

# XXIV Jornada de la Societat Catalana de Qualitat Assistencial

**GIRONA**

**5 i 6 de juny 2024**

Abordatge integrat de la persona:  
posem el **focus** en  
les **transicions**  
assistencials

# IA generativa i transformació digital en salut

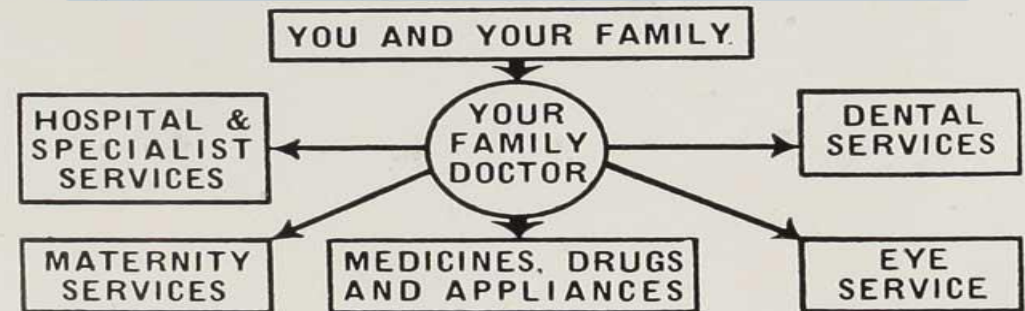
**JULIO MAYOL MARTÍNEZ**  
Director de la Unitat d'Innovació  
de l'Institut de Investigació  
Sanitaria del Hospital Clínico San  
Carlos (IdISSC) (Madrid).



# YOUR NEW NATIONAL HEALTH SERVICE

On 5th July the new National Health Service starts

Anyone can use it—men, women and children. There are no age limits, and no fees to pay. You can use any part of it, or all of it, as you wish. Your right to use the National Health Service does not depend upon any weekly payments (the National Insurance contributions are mainly for cash benefits such as pensions, unemployment and sick pay).



## CHOOSE YOUR DOCTOR NOW

The first thing is to link up with a doctor. When you have done this, your doctor can put you in touch with all other parts of the Scheme as you need them. Your relations with him will be as now, *personal and confidential*. The big difference is that the doctor will not charge you fees. He will be paid, out of public funds to which all contribute as taxpayers.

So choose your doctor now. If one doctor cannot accept you, ask another, or ask to be put in touch with one by the new "Executive Council" which

has been set up in your area (you can get its address from the Post Office). If you are already on a doctor's list under the old National Health Insurance Scheme, and do not want to change your doctor, you need *do nothing*. Your name will stay on his list under the new Scheme.

But make arrangements for *your family* now. Get an application form E.C.1 for each member of the family either from the doctor you choose, or from any Post Office, Executive Council Office, or Public Library; complete them and give them to the doctor.

There is a lot of work still to be done to get the Service ready. If *you* make *your* arrangements in good time, you will be helping both yourself and your doctor.

Issued by the Department of Health for Scotland

A

This advertisement appears in selected Sunday, Morning and Evening newspapers in Scotland.

# Problemas de los sistemas sanitarios

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Variabilidad injustificada de calidad y resultados

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Daño

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Desperdicio

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Inequidad

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Falta de prevención

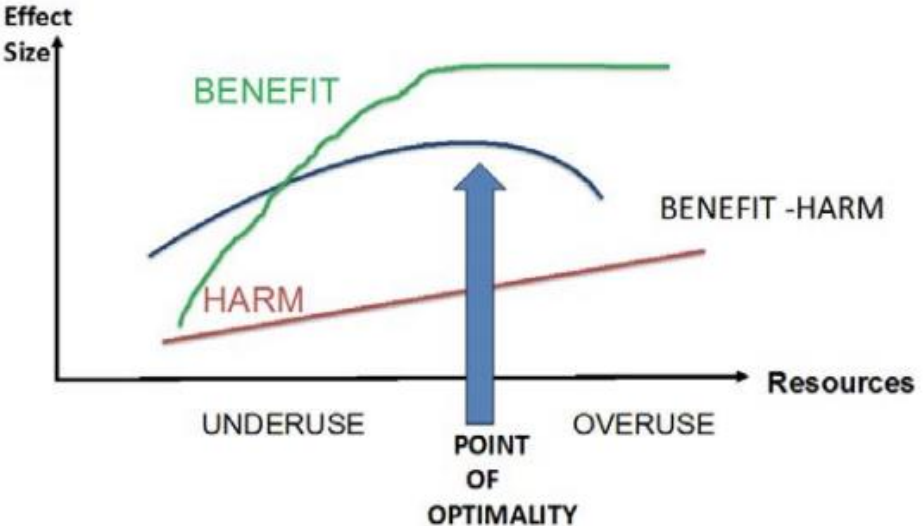
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Deshumanización

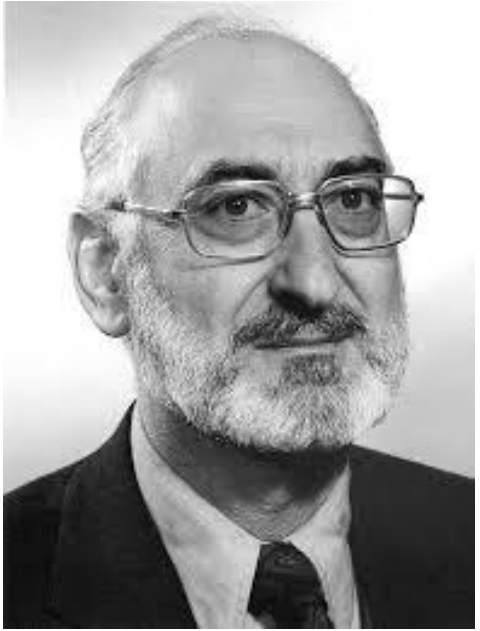
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Impacto medioambiental

# Optimización: en sanidad, más no es mejor



**Figure 1.** What this shows is that as increased investment takes place the benefits increase quickly at first and then flatten off whereas the harm that results goes up in a straight line, or may even increase faster than the direct relationship if people are treated are at high risk of complications and side effects.



umber 55, Summer 2019

**Value Based Surgery**

**Introducing our Guest Editor Professor Julio Mayol**

We are delighted to announce that Professor Julio Mayol is the Guest Editor of the Summer Issue of JASGBI.  
Julio is a general and colorectal surgeon and currently serves as Chief Medical and Innovation Officer at Hospital Clinico San Carlos, Madrid and Professor of Surgery at Universidad Complutense de Madrid.  
He leads the Innovation Unit at Instituto de Investigación Sanitaria San Carlos and serves



