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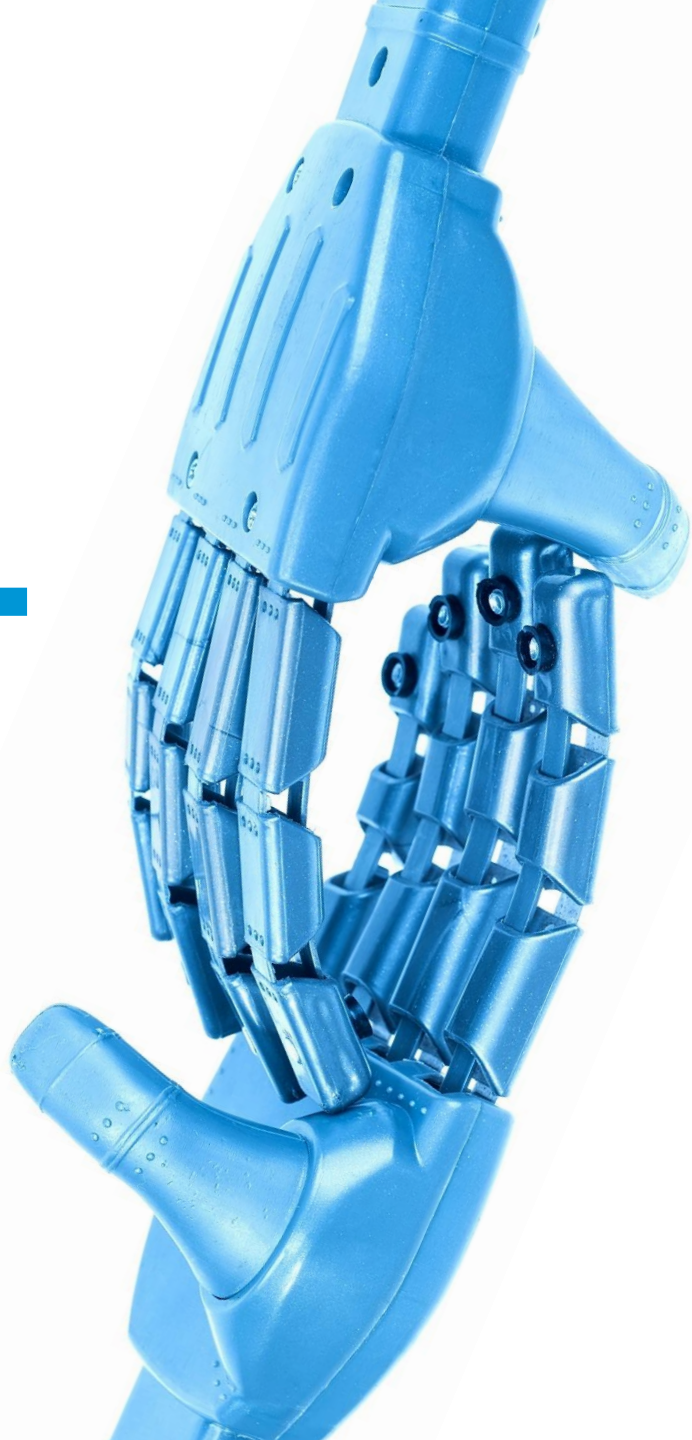
THE AUTOMATED LEARNING IS
GAINING GROUND IN ALL SECTORS

ARTIFICIAL INTELLIGENCE



FINTECH SERIE BY innovation edge

01 /INTERVIEW

"Artificial intelligence is not around the corner"

The director of the Artificial Intelligence Research Institute at the CSIC, Ramón López de Mántaras, talks about the progress of automated learning and points out that common sense is the biggest challenge for AI.

"It is said that within 30 years machines will be smarter than us. That they will be superior to us. In reality, we are currently developing specific intelligences. The system performs a task very well, better even than human beings: there are systems that are able to make a better diagnosis than a doctor but they do not possess general medical knowledge; or they can beat us at a specific game but are unable to play any other game. Artificial intelligence is not around the corner."

Ramón López de Mántaras, the director of the Artificial Intelligence Research Institute at the CSIC, has no doubts about the potential of AI. From his office at Universidad Autónoma de Barcelona, he qualifies the progress of the branch of computer science that develops programs to emulate human beings in terms of their learning and logical thinking.

