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The Way to Venice

BACKGROUND DOCUMENT
Trends in Artificial Intelligence
2021-2022

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Foreword

As the second edition of the international conference on *Ethics and Artificial Intelligence* approaches (June 24-25, 2022), we are pleased to attach a Background Document that provides an update on the main trends and evolutions in the field since the first edition, in September 2021.

The analysis focuses on four macro themes: AI as a strategic geopolitical lever; data driven and digital enabled business models; the twin revolutions (ecological and digital); and AI regulation.

This document is our way of welcoming you to the conference's second edition. We hope it both captures the spirit of the meeting and offers meaningful insights for future study of the crucial issue of "ethics and AI".

1. AI as a geopolitical strategic lever

As of 2020, the concept of normalcy has changed completely. The whole world, in fact, has witnessed events that have revolutionized everyday life, the balance, and the priorities of people.

The first major event that started this season of great change was the Covid-19 pandemic. In addition to raising important issues of health management, the pandemic forced people to stay indoors. It also set all the scientists of the world on a race to find a cure and all the governments on a search for material needed to manage the disease (i.e. oxygen equipment, personal protective equipment, ventilators, etc.). The exchange of information and the management of data became issues of strategic importance for the security of countries that, on the one hand, wanted neither to show the world that they were unprepared nor to adapt their economies to a new reality which included contractions in consumption, and, on the other hand, hoped that sharing data and discoveries would help to accelerate a process that could lead the world out of the grip of the disease – a process that is still ongoing.

The second major event that has shaken the world is Russia's invasion of Ukraine. In this case too, the management of data and information has been crucial to the flow of events on several levels.

First of all, information is widely used as an indirect weapon to leverage soft power and to sway the population, through targeted propaganda and thanks to isolation from outside sources (especially as the latter are perceived to be run by the enemy).

Secondly, data and information are central to the digital battlefield – the “cyberwar” – which has taken on dimensions comparable to traditional warfare in terms of people involved and damage wrought. Cyber attacks have sparked ongoing debate about blurred borders: it is not yet perfectly clear what is or is not allowed, so “penetration testers” launch trial attacks, to test the limits of given systems, evading legal repercussions. Clearly the behavior of independent groups in this field is under scrutiny.

Thirdly, the fundamental need to be independent in the management of IT infrastructures has emerged. This not only allows for continuity for businesses in the European Union, but also guarantees the fundamental rights enshrined in the EU to all citizens (e.g. privacy).

The theme of cybersecurity has been taken into serious consideration recently in Italy as well, with structural investments and institutional actions. In particular, the government has established an Authority and created specialized teams in law enforcement. These decisions were necessary given the spike in ransomware attacks suffered by Italy's small and medium-sized companies in recent years.

To complete this action, important investments have been made both in the communication and IT infrastructures. These will guarantee protection of the European regulations as well as improve IT security in general.

Over the last year, Italy's Ministry of Economic Development has also proposed a national strategy for the implementation of artificial intelligence. This suggests a better dialogue between institutions, universities and businesses, which will render such technology a lever of strategic advantage for the entire nation.

2. Data driven and digital enabled business models

The AI market in Italy is thriving and expanding. According to a report produced by Assintel – the permanent observatory on the digital market carried out by Confcommercio’s national association of ICT companies and edited by IDC – in 2021, the Italian AI market was worth 860 million euro; in 2022 it will reach 1.1 billion; it is due to continue growing, and expected to reach 1.4 billion euro in 2023.

In 2021, McKinsey published its annual report on “The State of AI”, which aims to illustrate the evolution of the adoption of this technology by businesses in the current year. As in 2020, and perhaps also thanks to an extra push due to the Covid-19 pandemic, the adoption of AI-related tools and processes grew significantly compared to the previous year. In particular, the data show two key results: the first is the significant increase of companies that see artificial intelligence as the force behind at least 5% of their EBIT (earnings before interest and taxes); the second is the expansion of this technology – previously limited mainly to reporting and marketing – to bottom-line activities and to the production of completely new AI-enabled products and services.

