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Coordinated Plan on Artificial Intelligence

1. INTRODUCTION – THE EUROPEAN AI STRATEGY

Like electricity in the past, artificial intelligence (AI) is transforming our world. It is at our fingertips, when we translate texts online or use a mobile app to find the best way to go to our next destination. At home, a smart thermostat can reduce energy bills by up to 25% by analysing the habits of the people who live in the house and adjusting the temperature accordingly [1] . In healthcare, algorithms can help dermatologists make better diagnosis, for example detecting 95% of skin cancers by learning from large sets of medical images [2] .

By making sense of vast amounts of data to offer efficient solutions, AI improves products, processes and business models in all economic sectors. It can help companies identify which machines will need maintenance before they break down. AI also transforms public services.

> Artificial Intelligence refers to systems that display intelligent behaviour by analysing their environment and taking action — with some degree of autonomy — to achieve specific goals. We are using AI on a daily basis, for example to block email spam or speak with digital assistants.
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> Growth in computing power, availability of data and progress in algorithms have turned AI into one of the most important technologies of the 21st century.

The changes brought by AI also raise concerns. Workers fear they will lose their job because of automation, consumers wonder who is responsible in case a wrong decision is taken by an AI-based system, small companies do not know how to apply AI to their business, AI start-ups do not find the resources and talent they need in Europe, and international competition is fiercer than ever with massive investments in the US and China.

To address these challenges and make the most of the opportunities offered by AI, the Commission published a European strategy [3] in April 2018. The Commission proposed an approach that places people at the centre of the development of AI (human-centric AI) and encourages the use of this powerful technology to help solve the world's biggest challenges: from curing diseases to fighting climate change and anticipating natural disasters, to making transport safer [4] and fighting crime and improving cybersecurity.

This strategy supports an ethical, secure and cutting-edge AI made in Europe. It builds on Europe's scientific and industrial strengths [5] and is based on three pillars: increasing public and private investments in AI, preparing for socio-economic changes, and ensuring an appropriate ethical and legal framework. To ensure its success, coordination at European level is essential.

2. THE COORDINATED PLAN ON AI – OVERVIEW

In its strategy on AI for Europe, the Commission proposed to work with Member States on a coordinated plan on AI by the end of 2018, with the aim to maximise the impact of investments at EU and national levels, encourage synergies and cooperation across the EU, exchange best practices and collectively define the way forward to ensure that the EU as a whole can compete globally. The proposal of a coordinated plan built on the declaration of cooperation on AI launched in April 2018 at the Digital Day and signed by all Member States and Norway [6] . It was endorsed by the European Council in June 2018 [7] .

Member States (as part of the group on digitising European industry and AI), Norway, Switzerland and

the Commission prepared the plan during several meetings between June and November 2018. Exchanges also took place during Competitiveness Council meetings under the Austrian Presidency of the EU.

During these meetings, Member States and the Commission identified a series of common actions to increase investments, pool data – the raw material for AI -, foster talent and ensure trust [8] , building on the European strategy. They prioritised areas of public interest, such as healthcare, transport and mobility, safety, security and energy, as well as important economic sectors such as manufacturing and financial services.

The result of this joint work, the coordinated plan, is the annex to this Communication. It details actions to be started in 2019-2020 and prepares the ground for activities in the following years. It will be reviewed and updated annually.

This Communication highlights the main objectives and initiatives of the plan.

2.1. Common objectives and complementary efforts

The coordinated plan provides a strategic framework for national AI strategies. As of today, five Member States have already adopted a national AI strategy with a dedicated budget [9] . All other Member States are encouraged to develop their national AI strategy by mid-2019, building on the work done at the European level. These are expected to outline investment levels and implementation measures.

In the course of next year, Member States and the Commission will also agree on common indicators to monitor AI uptake and development in the Union and the success rate of the strategies in place, with the support of the AI Watch developed by the Joint Research Centre of the Commission [10] .

Europe is currently behind in private investments in AI [11] . Without major efforts, the EU risks losing out on the opportunities offered by AI, facing a brain-drain and being a consumer of solutions developed elsewhere. This is why the European AI strategy has set ambitious, yet realistic, targets: in the Union, public and private investments in AI must be scaled up in order to reach the target of EUR 20 billion per year over the next decade. As a first step, the Commission is increasing investment in AI under the research and innovation framework programme Horizon 2020 to EUR 1.5 billion in the period 2018-2020. This amount corresponds to a 70% increase relative to period 2014-2017. If Member States and the private sector make similar efforts, total investments in the Union will grow to more than EUR 20 billion for the period 2018-2020 [12] , thus positioning the Union to further increase efforts over the next decade, with investment gradually reaching EUR 20 billion per year. This would correspond to an annual investment of EUR 7 billion by the public sector (Member States and Commission), on par with other continents. The Commission proposed, under the next programming period 2021-2027, that the Union invests in AI at least EUR 1 billion per year from Horizon Europe and the Digital Europe programmes [13] .

Taking these targets into account, Member States have agreed that ambition is required and that national efforts need to be increased. Coordinated public efforts will help leverage more private investments.

While public investment plays an important role, an important duty for regulators is to eliminate the obstacles due to fragmented markets. Products and services are increasingly interlinked and digitised. In this context, it is of utmost importance to avoid market fragmentation in strategic sectors such as artificial intelligence, including by strengthening key enablers (e.g. common standards and fast communication networks). A real Single Market with an integral digital dimension [14] will make it easier for businesses to scale up and trade across borders and thereby further boost investments.