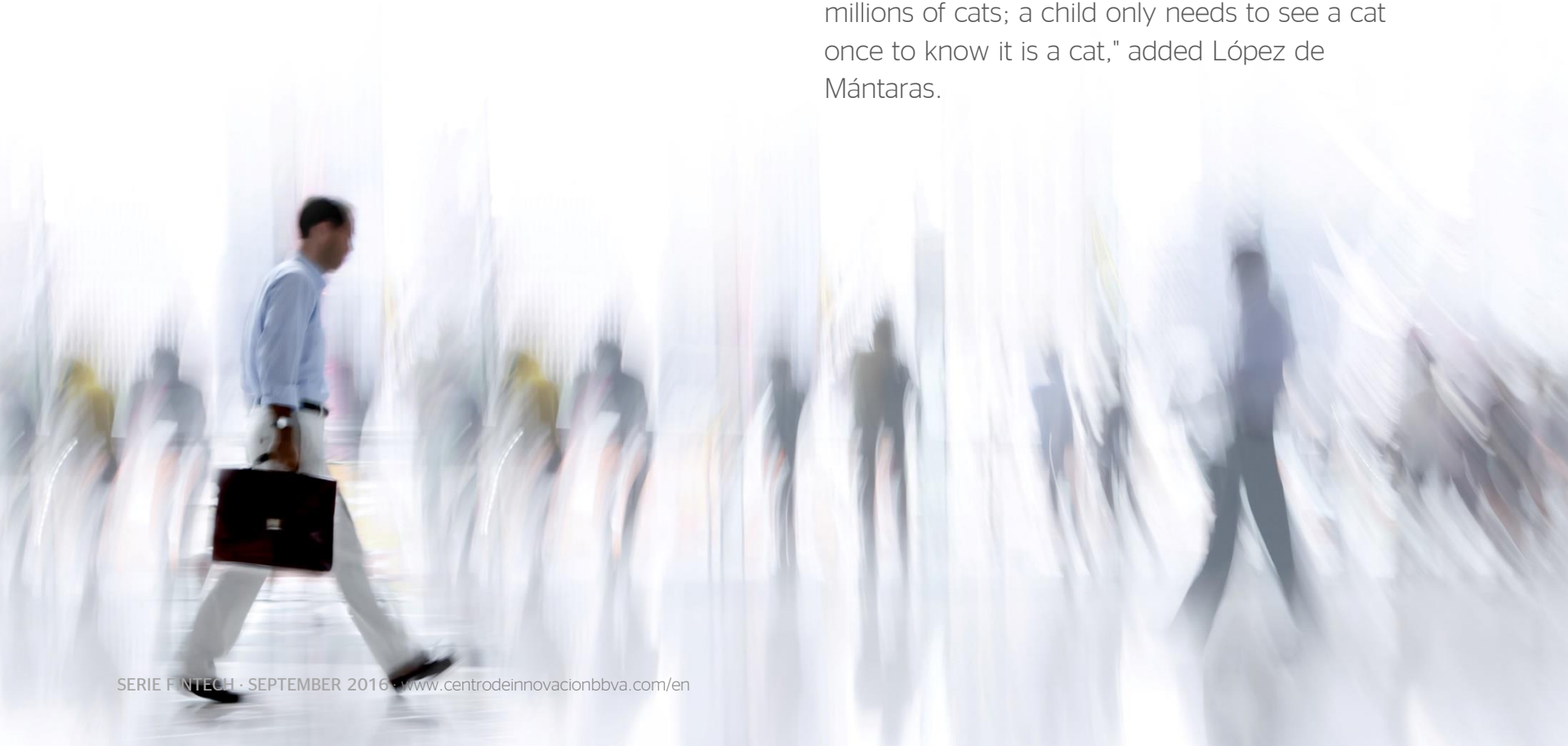
According to López de Mántaras, common sense is the biggest challenge faced by artificial intelligence. "The general 'question-answer' interaction with deep semantic exchange is not impossible but I think it will take a while; and I mean decades. There are specific algorithms that can do plenty of different things but they are independent from each other."