**Contributors**

**Sir Muir Gray**

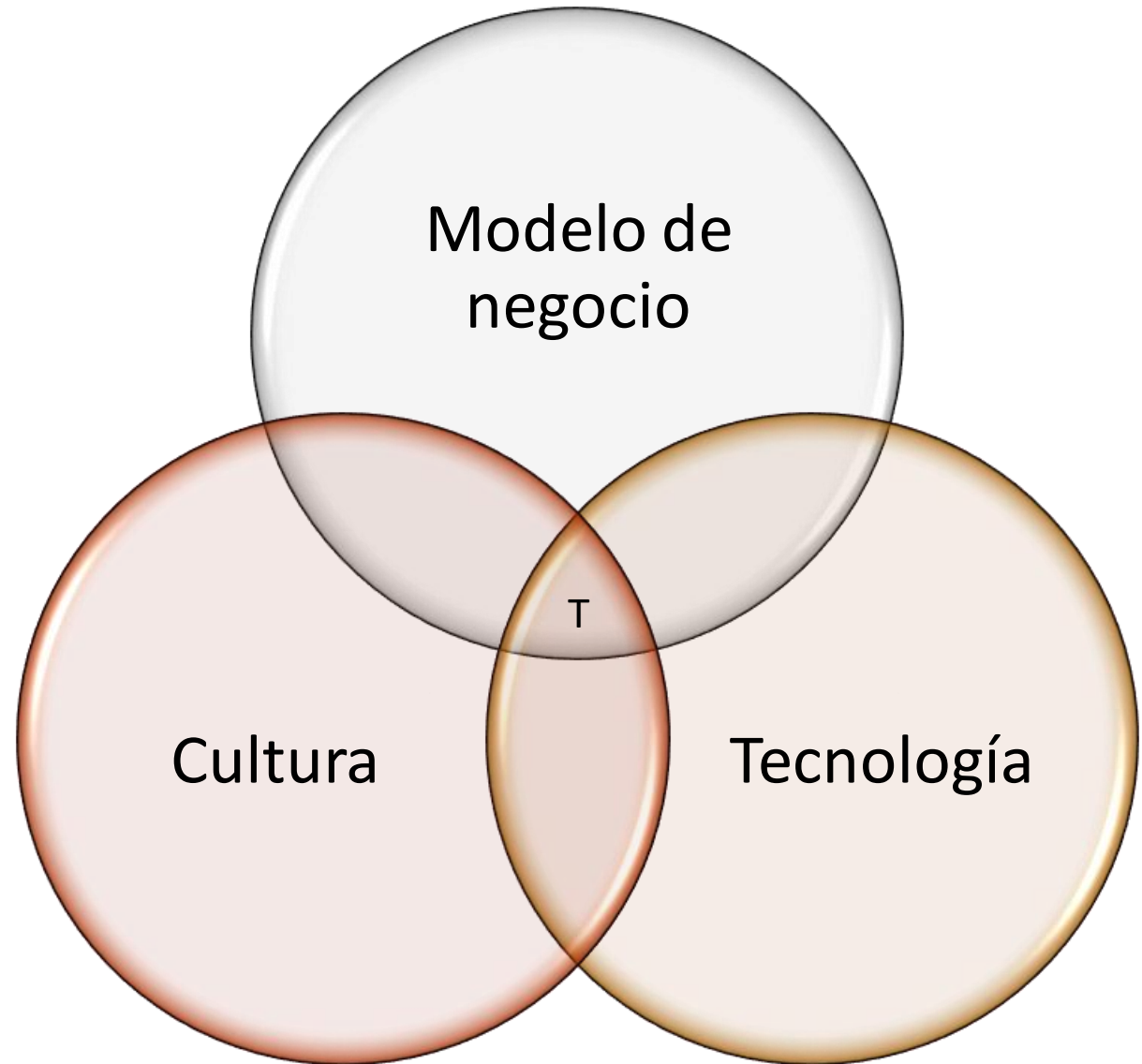
Sir Muir Gray is a Consultant in Public Health in Oxford University Hospital NHS Trust and a professor in the University of Oxford's department of Primary Care Health Sciences.  
He is also a Consultant in Public Health for www.ukactive.com.  
Muir has worked in the Public Health Service in England since 1972. He has carried out a number of tasks in that time, for example the development of the National Screening Committee.  
He is developing Better Value Healthcare, whose mission is to publish handbooks and



development programmes designed to get more value from health care resources in England, and worldwide.  
He is the author of Sod70! and with Diana Moran the joint Author of Sod Sitting, Get Moving.

umber 55, Summer 2019

# Innovación



# ¿Qué es valor personalizado?

(Beneficio – daño) x (PROMs + PREMs)

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Costes (€ + tiempo + CO2)

