History.
Is winter coming?

To younger generations, AI might seem like the latest among new technologies. But in reality, it is a discipline with more than 70 years of history already behind it. In fact, It was the middle of the 20th century when research from this new branch of computer science first started getting published. Alan Turing, the British scientist who played a decisive role in deciphering German messages during World War II, laid the initial foundations in 1950 with his seminal essay *Computing Machinery and Intelligence*, predicting that in fifty years time "one will be able to speak of machines thinking." Five years later, American mathematician John McCarthy coined the term "artificial intelligence" to refer to the discipline in its nascent form.

Since then, AI has come a long way, but its evolution has been far from linear. In fact, this seventy-year history is marked by an irregular timeline in which phases of enthusiasm and great progress have been followed by others of indifference. These periods of skepticism and lackluster investment have been called the winters of artificial intelligence (see Figure 1).

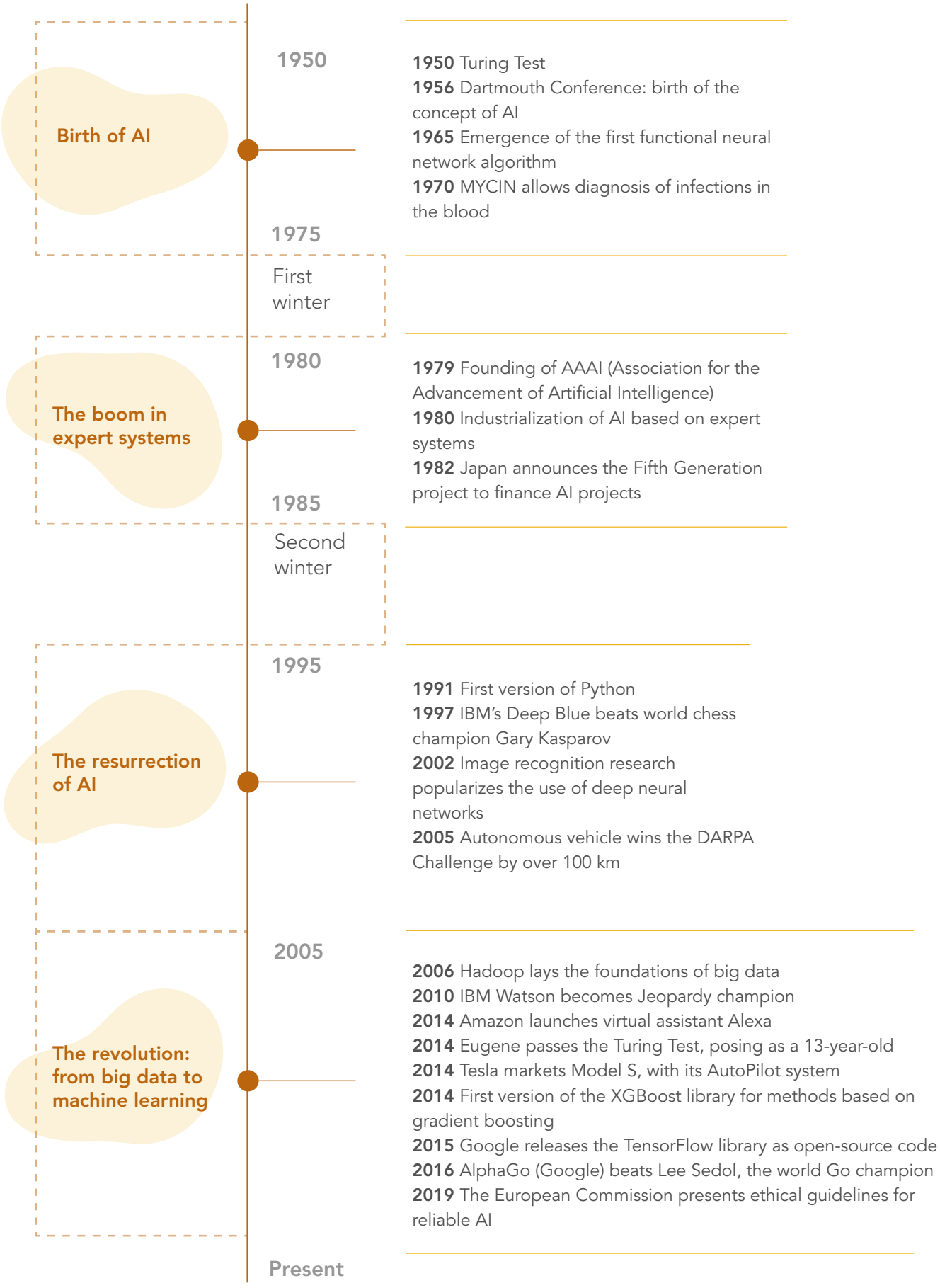
We can see in detail how the seasons have changed throughout the development of AI.