The researcher stresses that in a specific area (e.g. banking) it is possible to hold an intelligent conversation. "If 90% of people are going to, for example, use bank-related terms online, the machine is able to represent and anticipate the concepts that will be used, establish relationships and add semantic depth. From there, the robot can hold what you could call an intelligent conversation. However, if the terms change, the machine is unable to respond. **When you move out of a specific framework, the conversation is over."**

The problem arises when general concepts are involved: "Two examples: Google Translate is pure statistics and, for this reason, it's a pretty stupid and fragile system. Some of its translations are a disaster. Also, there is no reasoning behind artificial vision and, as a consequence, when we ask the machine to interpret the image of a baby with a tooth brush in front of its face, it tells us that the baby is holding a baseball bat. There are millions of photos of children with baseball bats online. It's a photo you can find anywhere and that's what the system learns. This is the **weakness of a system based on mass data analysis."**

And where is artificial intelligence less fragile? The researcher mentions two areas – reinforcement learning, e.g. logistics and its assembly lines; and inductive learning, e.g. the robot recognizes chairs: even if it is seeing chairs that it has never seen before, it identifies common characteristics since it is able to generalize.

In terms of vision and language, artificial intelligence is progressing less because of the high number of examples to be learned. Perception and communication are very complicated since **machines possess no implicit knowledge or experiences:** "Learning based on mass data analysis works when you use millions of examples – a system recognizes a cat because it has seen millions of cats; a child only needs to see a cat once to know it is a cat," added López de Mántaras.



Ethics of artificial intelligence

The physicist is very hard on the aura surrounding AI: "When we talk about artificial intelligence, we are talking about very specific intelligences. It's not what you see in the movies or what you hear about: people who talk about post-humanism as a consequence of technological singularity don't really know what they are talking about since none of the people selling the idea that we will become obsolete are experts in artificial intelligence. **I don't agree at all that artificial intelligence means the end of Humanity.“**

Ethics is also a concern for the researcher. He points out that it is important to have regulations and make brave decisions. "We should ban bots that buy and sell in the stock markets in milliseconds or less because they take over the system and human traders don't have anything to do.“

"There are already competing software companies and it is unacceptable that they dominate the lines of communication and make it impossible for other companies to enter the market. And they also push human buyers out. They are very dangerous and destabilize the economy," he warned.
While he waits for regulations, his team of 60 at CSIC keeps working on a single system that integrates all capacities of intelligence so that **robots can perform increasingly more complex tasks.**

02

"Robo-advisors" for a more inclusive financial system

Robo-advisors are becoming increasingly popular as a useful tool for making good financial decisions. The Colombian company Alkanza develops these automated services that use algorithms, artificial intelligence and machine learning to analyze millions of potential investments and provide users with the best options for ensuring profitability from the money they invest.

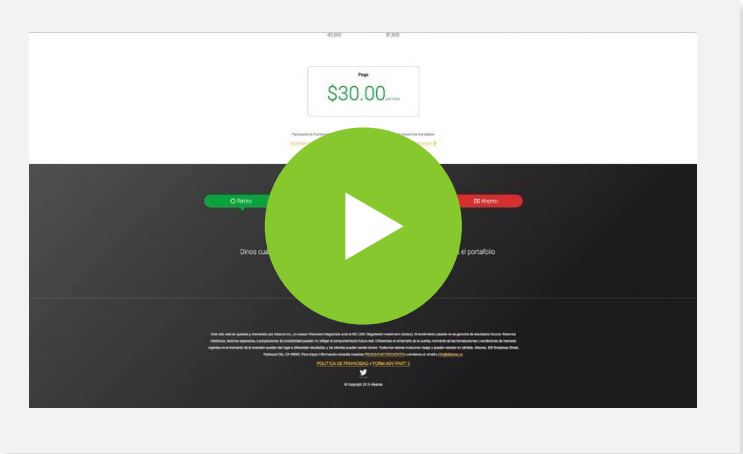
Alkanza

Created by the Colombian Andrés Villaquirán, is a technology company dedicated to the diversification and strategic selection of its users' assets. This is how it works: the users define their goal, for example: buying a house, paying for their studies, ringfencing their money for their retirement.

Alkanza's systems then analyze the investment funds offered by the users' bank to achieve the widest possible diversification, and from there creates an investment portfolio.

In countries like the United States, Mexico and Brazil, where Alkanza is already more consolidated, the portfolio is automatically implemented –that is, after consultation with the user, **the system automatically tells the bank which products the user should invest their money in**. The service is still not totally automated in Colombia, as although Alkanza can identify opportunities, the users themselves must make the adjustment or rebalance their portfolio.

Andrés Villaquirán shares some tips about robo-advisors and their role in the fintech world.



What value do robo-advisors contribute to the financial ecosystem?

