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Opinion of the European Economic and Social Committee on Artificial intelligence — The consequences of artificial intelligence on the (digital) single market, production, consumption, employment and society (own-initiative opinion)

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Opinion of the European Economic and Social Committee on 'Artificial intelligence — The consequences of artificial intelligence on the (digital) single market, production, consumption, employment and society'

(own-initiative opinion)

(2017/C 288/01)

Rapporteur: Catelijne MULLER

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Section responsible	Single Market, Production and Consumption
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1. Conclusions and recommendations

1.1 Artificial intelligence (AI) is currently undergoing a number of important developments and is rapidly being applied in society. The AI market amounts to around USD 664 million and is expected to grow to USD 38,8 billion by 2025. As AI can have both a positive and a negative impact on society, the EESC has undertaken to closely monitor developments surrounding AI, not only from a technical perspective but also specifically from an ethical, safety and societal perspective.

1.2 As the representative of European civil society, the EESC will shape, focus and promote the public debate on AI in the coming period, involving all relevant stakeholders: policy-makers, industry, the social partners, consumers, NGOs, educational and care institutions, and experts and academics from various disciplines (including AI, safety, ethics, economics, occupational science, law, behavioural science, psychology and philosophy).

1.3 Although important, the discussion on superintelligence is currently predominating and this is overshadowing the debate on the impact of the current applications of AI. Therefore, the task and objective of this process will, among other things, be to enhance and broaden knowledge of AI and thereby feed into an informed and balanced debate free of worst-case scenarios and extreme relativism. In this connection, the EESC will undertake to promote the development of AI for the benefit of humanity. Nevertheless, an important task and objective of this process is also to recognise, identify and monitor disruptive developments in and around the development of AI, in order to be able to address them adequately and in good time. This will lead to increased social involvement, trust and support with respect to the further sustainable development and use of AI.

1.4 The impact of AI is of a cross-border nature and therefore supra-national policy frameworks will also need to be established. The EESC recommends that the EU take the lead globally in establishing clear global policy frameworks for AI, in line with European values and fundamental rights. The EESC is able and willing to make a contribution to this.

1.5 The EESC currently identifies 11 areas where AI poses societal challenges: ethics; safety; privacy; transparency and accountability; work; education and skills; (in)equality and inclusiveness; law and regulations; governance and democracy; warfare; superintelligence. The EESC makes the following recommendations.

1.6 The EESC calls for a human-in-command approach to AI, including the precondition that the development of AI be responsible, safe and useful, where machines remain machines and people retain control over these machines at all times.

1.7 The EESC calls for a code of ethics for the development, application and use of AI so that throughout their entire operational process AI systems remain compatible with the principles of human dignity, integrity, freedom, privacy and cultural and gender diversity, as well as with fundamental human rights.

1.8 The EESC calls for the development of a standardisation system for verifying, validating and monitoring AI systems, based on a wide range of standards in the areas of safety, transparency, comprehensibility, accountability and ethical values.

1.9 The EESC calls for a European AI infrastructure consisting of open-source learning environments that respect privacy, real life test environments and high-quality data sets for developing and training AI systems. The EESC highlights the (competitive) advantage the EU can gain on the global market by developing and promoting ‘responsible European AI systems’, complete with European AI certification and labels.

1.10 The EU, national governments and the social partners should jointly identify which job sectors will be affected by AI, to what extent and on what timescale, and should look for solutions in order to properly address the impact on employment, the nature of work, social systems and (in)equality. Investment should also be made in job market sectors where AI will have little or no impact.

1.11 The EESC recommends that these stakeholders work together on complementary AI systems and their co-creation in the workplace, such as human-machine teams, where AI complements and improves the human being's performance. The stakeholders should also invest in formal and informal learning, education and training for all in order to enable people to work with AI but also to develop the skills that AI will not or should not acquire.