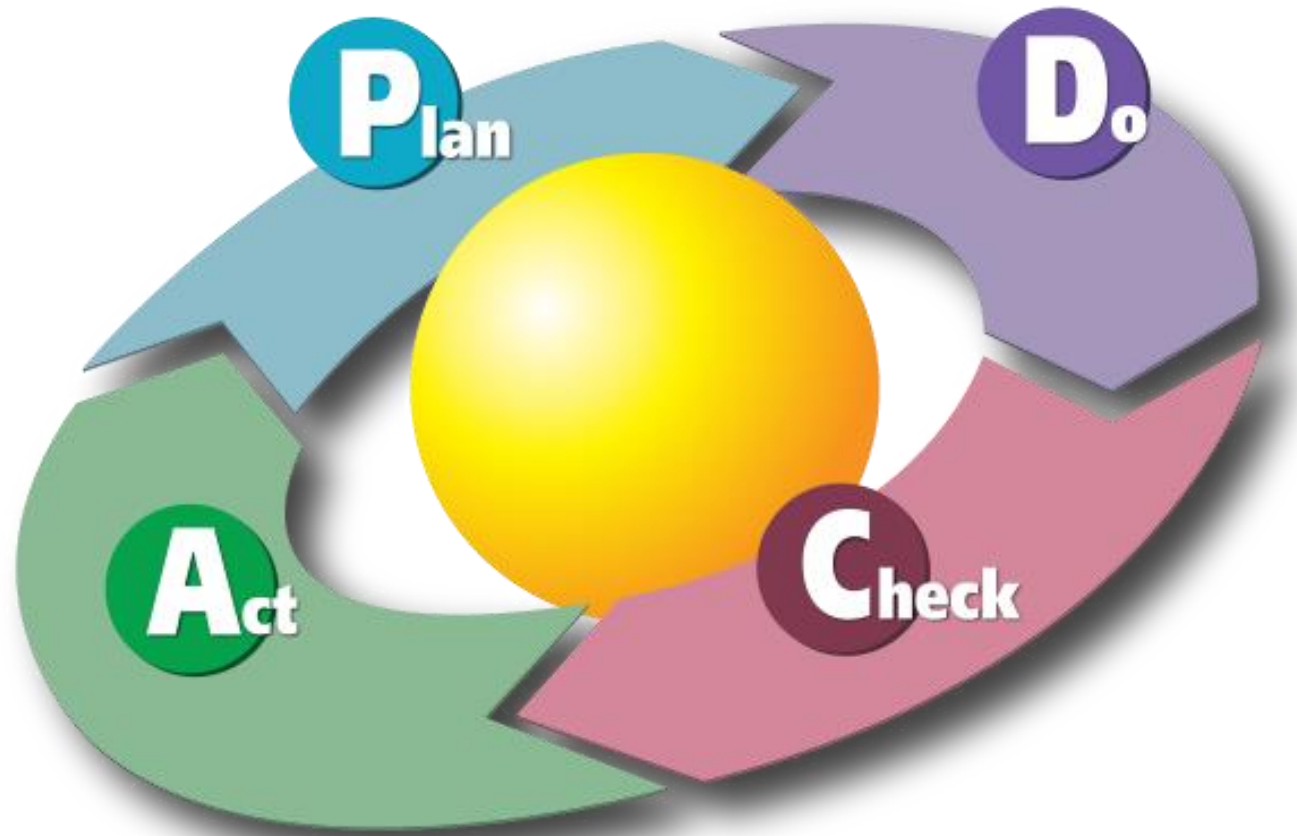
Personalized and population  
value

Sir Muir Gray

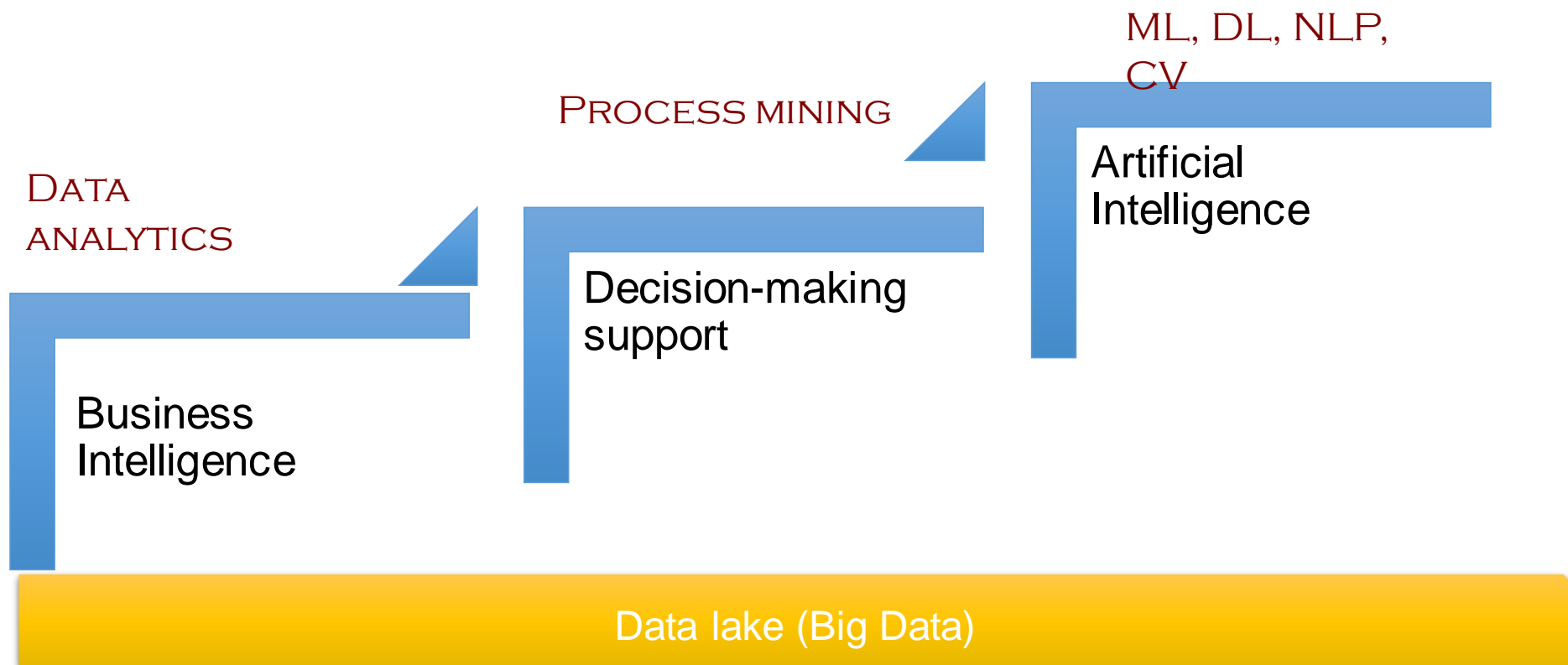




La mejora  
continua



## Datos sanitarios y tecnología



# Ada Lovelace, Alan Turing y John Von Neumann

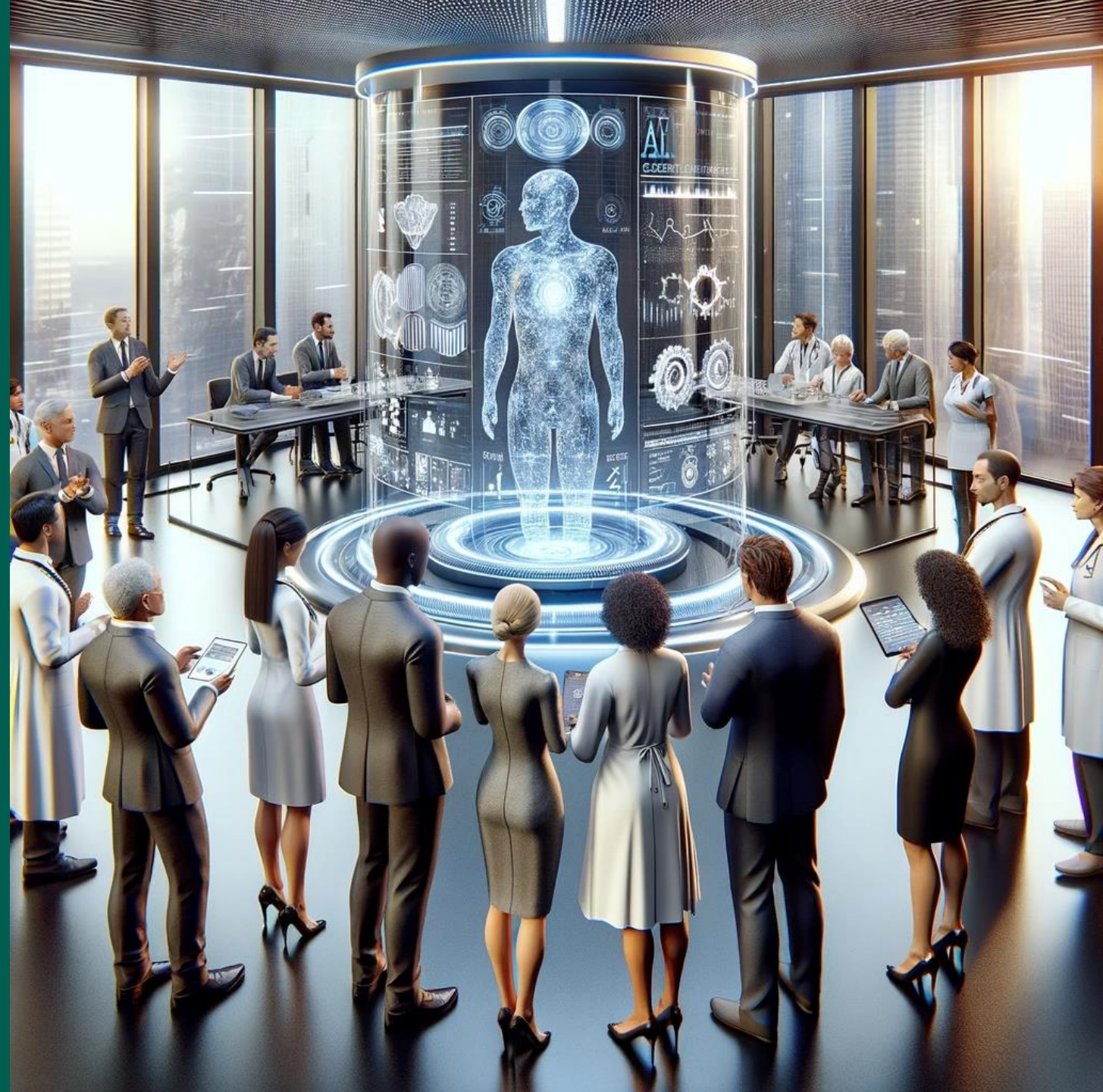


ds This is only a foretaste of what is to come and only the shadow of what is going to be

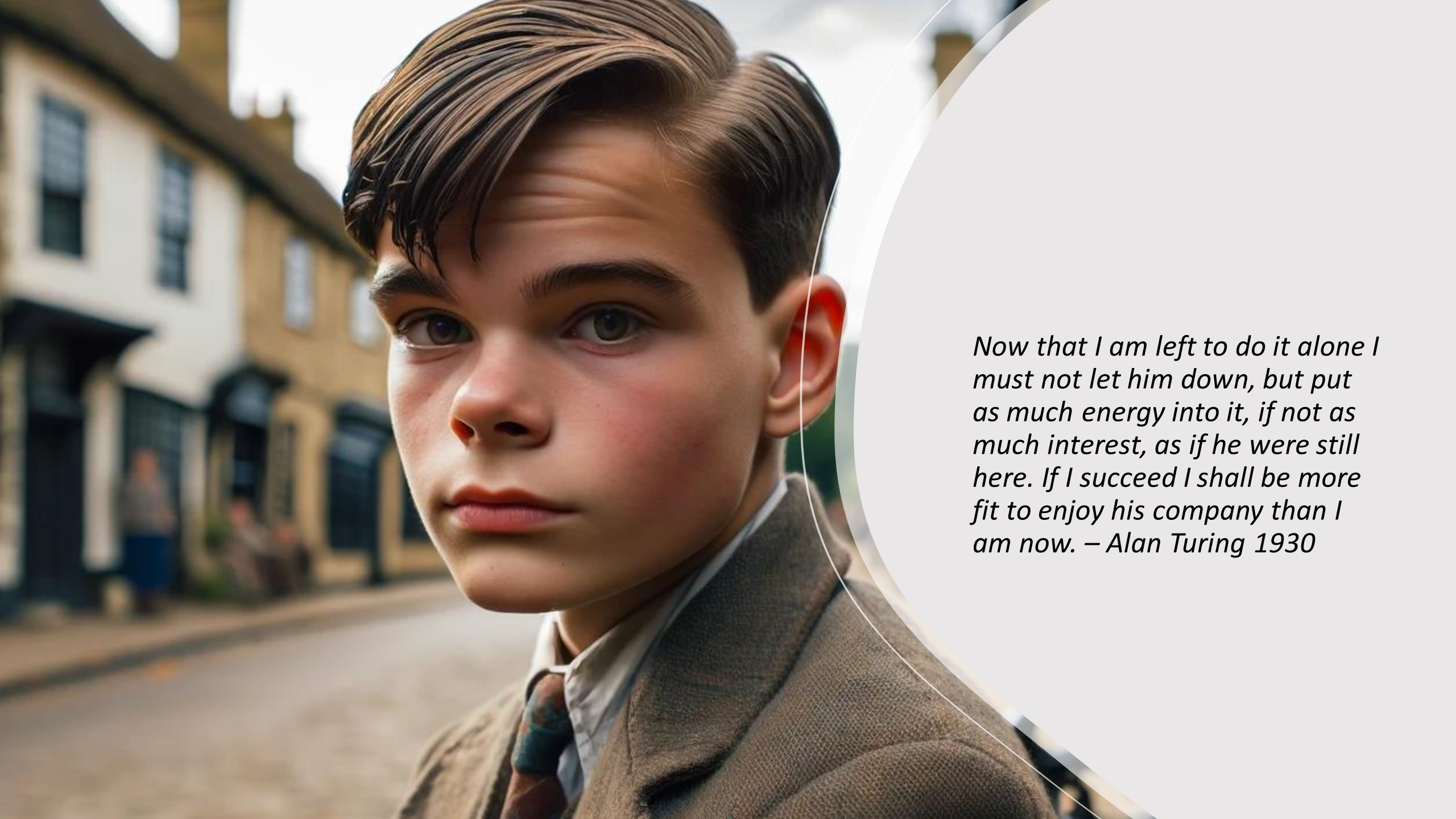
# Inteligencia artificial

Es la capacidad de una máquina de simular las mismas habilidades cognitivas que los seres humanos:


1. Razonar
2. Aprender
3. Planear
4. Crear







*Now that I am left to do it alone I must not let him down, but put as much energy into it, if not as much interest, as if he were still here. If I succeed I shall be more fit to enjoy his company than I am now. – Alan Turing 1930*



# La máquina de Turing - 1936



MIND  
A QUARTERLY REVIEW  
OF  
PSYCHOLOGY AND PHILOSOPHY

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I.—COMPUTING MACHINERY AND  
INTELLIGENCE