Using robots and algorithms allows you to offer very low-cost solutions for people who don't have abundant resources to invest. For banks, the cost of giving advice to people who do not have high investment capital is quite considerable, whereas with these automated systems the cost of support is significantly less.

What is needed for robo-advisors to be able to work to their maximum potential in countries like Colombia?

There are two challenges: on the one hand, smaller banks still don't have the technology to allow them to connect to robo-advisors. In the case of large companies, it's more a question of willingness. In countries like the United States, many banks have even created their own robo-advisors, so we should get ready to see an integrated ecosystem of financial technology in the future.

How do you gain the trust of a customer who looks to you to manage their money profitably?

The first thing is that **we're regulated like any other financial institution.** Another important point is that we don't have access to our customers' money –we only have access to be able to instruct the bank to invest the money in a particular product. Our servers connect directly with the bank's servers to tell them how to manage our customers' investment.

The key also lies in the **reports that are regularly sent to the customers** so they can see the state of their investments clearly and intuitively from any device.

We also pay attention to transparency. We inform the customers of the costs and fees from the start.

How is the customers' information managed?

All the information is confidential. We work with blind algorithms, that is, they have access to the data to make the calculations, but they don't need to use the users' names or personal information.

What's your business model?

Right now our business model is that we charge a percentage of the asset under management, but we're moving to a model where we can charge customers only when they make money, and we want to give them some return even when they don't make money. We believe that's the way it should be.

How do you use the analytics derived from past investments to refine your algorithms?

As you get to know your customers better from the financial point of view, and you have algorithms that allow you to process this information with machine learning and artificial intelligence, you can offer them significantly better financial advice. Every day we revise our users' portfolios to analyze how they react to new market information, we assess over a million investment options to find the most suitable diversification. The idea is to make adjustments or rebalances that allow us to achieve the goal proposed by our customer.

What questions should users ask when choosing a robo-advisor?

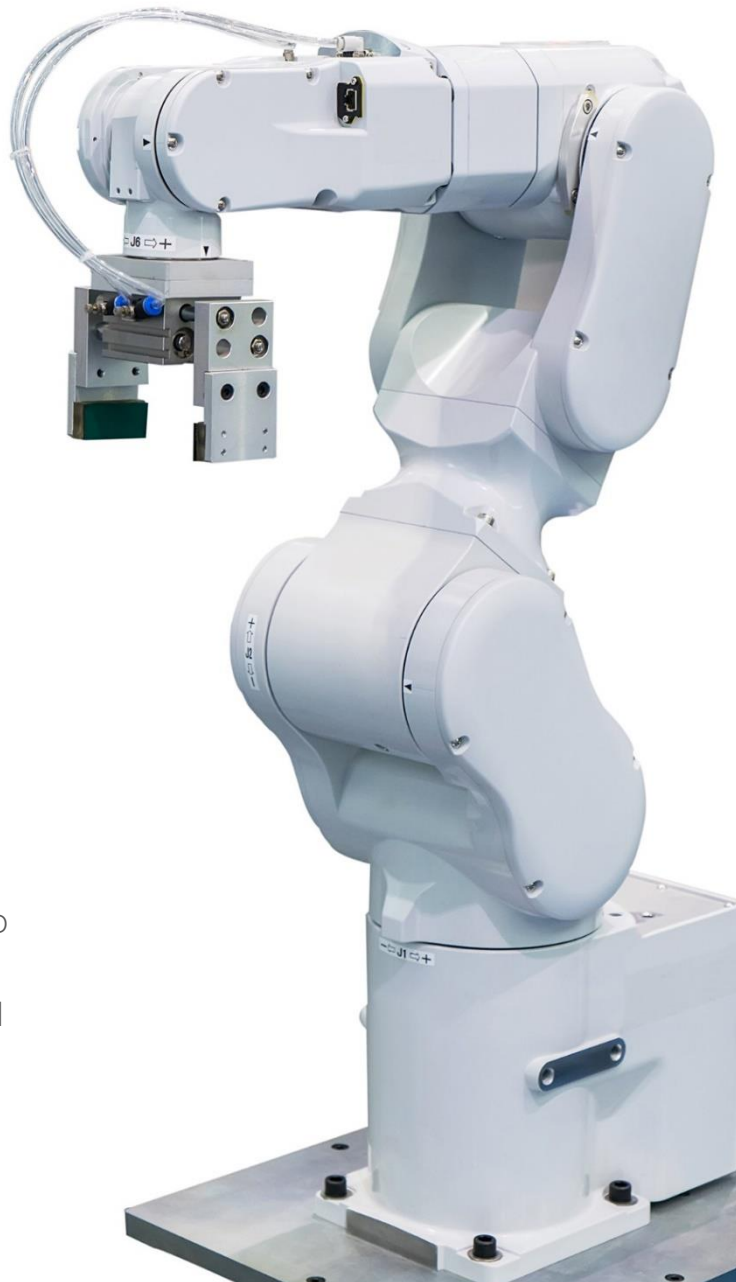
In addition to choosing an intuitive platform, users should keep a close eye on the results of their portfolio management. The robo-advisor should allow them to track the results, everything should be transparent. That's what the customer deserves and what makes the difference. It's also important to look carefully at the experience and training of the people who are going to provide you with the service, and of course, to make sure the service is supervised by a regulatory body.