1.12 It is already necessary to carry out a detailed evaluation of the EU laws and regulations in the six areas identified by STOA (Scientific Foresight Unit) that may need to be revised or adapted. The EESC is able and willing to play a role in this evaluation process. The EESC opposes the introduction of a form of legal personality for robots or AI. This would hollow out the preventive remedial effect of liability law; a risk of moral hazard arises in both the development and use of AI and it creates opportunities for abuse.

1.13 The development of AI applications that benefit society, promote inclusiveness and improve people's lives should be actively supported and promoted, both publicly and privately. Under its programmes, the European Commission should fund research into the societal impact of AI and of EU-funded AI innovations.

1.14 The EESC supports the call by Human Rights Watch and others for a ban on autonomous weapon systems. The EESC welcomes the consultation on this issue announced by the UN, but considers that it should also cover the applications of AI in cyber warfare.

2. Artificial intelligence

2.1 There is no single accepted and rigid definition of AI. AI is a catch-all term for a large number of sub(fields) such as: cognitive computing (algorithms that reason and understand at a higher (more human) level), machine learning (algorithms that can teach themselves tasks), augmented intelligence (cooperation between human and machine) and AI robotics (AI imbedded in robots). The central aim of AI research and development is, however, to automate intelligent behaviour such as reasoning, the gathering of information, planning, learning, communicating, manipulating, detecting and even creating, dreaming and perceiving.

2.2 AI is broadly divided into narrow AI and general AI. Narrow AI is capable of carrying out specific tasks. General AI is capable of carrying out any mental task that can be carried out by a human being.

2.3 Good progress has recently been made in the field of narrow AI, in particular with the growth of computer processing power, the availability of large volumes of data and the development of machine learning (ML). ML refers to algorithms that can teach themselves specific tasks without needing to be programmed. This method is based on the processing of 'training data' on the basis of which the algorithm learns to recognise patterns and devise rules. Deep learning (DL), a form of ML, uses structures (neural networks) that are loosely based on the human brain and that learn by means of training and feedback. The result of these developments is that by using algorithms AI systems may now be self-teaching, autonomous and adaptive.

2.4 Research and development in AI have for some time been primarily focused on reasoning, knowledge acquisition, planning, communication and perception (visual, auditory and sensory). This has led to a large number of AI applications: virtual assistants, self-driving cars, automatic news aggregation, speech recognition, translation software, text-to-speech software, automated financial trading, legal eDiscovery, etc.

2.5 The EESC notes that there has recently been an exponential increase in the amount of AI applications and investment. The AI market currently amounts to around USD 664 million and is expected to grow to USD 38,8 billion by 2025.

3. Opportunities and threats of AI

3.1 It is virtually undisputed that AI can have significant advantages for society: consider applications in sustainable agriculture, safer transport, a safer financial system, more environmentally friendly production processes, better medicine, safer work, more personalised education, better jurisprudence and a safer society. It may even potentially help eradicate disease and poverty. AI may also make a major contribution to boosting industry and to improving the EU's competitiveness.

3.2 As with every disruptive technology, AI also entails risks and complex policy challenges in areas such as safety and monitoring, socio-economic aspects, ethics and privacy, reliability, etc.

3.3 We are at a crucial point in determining the (framework) conditions for the ongoing and further development and use of AI. The benefits associated with AI can only be achieved sustainably if the challenges surrounding it are also adequately addressed. Policy choices should be made to this end.

a) Ethics

3.4 The development of AI raises many ethical questions. What impact does autonomous (self-teaching) AI have on our personal integrity, autonomy, dignity, independence, equality, safety and freedom of choice? How do we ensure that our fundamental norms, values and human rights remain respected and safeguarded?

3.5 Furthermore, the development of AI is currently taking place within a homogenous environment principally consisting of young, white men, with the result that (whether intentionally or unintentionally) cultural and gender disparities are being embedded in AI, among other things because AI systems learn from training data. This data should be accurate and of good quality, diverse, sufficiently detailed and unbiased. There is a general tendency to believe that data is by definition objective; however, this is a misconception. Data is easy to manipulate, may be biased, may reflect cultural, gender and other prejudices and preferences and may contain errors.