1950—1975. Beginnings: First sparks and moments of glory

Alan Turing's essay published by *Mind* magazine in 1950 (*Computing Machinery and Intelligence*) raised the big question: can machines think? Understanding the difficulty of defining what characterizes a machine and what is considered "thinking," Turing avoids answering this question directly. Instead, he replaces the original question with an imitation game, which would later come to be known as the Turing test. This method measures the human intelligence level of a mechanical device that has now been used for many years. The game involves three participants: one person who asks questions and two people who answer. After a five-minute conversation, the interrogator must decide which of their two conversation partners is a person, and which is a machine. The machine passes the test if it manages to deceive the interrogator, proving that it thinks—or at least behaves—like a human under those conditions.

Many experts consider the Turing test to be first spark of the new discipline, although its theoretical foundations were not laid until several years later in 1956 at Dartmouth University in New Hampshire. There, some of the best experts in neural networks, automation and intelligence met at a summer seminar organized by professor John McCarthy. The discussions held began from the hypothesis that any aspect of learning or intelligence can be precisely defined, meaning that a machine could simulate it. Their aim was to determine whether machines could solve problems that had historically been limited to humans, and learn to improve their performance.

Figure 1. *The timeline of AI*



Source: everis, using public information

Despite the limited computing capabilities of the time, numerous advances were made during the 1960s and 1970s. Among them were the first functional chatbot and networks with "backpropagation," as well as a bubble of expectations that was arising around the possibility of machine translation. Wide press coverage and the generosity of the U.S. Defense Advanced Research Projects Agency (*DARPA*), which granted $2.2 million in funding for such projects in 1963, were also responsible for creating an atmosphere of great excitement, ushering in a golden era for the scientific community working on AI. It was what Professor McCarthy referred to as the "Look ma, no hands!" era.

1975—1980. The first winter

Disappointments in areas such as machine translation—which had built high expectations as a potentially useful tool in the Cold War—as well as difficulties using basic artificial neural networks known as "perceptrons" caused the AI bubble to deflate. In turn, public funding was reduced or disappeared entirely, meaning projects began to stall. The final straw came with the 1973 publication of the Lighthill report in the UK, which concluded that "in no part of the field have the discoveries made so far produced the major impact that was [then] promised."

1980—1985. The boom in expert systems

The immediate future of AI was marked by a brief but intense period. From 1980 onwards, efforts were focused on creating commercial products through area-specific research into expert systems. It was in this way that the discipline arrived at a historical turning point. In the early phases, projects were geared towards what was known as "general" or "strong" AI, which seeks to replicate human intelligence and can therefore be used in multiple activities. Faced with the difficulty of this objective, in the 1980s focus shifted towards "narrow" or "weak" AI, which looked to implement applications and systems in specialized areas such as financial planning, medical diagnosis, artificial vision, geological exploration and microelectronic circuit design.

This change in direction initiated a second wave of interest in AI among global authorities, stimulating the sector once again with the introduction of subsidies. In 1981, Japan announced the Fifth Generation project, a ten-year plan for building the next set of intelligent computers. In response, the United States created the Microelectronics and Computer Technology Corporation (MCC), a research consortium whose objective was to reinforce the competitiveness of the national economy. Although tarnished by the Lighthill report, the reputation of the discipline in Britain was restored in 1982 with the publication of the Alvey report, which proposed a five-year program to mobilize the technical capacities of the British economy. The peak of this investment scheme saw hundreds of new AI companies appear, as well as the emergence of adjacent industries.

1985—1995. A second winter

Just like the first winter, the second phase of inertia in research and investment was precipitated by the disappointing results of programs launched in different countries around the world. As many companies went bankrupt, the expert systems that had been developed began to receive criticism from specialists. The most notable was that of the mathematician who gave the discipline its name, John McCarthy. When warning against possible instances of malpractice, he gave the example of a medical assistance system that

would allow the killing of bacteria, but not save the patient's life.

1995—2005. The resurrection

Towards the end of the century, thanks to the application of specific engineering methods and a significant increase in computing power, we saw major advances in the development of sophisticated research tools.

For example, in 1997, Deep Blue—the chess computer developed by IBM—became the first machine to beat the Russian player Garry Kasparov, who was the World Chess Champion at the time. This had a great impact on the opinion of the public worldwide. That same year, two 20-year-olds from Stanford University in California created Google, which would revolutionize the world of AI in the years to follow. Another milestone was the Grand Challenge, a self-driving car race organized by DARPA in 2005, in which five vehicles successfully completed the 132-mile course.