In Italy, the situation is different. In November 2021, the European Commission published the DESI (Digital Economy and Society Index) report, which measures the digitalization of the EU Member States. Italy ranked particularly poorly on the culture of the population in STEM-skills, which is the main reason behind the delay in adopting technology in small and medium-sized enterprises – the basis of the country’s economic fabric. Italy urgently needs to bridge that cultural gap with other member countries. According to the most widespread theories of change management, the persistent resistance to change is due to a fear of the unknown, but if companies do not face change and do not govern it, they risk remaining cut off from the global economy or at least missing out on many opportunities for digital-mediated evolution.

Traditionally, big data and machine learning applications, in fact, have been used to streamline processes, improve industrial performance and automate some procedures with little added value; that is, they have been used to conduct digital transformations but rarely to carry out real business model

innovation. Clearly, as a result of process efficiency and automation, the workforce has suffered from the hypothetical threat – not necessarily justified by the numbers – of being replaced by intelligent machines.

As technology and the supporting infrastructure have matured, many companies have placed a new value on digital assets – particularly data – and this has often become a cornerstone of their competitive advantage in the marketplace, at the heart of their value proposition. Such supporting technology infrastructures indeed play a key role in enabling this new awareness. Among these, connectivity and cloud computing have most enabled acceleration.

With regard to connectivity, the spread of fiber optics and fifth-generation connectivity (5G) puts companies in a position to set up truly distributed computing and data acquisition networks such as IoT (Internet of Things) and IIoT (Industrial Internet of Things), with performances appropriate to the needs of the underlying industrial processes. As for cloud computing, the ability for everyone to access powerful computing infrastructure at low cost democratizes access to data-mediated opportunities that have traditionally been accessible only to a few highly structured companies. This accelerates research and specialization in data-driven algorithmic approaches. In addition, cloud infrastructures allow a progressive shift in services from “on-premises” to “as-a-service”, thus radically changing companies’ business models. The digital economy has shifted from software-as-a-service (SaaS) to platforms as a service (PaaS) to infrastructures as a service (IaaS). Today, we rightly speak of an Everything as a Service economy.

In the recent past, further opportunities for the development of data-driven business models have been possible thanks to the maturation of blockchain, which has helped to enable the creation of new modes of interaction between users, known as metaverses.

The blockchain basically allows notarization of data being written on a shared platform, rendering it not modifiable. This technology allows the issuance of non-fungible tokens (NFTs) that associate a certificate of ownership and authenticity to any tangible good and, in particular, to digital goods, thus allowing the scarcity of goods to be simulated even in non-physical worlds.

Artificial intelligence has a different impact within this new scenario. It consists of a “world of worlds”. First of all, the new modes of interaction mediated by the latest generation sensors and actuators (powered by advanced AI algorithms) allow the enjoyment of a multi-modal experience. That is, it becomes possible to engage more than one sense in a given interaction, at the same time and from a distance.

The second impact is related to computer vision, which allows digital copies of physical elements to be reproduced in a simple and efficient way. They can then be inserted into digital worlds, which can also be procedurally generated without the supervision of a human being.

The third impact is related to the management of virtual economies in which virtual goods are exchanged in virtual worlds for real money.

3. Twin revolutions

The issue of the twin revolutions – ecological and digital – has significant ethical relevance. In fact, AI and digital technologies are capable of having a highly positive impact on the environment (for instance, according to the Global e-Sustainability Initiative 2020, the digital revolution’s impact on the environment is 7 times more positive than negative; indeed, it will cause a reduction in greenhouse gas emissions of 20% by 2030). Therefore, reducing their use would be regrettable, also from an ethical point of view.

The power of processing enormous amounts of data is useful in studying climate change: it can assist scientists as well as decision-makers. AI developments in business facilitate greater results with fewer resources and lower environmental costs; they also create digital-mediated economic value. The ability of AI technologies to deal with huge amounts of complexity is necessary for the solution of difficult problems (such as sustainable traffic management and large-scale garbage collection) and for the design of smart cities. The de-materialization people regularly experience today (online meetings or classes, remote working, e-books, etc.) helps protect natural ecosystems. Finally, AI technologies can prevent energy waste as well as create alternative energy models.