3.6 The AI systems now being developed will not have any built-in ethical values. We humans must make provision for them in AI systems and in the environments in which they are used. The development, application and use of AI systems (both public and commercial) must take place within the limits of our fundamental norms, values, freedoms and human rights. The EESC therefore calls for the development and establishment of a uniform global code of ethics for the development, application and use of AI.

b) Safety

3.7 The use of AI in the physical world undoubtedly gives rise to safety issues. A distinction can be made between internal and external safety.

— Internal safety: is the AI system robust enough to (continue to) function well? Is the algorithm well programmed? Does it crash? Is it resistant to hacking? Is it effective? Is it reliable?

— External safety: is the AI system safe when in use in society? Does it operate safely, not only in normal, but also in unknown, critical or unpredictable situations? What bearing does the self-teaching ability have on safety, including if the system continues to learn after entering into use?

3.8 The EESC believes that AI systems may only be used if they meet specific internal and external safety requirements. These requirements should be determined by AI and safety specialists, businesses and civil society organisations collectively.

c) Transparency, comprehensibility, monitorability and accountability

3.9 The acceptance and sustainable development and application of AI are linked to the ability to understand, monitor and certify the operation, actions and decisions of AI systems, including retrospectively.

3.10 The actions and decisions of AI systems (through smart algorithms) increasingly intervene in peoples' lives. Examples include the use of AI in information-led policing, when assessing mortgage applications or in the procedure for authorising insurance. The comprehensibility, monitorability and accountability of the decision-making process of an AI system is crucial in this regard.

3.11 Currently, many AI systems are very difficult for users to understand. This is also increasingly true for those who develop the systems. In particular, neural networks are often 'black boxes', in which the (decision-making) processes taking place can no longer be understood and for which there are no explanatory mechanisms.

3.12 The EESC advocates transparent, comprehensible and monitorable AI systems, the operation of which is accountable, including retrospectively. In addition, it should be established which decision-making procedures can and cannot be transferred to AI systems and when human intervention is desirable or mandatory.

d) Privacy

3.13 The privacy of AI systems is an issue of concern. Many (consumer) products already have built-in AI: household appliances, children's toys, cars, health trackers and smartphones. All of these products transmit (often personal) data to the cloud-based platforms of their manufacturers. Whether or not privacy is sufficiently guaranteed is an issue of concern, particularly given that trade in data is now booming, meaning that the data generated does not remain with the producer but is sold on to third parties.

3.14 AI is also able to influence people's choices in many areas (from commercial decisions to elections and referendums) by analysing large quantities of (often) personal data. Children are a particularly vulnerable group. The EESC is concerned about AI applications that explicitly aim to influence the behaviour and desires of children.

3.15 It is necessary to prevent the application of AI to personal data from restricting people's actual or perceived freedom. The EU General Data Protection Regulation (GDPR) provides for significant privacy protection for digitally collected personal information. In the light of the development of AI, it must be properly monitored whether people's right to informed consent and freedom of choice when submitting data, as well as their right to access, amend and verify data, are reasonably assured in practice.

e) Norms, standards and infrastructure

3.16 New standardisation systems based on a broad spectrum of standards should be developed for verifying and validating AI systems, in order to be able to assess and monitor the safety, transparency, comprehensibility, accountability and ethical responsibility of AI systems.

3.17 The EESC calls for the EU to develop its own AI infrastructure consisting of open-source learning environments that respect privacy and high-quality data sets for developing and training AI systems. The EU could also gain a (competitive) advantage on the global market by promoting responsible European AI systems. In this connection, the Committee recommends exploring the potential of European AI certification and labels.

f) Impact on work, employment, working conditions and social systems

3.18 Opinions are divided on the speed with which and the extent to which this will occur; however, it is clear that AI will have an impact on employment levels and the nature and character of many jobs, and consequently also on social systems.