BY A. M. TURING

1. *The Imitation Game.*

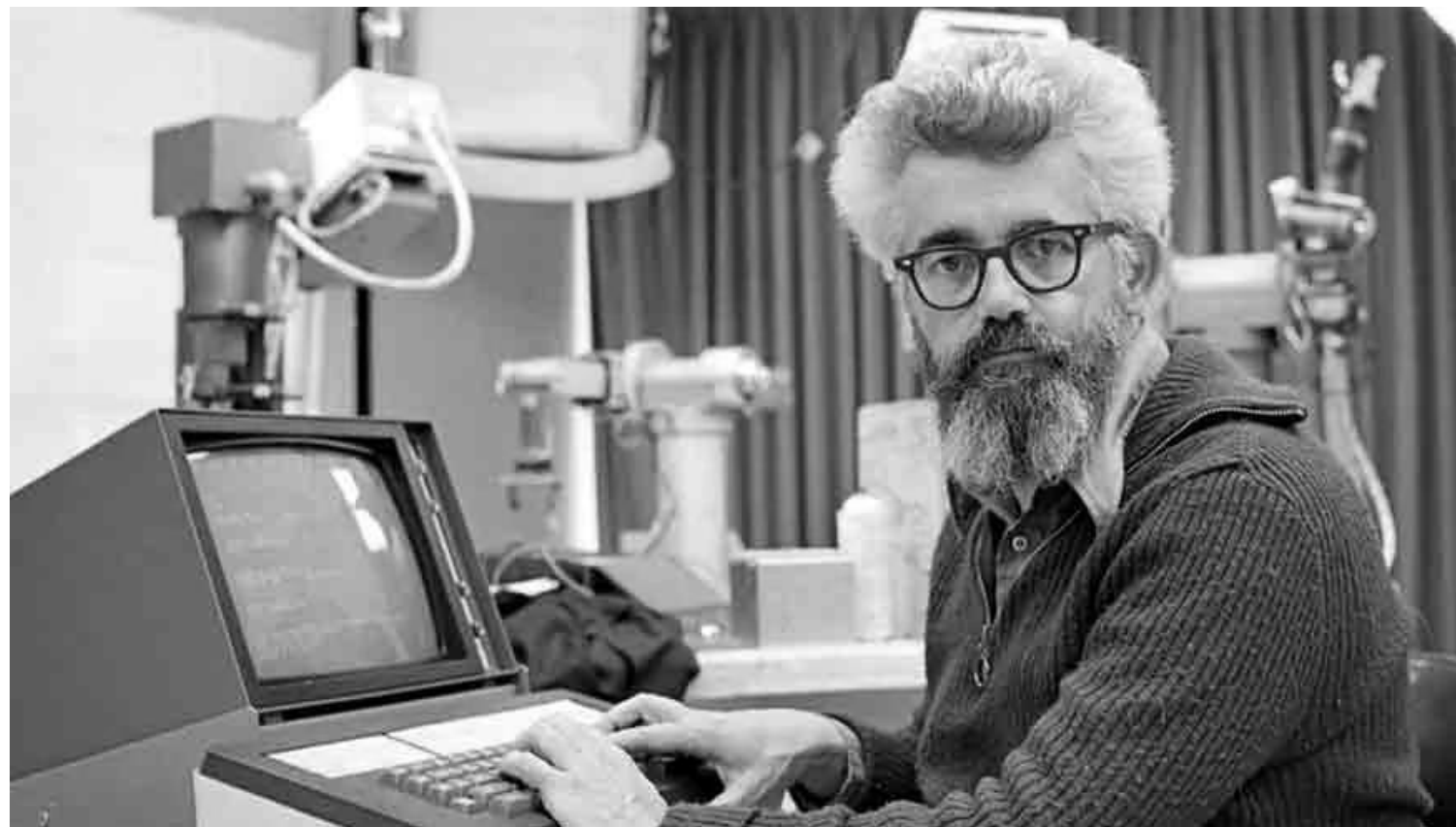
I PROPOSE to consider the question, 'Can machines think?' This should begin with definitions of the meaning of the terms 'machine' and 'think'. The definitions might be framed so as to reflect so far as possible the normal use of the words, but this attitude is dangerous. If the meaning of the words 'machine' and 'think' are to be found by examining how they are commonly used it is difficult to escape the conclusion that the meaning and the answer to the question, 'Can machines think?' is to be sought in a statistical survey such as a Gallup poll. But this is absurd. Instead of attempting such a definition I shall replace the question by another, which is closely related to it and is expressed in relatively unambiguous words.



El test de Turing



Artificial  
intelligence



John McCarthy  
MIT Professor

A PROPOSAL FOR THE  
DARTMOUTH SUMMER RESEARCH PROJECT  
ON ARTIFICIAL INTELLIGENCE

J. McCarthy, Dartmouth College  
M. L. Minsky, Harvard University  
N. Rochester, I.B.M. Corporation  
C.E. Shannon, Bell Telephone Laboratories

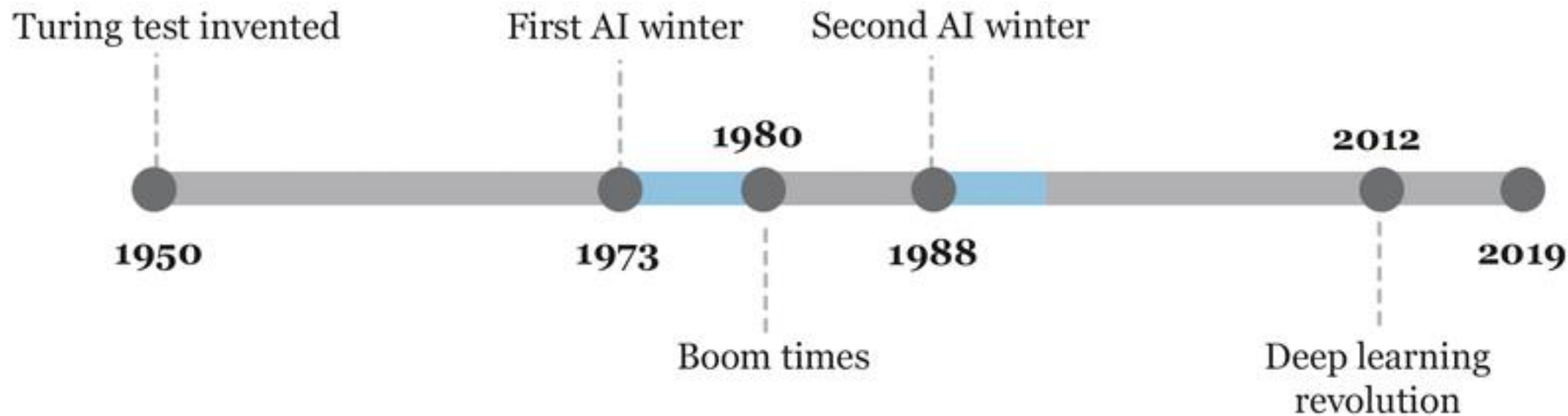
We propose that a 2 month, 10 man study of artificial intelligence be carried out during the summer of 1956 at Dartmouth College in Hanover, New Hampshire. The study is to proceed on the basis of the conjecture that every aspect of learning or any other feature of intelligence can in principle be so precisely described that a machine can be made to simulate it. An attempt will be made to find how to make machines use language, form abstractions and concepts, solve kinds of problems now reserved for humans, and improve themselves. We think that a significant advance can be made in one or more of these problems if a carefully selected group of scientists work on it together for a summer.