Moreover, digital platforms are at the basis of the functioning of new inclusive forms of our sharing economy, producing a valuable impact on economic, social and environmental sustainability. Indeed, sustainability requires a new kind of circular economy, different from older, traditional versions. Circular economies of the past were mainly caused by poverty and necessity and were superseded by the linear economy of an industrial expansion that proceeded without much consideration of environmental issues. The AI and digital revolution can grant an “intelligent” circular economy, in which products are designed to be recycled and re-used.

The role of scientific research in building a safe and just space for humanity is fundamental. Recent reports by the EU Commission, such as “Science, Research and Innovation Performance”, highlight how central research and innovation are to the ecological and digital transition that Europe needs. The EU ranks among the top players in the fields of scientific products

concerning climate and bioeconomy (respectively, 25% and 27% of top cited publications).

The Next Generation EU as well as the European Commission directive “A New Circular Economy Action Plan. For a Cleaner and More Competitive Europe” are fundamental instruments within the European Green Deal. They contribute to setting a new agenda for sustainable growth and address the importance of AI in accelerating the green transition, establishing a new circular economy and developing green communities. In fact, we know that AI applications are particularly relevant in at least four main areas: product design (extending lifetime through predictive maintenance); business models (matching supply and demand more efficiently); infrastructure organization (automating recycling infrastructure and re-shaping networks and systems, even outside the domains of business or industry); consumer empowerment (facilitating access to more fair and updated information). The potential digital-mediated economic value unlocked by AI in the circular economy has been estimated at an impressive 127 billion dollars per year in the food sector and 90 billion in consumer electronics, globally.

Furthermore, the alliance between ecological strategies and AI development is not only an opportunity for the protection of our habitat but also for new forms of economic growth (see for example the new economic scenarios in cultural heritage, spare time activities and tourism).

As major scholars have noted, the AI revolution can not only foster the green transition, but also help us rethink the very relationship between humanity and the planet. AI can help people recognize how respect for nature, improvement of urban life, social inclusion (driven by equal access to information), and greater autonomy in personal organization can all be seen in strict connection with each other. If – as has been said before – AI can support decision-making processes, on the one hand, it is also true, on the other, that decision-makers must have a vision about AI and grasp its potential to trigger a virtuous cycle between nature and technology. A new awareness of the interconnection between the green and the blue should be spread at all levels of policy- and decision-making. Such awareness must reach even the most local levels, as well as the developing world.

4. AI regulation

“Artificial intelligence (AI) could help humanity overcome many of the serious social problems it faces. But at the same time, AI presents a series of complex challenges, particularly in terms of ethics, human rights and security. Yet, no international ethical framework that applies to all AI’s developments and applications currently exists. An international regulatory tool is indispensable.”

With these words, UNESCO Director General Audrey Azoulay announced the approval of the “Recommendation on the Ethics of Artificial Intelligence” by the General Conference of Member States at its forty-first session in November 2021. This document is the outcome of a three-year process, starting in 2018, which had three main moments: First, the “Preliminary study on a possible standard-setting instrument on the ethics of artificial intelligence” (2019) by an ad hoc group of UNESCO’s World Commission on the Ethics of Scientific Knowledge and Technology (COMEST); then, the creation of an ad hoc group of experts, which prepared the first draft recommendation (2020); and finally, the Technical Negotiating Session (2021), which was attended by representatives appointed by Member States. On this last occasion, the text was released, and then presented to the General Conference in November 2021.

The document covers issues ranging from the elimination of “social scoring policies” (such as that developed in China, where individuals are given a score according to their abilities, and which can severely limit a person’s freedom), to data and environmental protection, in addition to appropriate human monitoring.

This action by UNESCO occurred in parallel and with many points in common with European Union initiatives.