03

Can AI be regulated?

US technology giants are coming together to look into the ethics of the progress in AI.

The robot boom has brought **people's fear** of losing their jobs to a new peak. People are also asking whether machines will be uncontrollable and go against humans. This is a fear that, as **The New York** Times has reported, **has led five technology giants to want to create an ethics standard for** artificial intelligence (AI). Researchers from **Google, Alphabet, Amazon, Facebook, IBM and Microsoft** have met to discuss the most tangible issues, such as the impact of AI on employment, transport and even wars.



For a long time, technology companies have made exaggerated promises of what artificial intelligence machines could do. Movies reinforced these dreams. But it's no longer science fiction. In recent years, AI has rapidly evolved in many areas, from cars and self-driving machines that react to the human voice, such as Amazon's Eco, to the manufacturing of new weapons that threaten to automate combat.

In July 2015, a thousand experts, including physicist Stephen Hawking, the cofounder of Apple, Steve Wozniak, Elon Musk, founder of Tesla, co-creator of PayPal, linguist Noam Chomsky, and Demis Hassabis, chief executive of Google's artificial intelligence company, **signed a petition alerting of the dangers of artificial intelligence** and demanded it be regulated.

Standford Projet

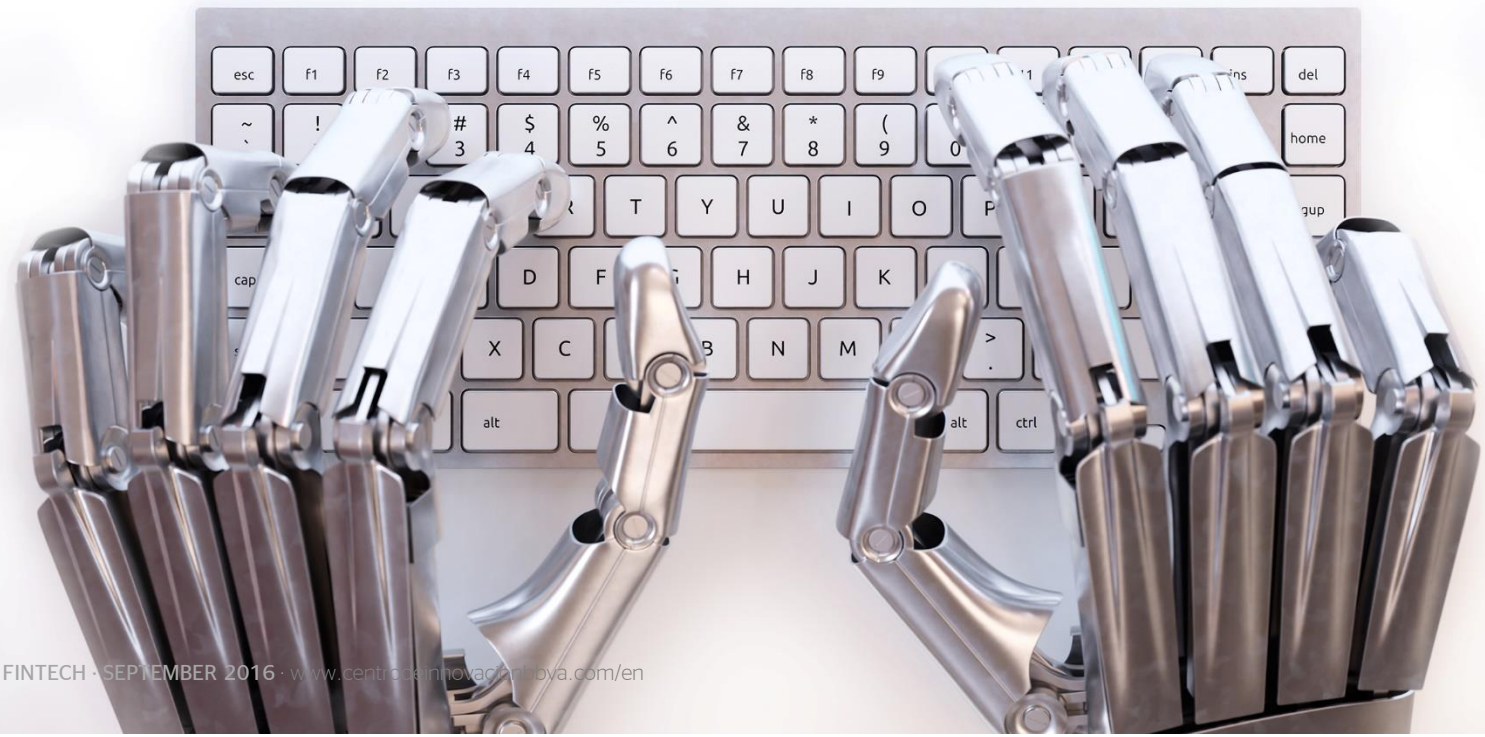
A year later -although the details of what the industry is going to do or say is still not clear- it's obvious that the large technology companies want to ensure that **research into AI is focused on benefiting people**, and not causing them harm.