August 31, 1955



## Areas de IA

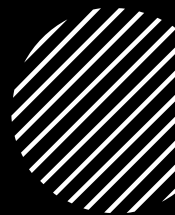
- ML y DL
- NLP
- Vision computarizada
- Realidad virtual
- Realidad aumentada
- Robótica



Schuchmann, Sebastian. (2019). Analyzing the Prospect of an Approaching AI Winter. 10.13140/RG.2.2.10932.91524.



# Habilitadores (a partir de 2005)



Avance científico: aprendizaje profundo (deep learning)



Big data (datos para alimentar el deep learning)



Capacidad de procesamiento

# Diferentes IAs

## IA Discriminativa

1. **Objetivo Principal:** se centra en predecir resultados futuros basándose en datos históricos. Utiliza patrones encontrados en los datos pasados para estimar lo que sucederá a continuación o si cierto evento es probable que ocurra.
2. **Datos:** Generalmente, opera con datos estructurados y etiquetados, y su rendimiento depende de la calidad y cantidad de datos históricos.
3. **Algoritmos:** Emplea técnicas como la regresión, las máquinas de soporte vectorial, los árboles de decisión, y las redes neuronales para predecir valores numéricos, etiquetas de clase o categorías.
4. **Aplicaciones:** Se usa en la detección de fraude, en la evaluación de riesgos, en la predicción de demanda, en el mantenimiento predictivo y en la analítica de clientes, entre otros.
5. **Ejemplo:** Un modelo de IA predictiva podría predecir el precio de las acciones en la bolsa para el siguiente día basándose en los datos financieros históricos.

•

## IA Generativa

1. **Objetivo Principal:** La IA generativa está diseñada para generar nuevos datos que son similares a los que ha aprendido. No sólo entiende los datos, sino que también puede crear nuevos ejemplos que podrían pasar por reales.
2. **Datos:** Puede trabajar con datos no etiquetados y aprender a generar datos en diversas formas, como texto, imágenes y música.
3. **Algoritmos:** Utiliza modelos como las redes generativas adversarias (GANs), las redes de autocodificadores variacionales (VAEs), y los modelos de atención como GPT (para texto) para generar nuevos datos.
4. **Aplicaciones:** Se aplica en la creación de arte, diseño de fármacos, síntesis de voz, generación de imágenes realistas, y en la mejora de videojuegos y simulaciones.
5. **Ejemplo:** Un modelo generativo podría crear imágenes realistas de personas que no existen, o componer música original en el estilo de un compositor dado.



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# ChatGPT sets record for fastest-growing user base - analyst note

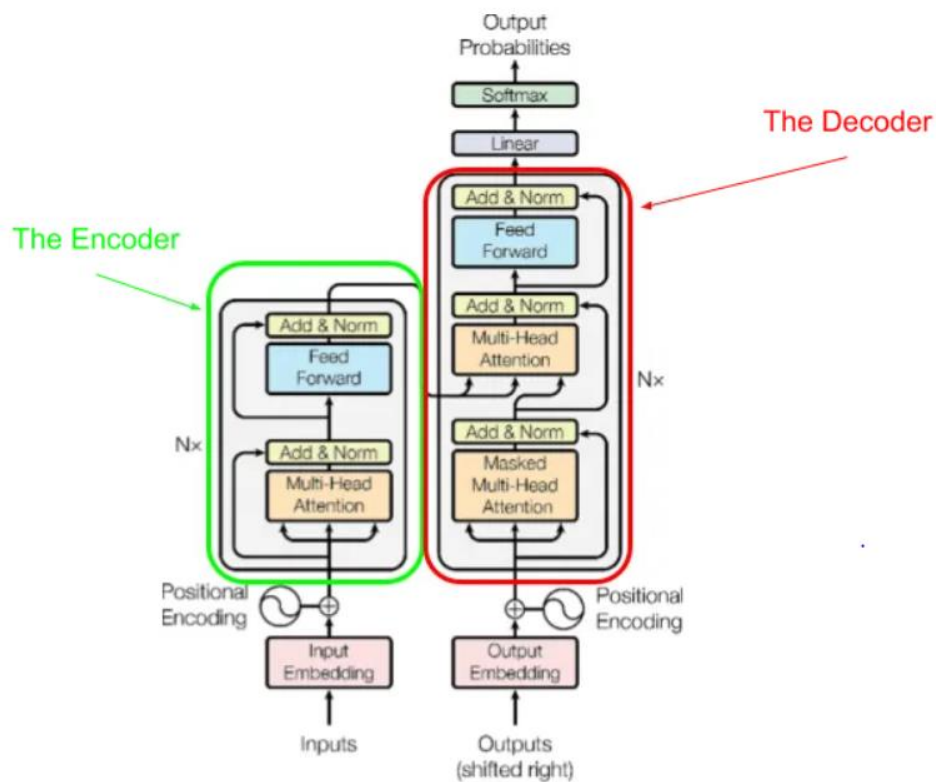
By Krystal Hu

February 2, 2023 4:33 PM GMT+1 · Updated 4 months ago

## Características

- Requerimientos tecnológicos de usuario: internet
- Modelo de negocio
  - Freemium
  - Abierto y gratuito