3.19 Brynjolfsson and McAfee from MIT refer to the current technological developments (including AI) as the second machine age. However, there are two important differences: (i) the 'old' machines predominantly replaced muscular power, while the new machines are replacing brainpower and cognitive skills, which affects not only low-skilled ('blue-collar') workers but also medium and highly skilled ('white-collar') workers and (ii) AI is a general purpose technology which affects virtually all sectors simultaneously.

3.20 AI can have significant advantages when it is used for dangerous, difficult, tiring, dirty, unpleasant, repetitive or tedious work. Work that can be 'routinised', data processing and analysis or work where planning or prediction plays a major role — work which is often done highly skilled people — can increasingly be carried out by AI systems.

3.21 However, the majority of jobs comprise a variety of activities. The likelihood that all of an individual's tasks can be done by AI or taken over by robots appears to be low. However, most people will be confronted with the automation of parts of their job. The time this frees up can be used for other tasks, provided that public authorities and the social partners make the necessary efforts in this regard. In this connection, it is necessary to bear in mind the impact these developments may have on professionals and managers and to promote their involvement so that they remain in control of these developments and are not the victims of them.

3.22 New jobs will also be created. However, no-one can predict what these will be, how many there will be and how quickly this will happen. Companies such as Google and Facebook manage to generate huge value with a relatively small number of employees. Moreover, these new jobs are not always quality jobs. The concern is that with the further development of AI, soon only low-paid mini-tasks will be left for a growing group of 'flex workers'.

3.23 AI will not only affect the quantity of available work but also the nature of existing work. AI systems offer more and more opportunities to track and monitor workers, raising concerns over autonomy and privacy. Work is now often determined and distributed by algorithms without human intervention, which influences the nature of the work as well as working conditions. There is also the risk of a drop in the quality of jobs and the loss of important skills through the use of AI systems.

3.24 The fact remains, however, that technology is not something inevitable. Governments and the social partners have the possibility of determining how AI is further developed and applied in the workplace and should also seize this opportunity with both hands. In this connection, it is important to focus not only on what AI is capable of doing, but also on what people are capable of doing (creativity, empathy, cooperation) and what we want people to keep doing, and to look for opportunities to enable people and machines to work together better (complementarity).

3.25 Augmented intelligence (complementarity), whereby human and machine work together and support each other, is the most interesting application of AI since its involves human with machine, as opposed to human instead of machine. However, co-creation is of major importance: workers must be involved in developing these kinds of complementary AI systems, in order to ensure that the systems are useable and that the worker still has sufficient autonomy and control (human-in-command), fulfilment and job satisfaction.

g) Education and skills

3.26 The maintenance or acquisition of digital skills is necessary in order to give people the chance to adapt to the rapid developments in the field of AI. The European Commission is firmly committed to developing digital skills through its Digital Skills and Jobs Coalition. However, not everyone will be capable of or interested in coding or becoming a programmer. Policy and financial resources will therefore need to be directed at education and skills development in areas that will not be threatened by AI systems (i.e. tasks in which human interaction is vital, where human and machine cooperate or tasks we would like human beings to continue doing).

3.27 When complementarity between human and AI is used (augmented intelligence), education in dealing and working with AI systems will be required for all, beginning at an early age, in order to ensure that people can retain autonomy and control in their work (human-in-command). Education regarding ethics and privacy in particular is important here since AI has a significant impact in these areas.

h) Accessibility, social (in)equality, inclusiveness and distribution

3.28 The vast majority of the development of AI and all its associated elements (development platforms, data, knowledge and expertise) is in the hands of the 'big five' technology companies (Amazon, Facebook, Apple, Google and Microsoft). Although these companies are supportive of the open development of AI and some of them make their AI development platforms available open-source, this does not guarantee the full accessibility of AI systems. The EU, international policy makers and civil society organisations have an important role to play here in ensuring that AI systems are accessible to all, but also that they are developed in an open environment.

