

Artificial intelligence: conceptual approach and regulatory framework

ALTHOUGH technology has been an intrinsic part of human cultures since the emergence of our species more than 2.5 million years ago, in the last 500 years we have entered an era of accelerated technological development, especially noticeable in the last two centuries. Throughout history, the introduction of new technologies has generated misgivings, mainly because of the disappearance of jobs and the social changes they bring. An emblematic example was the case of the Luddites in 19th century Britain, who destroyed factory machines as a form of protest. In general, these fears are often linked to a fear of change and loss of relevance in the social fabric.

To counter these fears, it is imperative to redefine the economic framework in which our predominantly capitalist societies operate. It is increasingly urgent to adopt alternative economic models that promote a more equitable redistribution of wealth and guarantee resources for all citizens. Measures such as higher taxes on large corporations, a guaranteed minimum income, taxes on robots and technology, as well as continuing education throughout life, are essential for people to feel useful at all stages of their lives. In this way, the pessimistic view of progress finds solutions that strengthen social rights rather than slowing down technological progress. The answer is ultimately political, not technological.

Today we are facing a new wave of profound transformations, driven by the widespread use of artificial intelligence tools. The ability of this technology to reshape our societies is a source of both optimism and concern. Therefore, the purpose of this report is to encourage debate on how artificial intelligence can contribute to the definition of public policies that improve people's lives.

Figure 1 Artificial intelligence: a strategic compass for public policy management



Historically, artificial intelligence emerged in the 1950s. Initially, it was defined as the study and design of machines capable of solving problems that, until then, required human intelligence. For decades, research in the field of this technology remained mainly in academia. There were golden periods with generous funding for these research groups, as well as periods of less financial support, known as *AI winters*.

Throughout all these periods, progress in artificial intelligence continued steadily, especially based on two major approaches: the first, the symbolic approach, sees intelligent systems as symbol manipulators, endowing them with the ability to reason, plan and represent the world; the second, non-symbolic or sub-symbolic representations, is based on systems in which language concepts are not identifiable at a particular point, but emerge in a distributed fashion.

Recently, applications based on the second approach, in particular generative artificial intelligence, have had a considerable social impact. This branch of artificial intelligence allows systems to generate texts that appear to be written by humans, images from linguistic descriptions, or videos based on narratives, among other capabilities. However, the risks that these technologies pose to our societies, especially to democracy, have prompted public authorities to intervene.

In response to these challenges, the European Union (EU) has adopted a law to regulate artificial intelligence. It prohibits certain practices, categorises others as high-risk and establishes a number of safeguards to avoid a negative impact of this technology on our lives, especially in critical areas of use. Under this European legislation, artificial intelligence would no longer be defined only as the creation of systems that solve complex problems, but in a more pragmatic way: an intelligent system is one that uses a specific technique from a list provided by law. In short, European law states that any *software* with reasoning, learning or modelling capabilities will be considered an artificial intelligence system.

In this report, we explore through various examples how artificial intelligence, both symbolic and sub-symbolic, can help us design effective public policies. We believe that the sustainable development goals set by the United Nations are challenges to which this technology will be key.

The various examples in this report are broken down into a number of areas of interest of sufficient relevance to give the reader a clear idea of the potential of artificial intelligence across the public policy domain. In the following, we briefly describe the key ideas in these areas.

With this overview of the evolution of this technology and its potential impact on our societies, the need arises to consider how it can be effectively integrated into public policy-making. The promise of artificial intelligence is not without its challenges: from the ethical implications involved to the infrastructure needed to implement these technologies in an inclusive and secure manner. In the following section we explore how governments and public institutions can harness it to address complex challenges ranging from economic planning to improving the quality of life in urban and rural contexts, without losing sight of the principles of transparency and equity.