# Los transformers y redes neuronales



## Attention Is All You Need

Ashish Vaswani\*  
Google Brain  
avaswani@google.com

Noam Shazeer\*  
Google Brain  
noam@google.com

Niki Parmar\*  
Google Research  
nikip@google.com

Jakob Uszkoreit\*  
Google Research  
usz@google.com

Llion Jones\*  
Google Research  
llion@google.com

Aidan N. Gomez\* †  
University of Toronto  
aidan@cs.toronto.edu

Lukasz Kaiser\*  
Google Brain  
lukaszkaizer@google.com

Illia Polosukhin\* ‡  
illia.polosukhin@gmail.com

### Abstract

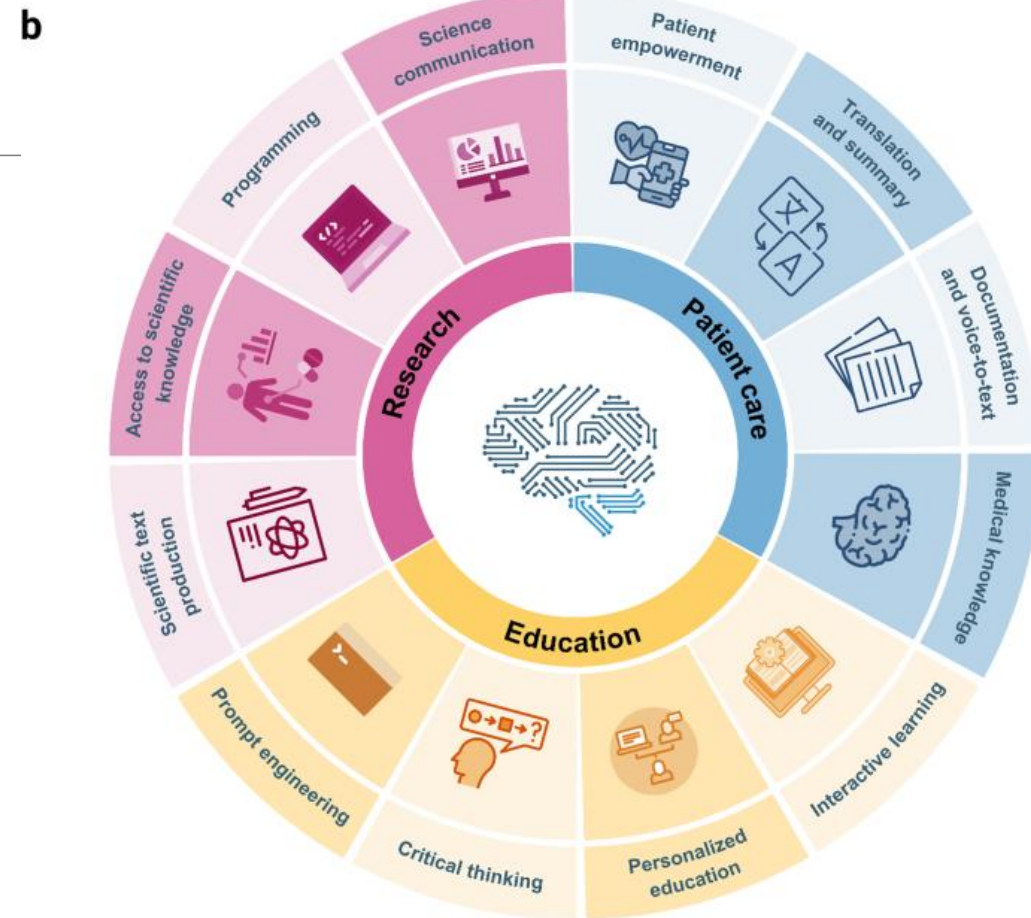
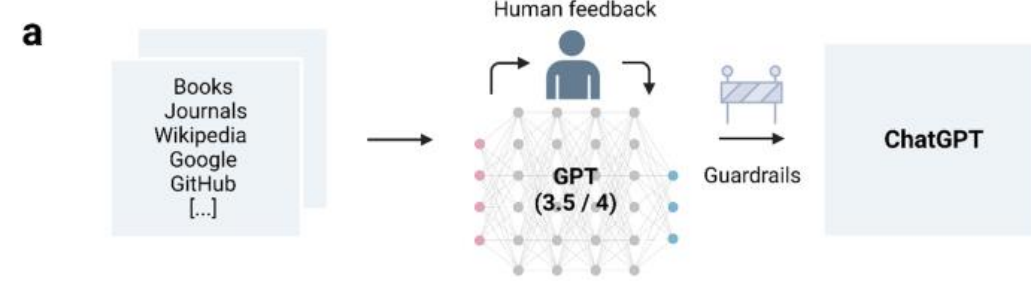
The dominant sequence transduction models are based on complex recurrent or convolutional neural networks that include an encoder and a decoder. The best performing models also connect the encoder and decoder through an attention mechanism. We propose a new simple network architecture, the Transformer, based solely on attention mechanisms, dispensing with recurrence and convolutions entirely. Experiments on two machine translation tasks show these models to be superior in quality while being more parallelizable and requiring significantly less time to train. Our model achieves 28.4 BLEU on the WMT 2014 English-to-German translation task, improving over the existing best results, including ensembles, by over 2 BLEU. On the WMT 2014 English-to-French translation task, our model establishes a new single-model state-of-the-art BLEU score of 41.0 after training for 3.5 days on eight GPUs, a small fraction of the training costs of the best models from the literature.



# Aplicación sanitaria

- Generación de conocimiento
- Gestión del conocimiento
- Educación, formación y entrenamiento
- Práctica clínica

Clusmann, J., Kolbinger, F.R., Muti, H.S. *et al.* The future landscape of large language models in medicine. *Commun Med* **3**, 141 (2023).  
<https://doi.org/10.1038/s43856-023-00370-1>



# Cómo usar ChatGPT en investigación (UNESCO)



## Writing up

- Improve writing quality
- Reformat citations and references
- Translate writing



## Data analysis

- Code data
- Suggest themes or topics for analysis



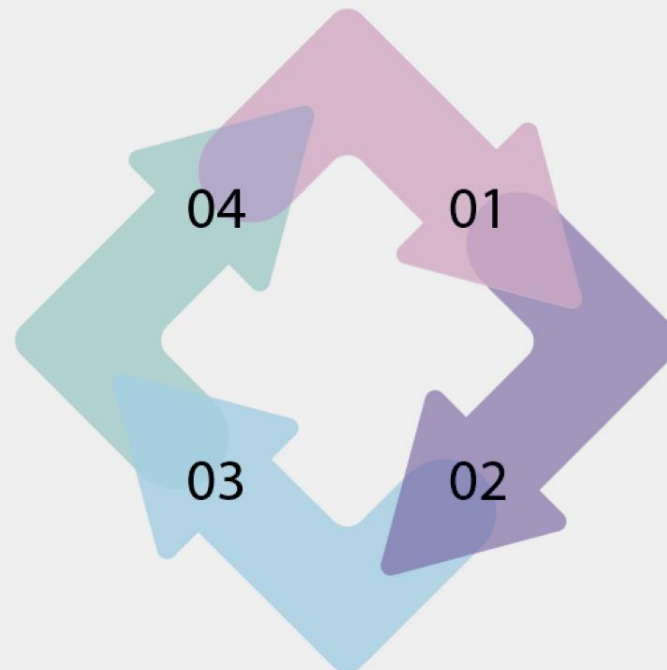
## Research design

- Generate ideas for research questions or projects
- Suggest data sources



## Data collection

- Search archives and datasets
- Translate sources into other languages



60  
MINUTES



# Pacientes sintéticos



Chat Files (0) ▾

He generado un conjunto de datos sintéticos para 5 pacientes con enfermedad de Duchenne. Aquí están los detalles:

(Optional) click on columns, rows, or cells to focus on specific data

Export ⓘ

	ID	Edad	Sexo	Peso (kg)	Altura (cm)	Nivel de Creatina Kinasa	Función Pulmonar (% esperado)	Fuerza Muscular (puntuación)
0	Paciente_1	11	Masculino	26.7	113.3	11949	78.5	3
1	Paciente_2	8	Masculino	24	105.7	7433	78.3	2
2	Paciente_3	9	Masculino	21.7	126	10311	60.2	4
3	Paciente_4	11	Masculino	16.5	102.3	10051	60.7	4
4	Paciente_5	7	Masculino	21.9	128.9	11420	75.7	4

Cada fila representa un paciente diferente, incluyendo información demográfica básica como edad y sexo, así como parámetros clínicos esenciales como peso, altura, nivel de creatina kinasa, función pulmonar y fuerza muscular.