The importance of the industry's effort has resulted in a report published by a group of experts from Stanford University led by Eric Horvitz, a Microsoft researcher. **The Stanford project** A study into one hundred years of Artificial Intelligence, traces a plan to draw up a **detailed report about the impact of AI on society every five years for the next century.**

"We're not saying that there shouldn't be any regulation" says Peter Stone, IT expert at the University of Texas in Austin, and one of the authors of the Stanford report. ***"We're saying that there's a right way and a wrong way*** to do things".

As the US newspaper pointed out, it's not the first time that technology giants, who are normally is fierce competition, have come to an agreement on something: in the 90's, for example, technology companies created a standard method for encrypting e-commerce transactions, laying the foundation for the decades of growth of Internet businesses.

The authors of the Stanford Artificial Intelligence and Life in 2030 report argue that it **will be impossible to regulate AI**. "The consensus of the study agrees that attempts to regulate AI in general would be an error, since there is no clear definition of what AI is (it's not just one thing), and the risks and considerations to bear in mind are very different for the different domains", says the report.

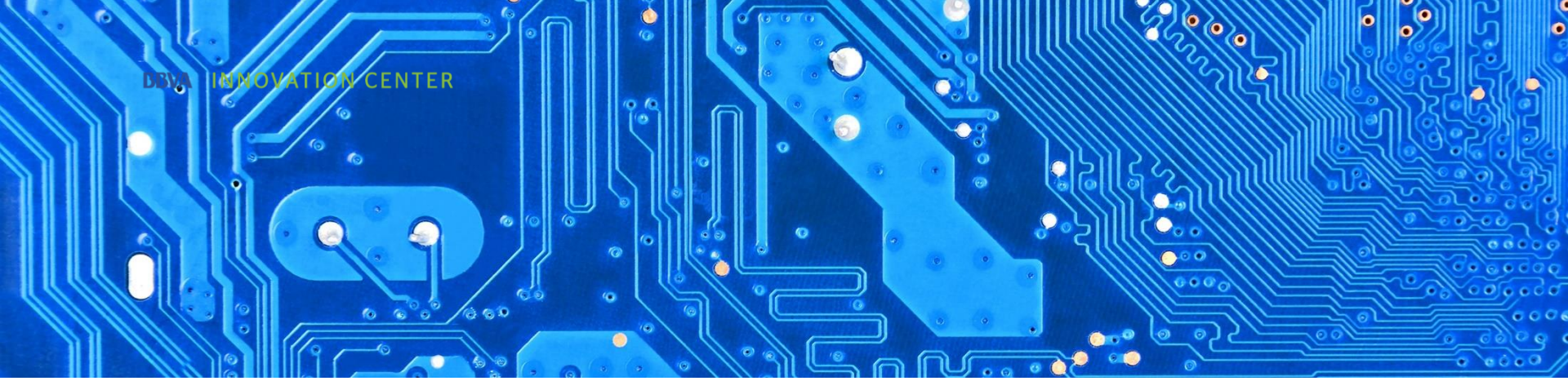


Increasing awareness

One of the **recommendations in the report is to increase the awareness and experience of AI throughout the government**, explains Stone in the US newspaper. An increase in public and private expenditure in AI is also requested.

