/2020/648791/IPOL_IDA\(2020\)648791_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/IDAN/2020/648791/IPOL_IDA(2020)648791_EN.pdf)

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Administrators responsible: Mariusz MACIEJEWSKI, Christina RATCLIFF; Editorial assistant: Irene VERNACOTOLA
Contact: Poldep-Economy-Science@ep.europa.eu
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