3.29 Technological changes that favour capital, whereby the innovation primarily benefits those who own it, weaken the position of labour relative to capital. Technological changes can also lead to (income) disparities between people (both locally as well as regionally and globally). AI may further reinforce these trends.

3.30 The important thing is to closely monitor and appropriately respond to these trends. There have already been calls for an AI tax, an AI dividend or shared ownership of AI systems by workers and employers. There is also increasing talk of the need for an unconditional basic income.

3.31 In a previous opinion (1), the EESC identified the possibility of a digital dividend to be shared equally with the aim of achieving positive growth effects. The EESC attaches importance to research on all these solutions; however a fair balance should be struck between developing AI that benefits people and potential hindering effects resulting from the solutions. Moral hazard, whereby responsibility for AI systems is transferred to an entity which cannot be held responsible, should also be avoided.

i) Laws and regulation

3.32 The implications of AI for existing laws and regulation are considerable. In June 2016, the European Parliament's STOA unit published an overview of EU laws and rules that will be affected by developments in the areas of robotics, cyber-physical systems and AI. The STOA set out six areas — transport, dual-use systems, civil liberties, safety, health and energy — within which as many as 39 EU regulations, directives, declarations and communications, as well as the European Charter for Fundamental Rights, may need to be revised or adapted. This assessment should be tackled quickly and vigorously; the EESC is able and willing to play a role in this process.

3.33 There is a lot of discussion regarding the issue of who can be held liable when a AI system causes damage, particularly if the AI system is self-teaching and continues to learn after entering into use. The European Parliament has drawn up recommendations for civil law on robotics, including a proposal to explore an 'e-personality' for robots so that they can incur civil liability for any damage they cause. The EESC is opposed to any form of legal status for robots or AI (systems), as this entails an unacceptable risk of moral hazard. Liability law is based on a preventive, behaviour-correcting function, which may disappear as soon as the maker no longer bears the liability risk since this is transferred to the robot (or the AI system). There is also a risk of inappropriate use and abuse of this kind of legal status. The comparison with the limited liability of companies is misplaced, because in that case a natural person is always ultimately responsible. In this regard, it should be examined to what extent the current national and EU laws, rules and jurisprudence in the area of (product and risk) liability and own risk provide an adequate answer to this question and, failing that, what kind of legal solutions can be put forward.

3.34 Taking the right approach to laws and regulations on AI will also require a good understanding of what AI can, cannot and will be able to do in the short, medium and long term.

3.35 AI is not limited by borders. It is therefore important to explore the need for global regulations, since regional legislation will be insufficient and will even produce undesirable effects. Given its tried and tested system of product and safety standards, the trend towards protectionism on other continents, the high level of knowledge within Europe, the system of European fundamental rights and social values and the social dialogue, the EESC recommends that the EU take a leading role in establishing uniform, global policy frameworks for AI, and that it promote this process at a global level.

j) Governance and democracy

3.36 AI applications can help promote public involvement in public policy and more transparent administrative decision-making. The EESC calls on the EU and national governments to use AI for this purpose.

3.37 The EESC is concerned about the targeted use of AI systems (in the form of smart algorithms) for news aggregation, for example on social media, which seems to have restricted information flow and led to the further division of society (e.g. 'filter bubbles' and 'fake news' on Twitter and Facebook during the US elections).