"The Government has its role as the government and we respect that", says David Kenny, general manager of the Watson artificial intelligence division at IBM "The challenge is that politics often sets technology back".

A memorandum has been distributed among the five companies to try and announce the creation of the new organization in mid-September. One of the unresolved problems is that Google DeepMind, an affiliate of Alphabet, doesn't want to participate.



Reid Hoffman, founder of LinkedIn with experience in Artificial Intelligence, is in talks with the Media Laboratory at the Massachusetts Institute of Technology (MIT) to finance a project to explore the social and economic effects of artificial intelligence. Both the MIT initiative and the association of the industry are trying to **closely link technological advances with political, social and economic issues.** The MIT group has been discussing the idea of designing new AI and robotic systems with "society inside the circle".

The phrase is a reference to a long debate about the design of IT and robotic systems which still require human interaction. For example, the Pentagon recently began a military strategy that requires the use of AI, but in which humans continue to control decisions when it comes to killing someone, instead of delegating this responsibility to machines.

"The key that I would like to point out is that IT scientists are not good at interacting with social scientists and philosophers" says Joichi Ito, director at the MIT Media Lab and member of the board of directors of The New York Times. **The future will tell whether ethics is imposed on artificial intelligence.**

04/CASE OF SUCESS

Inbenta: AI serving bank customers

The Catalan company specializing in artificial intelligence closed a $12-million investment round to expand its technology.

"I need to send money to Bogota" is an obvious phrase that any human understands. In the case of a computer, it's not as easy, as it's not going to find any content containing those words in the internal documentation. In the semantic world sending money is related to transferring. We develop technology for the system to understand that with those words you want to make an international transfer. It understands it and it's going to say how to do it. It's **the magic of natural language processing".**

This is how David Fernandez, managing director of customer satisfaction at Inbenta, explains the technology developed by this firm specializing in **natural language processing and semantic search.** Fernandez exemplifies how artificial intelligence can operate in the banking sector although the software they develop is applied in many sectors.

Founded in 2005, Inbenta has closed a investment round **of $12 million** (10.6 million euros) this week to enhance its technology on the market. Large companies, including BBVA, Iberdrola, Axa and Telefonica, **use cognitive models to interact with the user.**

"These systems interact directly with users to end up topping up the balance on a mobile phone or adding money to a card. They are transactions you can perform through a chatbot. You no longer have to go to a branch or log into the private area of a website to perform basic operations. You do it on your mobile. The potential is enormous" says Fernandez.

This **chabot** "has a **dialogued module** that will ask for information and then perform the entire transaction with the bank's internal applications, customized and with independent responses."

Semantic search technology accesses information through the company's Knowledge Base (FAQs) to find the **most relevant response**. For the artificial intelligence to work, Inbenta develops search **engines based on the contextual meaning of the questions that the customers** ask instead of just writing keywords.

Thanks to this, they can infer that when you write 'I will send money', you want to make an international transfer or when you're in a bank website and write 'pay', you're talking about money.

Behind those engines, Fernandez stresses, there's a team of **30 experts in computational linguistics.** The language is alive and philologists fine tune intelligent search engines every day.

And how much does this technology cost?

The Inbenta representative replies that "it costs less than it's worth" and clarifies that the "system makes more sense when there's a significant volume of data; it's very useful for large companies. If thousands of users enter seeking information to solve problems, the technology becomes much more valuable. It's an added value in customer service channels."

The company's R&D centers are in Barcelona although it has offices in France, Brazil, Chile and the Netherlands. Without forgetting the **U.S** because, in his opinion, "If you're a technology company and want to continue to grow, you have to be in **Silicon Valley**". The American market generated along with **Spain** about 85% of the group's total revenues - it closed 2015 with a turnover of five million dollars (4.6 million euros) - although Fernandez stressed that **Latin America** is beginning to implement **artificial intelligence** solutions and it's one of the next markets they aspire to conquer.

05/INFOGRAPHIC

Artificial intelligence

Artificial Intelligence (AI) is a branch of computer science with strong roots in other areas such as logic and cognitive science.