In addition to these advances, it was also a successful time for the tools that have proven to be indispensable for the development of AI. One of these tools was the programming language Python, named after the British comedy group Monty Python. The first version of NumPy, an open-source numerical calculation library, was also released. These tools lay the foundation for the algorithms that AI uses today.

2005—Present. The revolution: from big data to machine learning

In 2004, Google published an article that popularized program modeling and inspired the creation of Haddop in 2006. Haddop is an open-source system that allows for the distribution of data over multiple computers in order to solve problems that require the analysis of massive amounts of data. It makes it possible to manage large quantities of information in an efficient and cost-effective way. This is how big data was born.

Access to massive amounts of data, reduction in system costs, and improved computer capacity are three key factors that mark the turning point in the explosive development of the field over the last fifteen years. When combined, these three factors facilitated the industrialization of advanced machine-learning techniques, as well as the use of increasingly complex neural networks.

This led us to reach certain technological milestones throughout the century, such as machines based on weak AI. Among those include: IBM Watson, a supercomputer who reads and understands natural language to an extent that allowed him to win a TV game show in 2011; a supercomputer who passed the Turing test simulating a 13-year-old boy in 2014; the rise of virtual reality; and the launch of Amazon's virtual assistant, Alexa, in 2014.

Additionally, thanks to the growth of open-source software, libraries such as TensorFlow and XGBoost allow the capabilities of machine-learning algorithms to be used to the fullest. This is how data science communities, like Kaggle, gained popularity. These communities offer a place to share data in order to train automatic learning machines, and to compete against other data scientists to find the best algorithms to solve use cases, often financed by companies.

In this rich breeding ground, market solutions with extraordinary potential have appeared for the feasible development of various AI systems, such as self-driving cars, facial recognition, or virtual assistants.

In recent years, the implementation of case studies in the industry has led to a keen interest in the ethical, regulatory, and social responsibility aspects associated with the use of AI. This will be further analyzed in Section 2 of this report.

The future: Will the cold return?

AI is more popular than ever before, and not just as a tool for specialists. It has come into our lives and is here to stay, especially because it is used in many of our day-to-day applications. In this global pandemic we are facing as a society—and as an economy—the use of AI in the public and private sectors is bound to make a significant contribution on the road to the "new normal." AI can be used in the fight against the virus, whether it be by accelerating research for treatment and vaccines, or developing machines to detect the spread of the pandemic. AI can also be helpful in the recovery process, by helping companies act more efficiently during the crisis. However, under the current circumstances, and in the midst of unprecedented economic turmoil, it is quite difficult to know if a third winter for AI is coming. What is quite clear, though, are the high expectations AI generates today. The statement that Sundar Pichai—CEO of Alphabet Inc. and its subsidiary, Google—made at the World Economic Forum in Davos 2020 is more relevant than ever: "AI is one of the most profound things we're working on as humanity. It's more profound than fire or electricity." Is this fact or an exaggeration?

Maybe a bit of both.

The history of AI in banking: delayed, but intense

AI did not arrive to the financial sector until the 1980s. In the 30 years leading up to this, the focus of the field was on the development of AI's basic functions, such as neural networks or its use of algorithms, as well as on solving algebraic or linguistic problems.

However, the boom of expert systems—which refocused AI towards specific areas known as weak AI—caused researchers to begin to look into the financial industry. In 1982, for example, Apex created PlanPower, an AI program for tax and financial advice offered to clients with incomes of over $75,000.

That same year, famous mathematician James Simons developed Renaissance: a hedge fund that pioneered quantitative investing. Renaissance uses a combination of mathematical and computer-based systems to execute stock market trades.

In 1987, Chase Lincoln First Bank (now part of JP Morgan Chase), launched the Personal Financial Planning System. Shortly after, in 1989, FICO Score, a credit scoring formula based on a similar algorithm used by banks today, was released.

In the 1990s, the use of AI to detect fraud piqued great interest. In 1993, the United States Department of the Treasury sponsored the implementation of the FAIS system. FAIS has the ability to predict and identify potential money laundering incidents by processing up to 200,000 transactions a week.

The use of AI in the financial market has also had its upsets. The tampering with an automated program caused an extraordinarily sharp, albeit momentary, drop in the New York Stock Exchange, known as the flash crash of 2010.

In the 21st century, the use of AI has skyrocketed. For more than a decade now, banks have been using machine-learning techniques to detect credit card fraud. In 2014, the British fund manager, Man Group, began using AI to invest its clients' money. In 2016, Bank of America launched its chatbot Erica, which was considered a milestone in customer interaction. In 2018, various institutions announced the development of recommendation systems.