3.38 The EESC is also concerned about indications that AI systems have been used to influence people's (voting) behaviour. People's preferences and behaviour appear to have been predicted and actively influenced using smart algorithms. This is a threat to fair and open democracy. In the current era of polarisation and dismantling of international institutions, the precision and strength of such propaganda technology may quickly cause further disruption to society. This is one of the reasons why standards are needed for the transparency of (smart) algorithms and the ability to monitor them.

k) Warfare

3.39 The United Nations Convention on Certain Conventional Weapons has decided to convene experts in 2017 to discuss the implications of autonomous weapons. The EESC welcomes this and supports the call by Human Rights Watch and others for a ban on autonomous weapon systems. The EESC believes that such a ban should be seriously analysed and considered. However, this is not sufficient to address adequately the possible uses of AI in war and conflict situations. The applications of AI in cyber warfare should also be examined in this UN consultation.

3.40 In addition, it should be ensured that AI does not fall into the hands of people or regimes that aim to use it for terrorist activities.

l) Superintelligence

3.41 Finally, the question arises as to the possibilities and risks associated with the development of superintelligence. According to Stephen Hawking, the development of general AI may spell the end for mankind. Hawking predicts that, at that moment, AI will continue to evolve at a speed people cannot keep pace with. As a result, there are experts who opt for a 'kill switch' or reset-button, which we can use to deactivate or reset an out-of-control or superintelligent AI system.

3.42 The EESC calls for a human-in-command approach including the precondition that the development and application of AI be responsible and safe, where machines remain machines and people will be able to retain control over these machines at all times. The discussion on superintelligence is important in this connection, but is currently overshadowing the debate on the impact of the current applications of AI.

4. AI for the benefit of humanity

4.1 Large commercial players have now launched various initiatives for the open, safe and socially responsible development of AI (such as OpenAI). However, policy-makers cannot leave this to businesses and must play a role here. Targeted measures and support are needed for research into the societal challenges associated with AI and for the development of safe and robust AI systems.

4.2 EU programmes, including Horizon 2020, are well-suited to addressing this challenge. The EESC has noted that funding, particularly under the Societal Challenges pillar of Horizon 2020, is below that issued under the two other pillars, Excellent Science and Industrial Leadership, and is being scaled back. The EESC calls for research on the broad societal challenges as well as on the social applications of AI to have an important place under the Societal Challenges pillar.

4.3 Possible cross-cutting effects of AI should also be addressed. In parallel with funding for the development of disruptive of AI innovations, there should also be funding for research into the societal impact of these innovations and ways of addressing them.

4.4 The research and development of AI that benefits humanity also require a variety of high-quality, publicly available training and test data and real-life test environments. So far, AI infrastructure and a lot of quality data has only been available from and for a limited number of private operators and there are obstacles to testing AI in the public sphere, preventing AI being from applied in other areas. The development of publicly-available, high-quality data and a European AI infrastructure are essential in order to achieve secure, robust and useful AI.

5. Monitoring and taking necessary action

5.1 The broad societal impact of AI cannot yet be fully assessed. The fact that the impact will be significant is, however, undisputed. Developments in the field of AI are currently happening at a rapid pace, which calls for critical monitoring from a broad perspective, in order to be able to respond appropriately and in good time to major and disruptive developments, both technical and societal, ('game-changers') in and around the area of AI.

5.2 Technical game-changers may include notable or significant leaps in the development of AI capabilities, which may be precursors to achieving general AI. Societal game-changers may include considerable job losses without jobs to replace them, unsafe situations, system failures, unforeseen international developments, etc.

5.3 Policy-makers, industry, the social partners, consumers, NGOs, educational and health institutions, and academics and specialists from various disciplines (including (applied) AI, ethics, safety, economics, occupational science, law, behavioural science, psychology and philosophy) should work together to closely monitor developments in the area of AI and to draw up a list of these game-changers and keep it up to date, in order to be able to take the right measures at the right time, be they in the form of policy, law and regulations, self-regulation or social dialogue.

5.4 As the representative of European organised civil society, the EESC will shape, focus and promote this multi-stakeholder debate on AI in the coming period.

Brussels, 31 May 2017

The President of the European Economic and Social Committee

Georges DASSIS

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(1) OJ C 13, 15.1.2016, p. 161.