In 2019, the European Commission’s High-Level Expert Group on AI published the “Ethics Guidelines for Trustworthy AI”, aiming at an AI technology which has to be lawful (“respecting all applicable laws and regulations”), ethical (“respecting ethical principles and values”) and robust (“from a technical perspective, while taking into account the social environment”). As recent studies have shown, there is a shared set of ethical principles that AI codes or guidelines enacted by public and private institutions in the Western world consider to be fundamental. They include “beneficence, non-maleficence, autonomy, fairness, explicability”. However,

the key issue lies in specifying and implementing these very general principles in the context of concrete AI technologies and activities: any specific legal regulation aiming to discipline AI may vary from a more restrictive to a more liberal approach. In fact, on the one hand, over-regulation makes it impossible to cope with the endless discoveries and quick progress in AI technologies; it also depresses the competitive advantages of research centers, industries, and infrastructures. On the other hand, under-regulation puts human rights at risk, rights that undergird all the contemporary liberal democracies.

The “Artificial Intelligence Act” adopted by the EU Commission last year chooses a wise middle ground in order to avoid the risks of both over- and under-regulation. The document aims to outline flexible AI regulations for the construction of a European AI market and also to define – as declared by the Explanatory Memorandum – “a balanced and proportionate horizontal regulatory approach to AI that is limited to the minimum necessary requirements to address the risks and problems linked to AI, without unduly constraining or hindering technological development or otherwise disproportionately increasing the cost of placing AI solutions on the market”. In particular, the European Union, through the Artificial Intelligence Act, upholds a case-specific approach to the evaluation of risk. It examines risk from the perspective of both the functions performed by an AI system and the specific purpose and modality for which that system is used.

This normative framework offers many opportunities as well as challenges. The “DESI Report 2021” shows that the different European countries do not all run at the same speed towards digital performance; indeed, Italy is listed among the countries that are furthest behind. In particular, Italy has the lowest index in advanced skills. Unfortunately, European legal regulations establish some constraints, but they cannot help to reduce the digital divide between different countries. Simplification and – in certain cases – deregulation, however, can play a substantial role in reducing that gap. This may be particularly important for Italy, given its lower level of digitalization and computational power as compared with other European countries.

Moreover, the required ex-ante evaluation of risk is difficult and presents areas of uncertainty and discretionary power since a proper evaluation can only be done through experience. It is also an additional cost that may hinder some players and help others. With regard to the ex-ante control approach,

the instrument of regulatory sandboxes, provided by the AI Act, seems to be helpful and should be encouraged.

Still, under-regulation and a related over-use of AI can create serious problems; it can expose particular groups of people (like children, the mentally ill, etc.) to serious risks. It can also exacerbate mistakes: experimental technologies in sectors like justice or health, for example, can have dramatic consequences. Furthermore, energies must be dedicated to combating the successful use of AI technologies for criminal activities.

General interest about the problems of legal and/or ethical regulations for AI has been increasing over the last few years – not only in institutions, businesses and research centers, but also in the public opinion. Awareness is growing of the relevance of a public debate on AI regulation. Many general questions remain unanswered and need to be debated. Together with the problem of striking the right balance between too much and too little regulation, as highlighted above, there are three more main questions on the ethical agenda.

Managing human rights conflicts. When such conflicts arise, how to strike the right balance? For 7 out of the 10 most capitalized companies in the world today, the acquisition and management of data are extremely relevant parts of business. The regulation of “the right to be forgotten”, for instance, is the result of a balance between the right to privacy and the right to know.

Reducing the digital divide. Law and soft regulation can play a relevant role in reducing the digital divide between countries and among people within a country. Recently, for example, the Italian government launched a strategic program (*Programma Strategico Intelligenza Artificiale 2022-2024*), which increases Italian investment in research and education concerning AI. Such strategies can foster technology transfer and public-private initiatives for the adoption of advanced technologies in business.

Governing AI innovation. The digital revolution is shaping the world and creating new forms of interactions between man and machine. Should policy-makers limit themselves to watching digital innovation happen and then deciding whether to admit it or to restrain it? Or should they first set the desired goals and direction for digital innovation and then foster the means to achieve them? Governing the digital revolution does not mean fearing innovation; it means, rather, building a new relationship between people and technology for the enhancement of humanity.

The Way to Venice Report
Annex

Facts and Figures