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Historia

1958

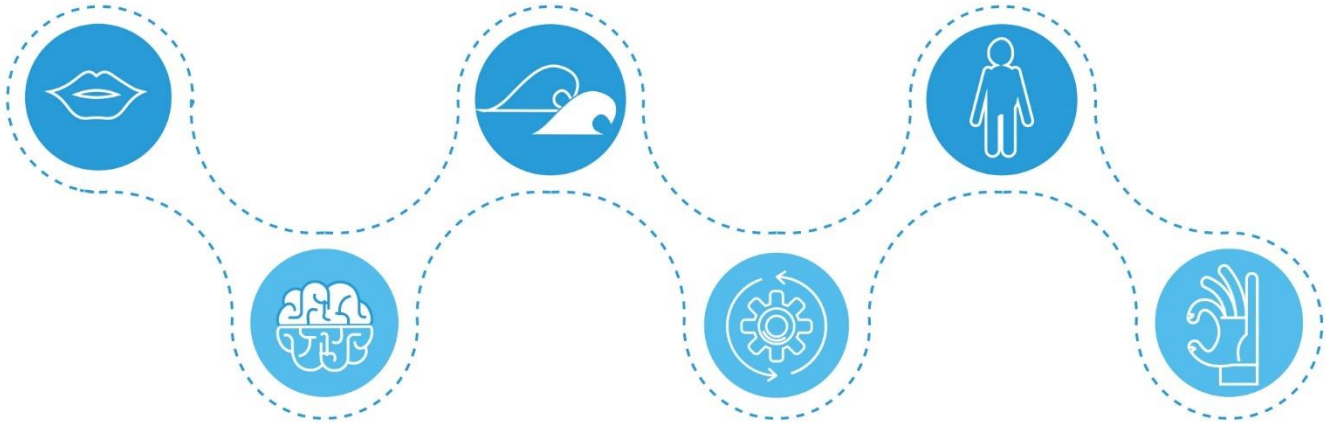
John McCarthy creates **"LISP",** the first language that was processed symbolically rather than numerically.

1973

"Wave," the first text programming language for robots, is created.

2011

Honda presents its renewed humanoid robot, **"Asimo"**, equipped with autonomous behavior control technology.



1965

Stanford University carried out research on **"expert systems,"** specialized programs that can solve problems.

1996

Intelligent agents are born; they are able to perceive their environment and act rationally.

2014

Osaka University and Toshiba design an **android** that is able to use sign language.

What is it?

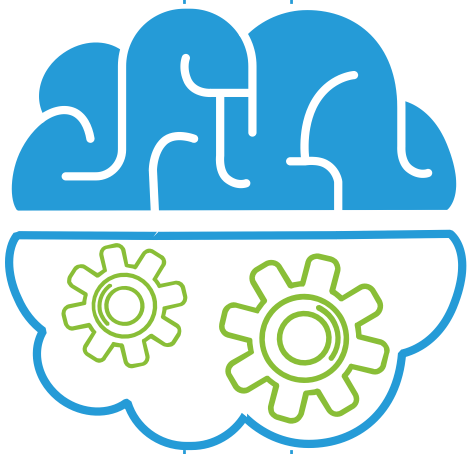
The issue of artificial intelligence is defined as building a machine in such a way that if its behavior were to be shown by a human begin, it would be considered to be intelligent.

Act like people

The model for assessing programs is based on human behavior.

Reason like people

What really matters is how reasoning takes place rather than the result of said reasoning.



Rational reasoning

Logic formalizes reasoning and it is used with this goal in mind. .

Rational behavior

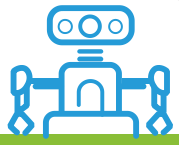
The challenge consists of the results, as objectively assessed. How these results are calculated does not matter.

APPLICATIONS

To this day, many applications are using some of the methods or algorithms designed in the context of artificial intelligence.

Gaming

Intelligence has always been thought of as naturally able to play. Artificial intelligence has been used in gaming to defeat the best human players.



Robotics

Robotics applications date back to the beginning of computing. There have been several goals, such as automating industrial processes, military applications and space exploration, among other objectives.

Vehicles

Countless types of vehicles with varying levels of autonomy have been built:

- The subway in the Japanese city of Sendai
- Unmanned aerial vehicles (UAV)

Robo-advisor

Banks use artificial intelligence to provide advice to their customers (robo advisors). These advisors replace traditional advisors and automate investment portfolios

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