2.2. Towards a European AI public-private partnership and more financing for start-ups and innovative small and medium-sized enterprises [15]

Member States and the Commission will also reinforce cooperation with the private sector. The Commission will bring companies and research organisations together to develop a common strategic research agenda on AI, defining priorities in line with the needs of the market and encouraging exchanges between sectors and across borders. This will pave the way for a new research and innovation partnership on AI, fostering collaboration between academia and industry in Europe. As part of this contractual partnership, the private sector is expected to commit to specific and high investments in AI. This partnership will build on existing partnerships in robotics and big data [16] , representing EUR 4.4 billion of investments, of which the majority (EUR 3.2 billion) comes from the industry. Stakeholders have already confirmed their support for setting up an AI partnership [17] .

Moreover, the Commission aims at making available resources for start-ups and innovators in AI and blockchain to help them grow their business. EUR 100 million should be initially mobilised in 2020, which could be further complemented through the participation of interested national promotional banks and other institutions. This could help prepare for strengthening access to finance for AI under the InvestEU programme from 2021 onwards.

At the same time, the Commission is making progress in setting up the European Innovation Council to

support cutting-edge technologies and the most innovative start-ups. In response to the call of the European Council in June 2018 [18] , a new pilot initiative [19] will be launched in early 2019 and will include support for the next generation of human-centric AI technologies.

2.3. Strengthening excellence in trustworthy AI technologies and broad diffusion [20]

Member States and the Commission aim to scale up national research capacities and reach critical mass through tighter networks of European AI research excellence centres. The objective is to foster cooperation among the best research teams in Europe, so that by joining forces they can tackle major scientific and technological challenges in AI more efficiently.

Bringing state-of-the-art AI applications to the market requires experimenting and testing in real-world environments. As part of the implementation of the Digitising European Industry strategy [21] adopted in 2016, the Commission is already supporting large-scale pilots and experiments in areas such as smart farming, smart cities and connected and autonomous vehicles.

Lessons will be drawn from these pilots and experiments. To optimise investment and avoid duplication of efforts, the Commission proposes that several large-scale reference test sites, open to all actors across Europe, will be developed using up to EUR 1.5 billion from the AI strand of the proposed Digital Europe programme, building on the strong base of existing centres of excellence in Member States. Examples of testing facilities that Member States are putting in place include the cross-border testing of connected and autonomous driving [22] and real scale experimentation of smart hospitals. In the case of connected and autonomous mobility, the identification of such testing facilities and the tests themselves will be coordinated, first, by the single EU-wide platform referred to in the EU strategy for mobility of the future [23] and, subsequently, by the corresponding partnership to be established under Horizon Europe.

It is equally important to foster the broadest possible uptake of AI in the economy, in particular by start-ups and small and medium-sized enterprises. By raising public awareness and sharing the latest scientific advances and tried and tested state-of-the-art technologies developed in Europe, we can ensure that every company, small or large, high-tech or not, as well as the public sector, can grasp these digital opportunities. The proposed new Digital Europe programme provides for co-investment by Member States and the Commission in digital innovation hubs across Europe, including via the Cohesion Policy funds. The programme will further facilitate the diffusion of AI capacity in each Member State and will link to an AI on-demand-platform [24] . To this end, in 2019 Member States will identify AI digital innovation hubs in their territory.

2.4. Adapting our learning and training programmes and systems to better prepare our society for AI [25]

Rapid technological progress means that the world of work will be significantly transformed, and sooner rather than later. In particular, technological changes will modify the skills required of workers, meaning that potentially very large numbers of workers will need to up-skill. Thus, more focus needs to be put on life-long learning. One specific aspect of change concerns those workers who will actually design and implement the AI solutions of the future. Almost all Member States are facing shortages of Information and communications technology professionals, and there are currently more than 600 000 vacancies for digital experts [26] . Moreover, talented researchers and promising start-ups frequently receive interesting offers from abroad. For example, in 2017 there were 240 000 Europeans in Silicon Valley [27] , many of whom entered the US to fill a specific job in the tech industry. Europe must be able to train, attract and retain talent of this kind, and encourage entrepreneurship, diversity and gender balance.

Member States will therefore exchange best practices on how to reinforce excellence and retain talented workers, as well as on how to step up and accelerate efforts to fully introduce and exploit the possibilities offered by the current legal migration acquis, including the blue card [28] , to attract talent. The blue card is a work permit allowing high-skilled non-EU citizens to work and live in the EU. Skills should also be covered in the national AI strategies which are to be published by mid-2019. The strategies should address AI-relevant skills within the formal education cycle, including in vocational training and higher education, as well as ways to improve opportunities for Masters and PhDs in AI.

The Commission will support Masters and PhDs in AI through the proposed closer cooperation between AI research excellence centres and, more broadly, the EU's research and innovation programmes. Interdisciplinarity will be supported by encouraging joint degrees, for example in law or psychology and AI. Moreover, digital skills that facilitate the development and use of AI, should be included in all education and training curricula.

Given the disruptive nature of many of the technological advances, policy-makers will develop strategies to deal with employment changes in order to ensure inclusiveness, as the pace with which some jobs will disappear and others appear is likely to accelerate, while business models and the way tasks or jobs are performed will change. This may make it necessary to modify current labour market and social protection arrangements to support transitions in the labour market. The Commission has established a high-level expert group on the impact of the digital transformation on EU labour markets that will deliver a report addressing these issues in spring 2019 [29] .