Try:

🔮 ¿Qué otros parámetros clínicos o analíticos específicos te gustaría incluir en los datos sintéticos?

🔮 ¿Necesitas información adicional sobre la enfermedad de Duchenne o su diagnóstico?

Default ▾ Tools Advanced Reasoning

📎 Send another message or file...



# Educación y Formación

Educación Médica

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Métricas

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Información de la revista

Vol. 24. Núm. 4.  
(Julio - Agosto 2023)

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## Apartados

Desafíos y riesgos de la iag en la educación médica

Conclusiones

Agradecimientos

EDITORIAL

DOI: 10.1016/j.edumed.2023.100851

Acceso a texto completo

## Inteligencia artificial generativa y educación médica

Generative artificial intelligence and medical education

Julio Mayo<sup>a,b,\*</sup>

<sup>a</sup> Departamento de Cirugía, Universidad Complutense de Madrid, España

<sup>b</sup> Instituto de Investigación Sanitaria San Carlos, Hospital Clínico San Carlos, Madrid, España

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International Journal of Spanish Respiratory Society of Pulmonology and Thoracic Surgery

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SCIENTIFIC LETTER

DOI: 10.1016/j.arbres.2023.03.017  
Available online 12 April 2023

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### Can an Artificial Intelligence Model Pass an Examination for Medical Specialists?

Álvaro Fuentes-Martín<sup>a</sup>, Ángel Cilleruelo-Ramos<sup>a</sup>, Bárbara Segura-Méndez<sup>a</sup>, Julio Mayol<sup>b</sup>

<sup>a</sup> Hospital Clínico Universitario de Valladolid, Universidad de Valladolid, Spain  
<sup>b</sup> Hospital Clínico San Carlos, IdISSC, Universidad Complutense de Madrid, Spain

# Diagnósticos complicados



NEJM AI 2023; 1 (1)  
DOI: [10.1056/AIp2300031](https://doi.org/10.1056/AIp2300031)

## PERSPECTIVE

### Use of GPT-4 to Diagnose Complex Clinical Cases

Alexander V. Eriksen , M.D.,<sup>1,2</sup> Sören Möller , M.Sc., Ph.D.,<sup>3,4</sup> and Jesper Ryg , M.D., Ph.D.<sup>1,2</sup>

Received: July 10, 2023; Revised: September 15, 2023; Accepted: September 29, 2023; Published: November 9, 2023

#### Abstract

We assessed the performance of the newly released AI GPT-4 in diagnosing complex medical case challenges and compared the success rate to that of medical-journal readers. GPT-4 correctly diagnosed 57% of cases, outperforming 99.98% of simulated human readers generated from online answers. We highlight the potential for AI to be a powerful supportive tool for diagnosis; however, further improvements, validation, and addressing of ethical considerations are needed before clinical implementation. (No funding was obtained for this study.)

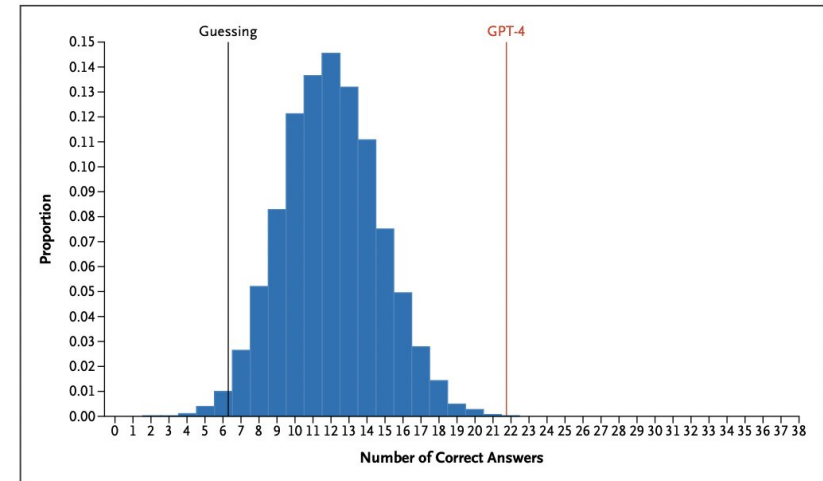


Figure 1. Number of Correct Answers of GPT-4 Compared with Guessing and a Simulated Population of Medical-Journal Readers.

Number of correct answers of GPT-4 (red line) to 38 multiple-choice real-world clinical case challenges compared with what would be expected by purely guessing with uniform probability for all answer possibilities (black line) and to the proportion of correct answers by a simulated population of 10,000 medical-journal readers (blue histogram).

# Dx29

The screenshot shows the homepage of Dx29, a platform for rare disease diagnosis. The header includes the logo 'Dx<sup>29</sup>' on the left, navigation links for 'Home', 'About us', 'Undiagnosed patients', and 'Diagnosed patients' in the center, and a language selector 'en' with 'Login' and 'Create user' buttons on the right. A blue banner below the header contains the text 'Diagnostic aid based on artificial intelligence' and a button 'Go to DxGPT for diagnosis'. The main content area features a large heading 'Do you have a rare disease? Start telling your story' followed by a sub-heading and a paragraph: 'Every patient has a story that needs to be heard. We help you to tell yours, and get a personalized report with all your symptoms. This is the beginning of the rare disease revolution.' Below this is the question 'What is your goal?' and two buttons: 'I want a diagnosis' and 'I want to know more about my disease'. To the right, there is an illustration of a person walking towards a checklist with three items, each marked with a red checkmark.

**Dx<sup>29</sup>**

[Home](#) [About us](#) [Undiagnosed patients](#) [Diagnosed patients](#) [en](#) [Login](#) [Create user](#)

Diagnostic aid based on artificial intelligence [Go to DxGPT for diagnosis](#)

## Do you have a rare disease? Start telling your story

Every patient has a story that needs to be heard. We help you to tell yours, and get a personalized report with all your symptoms. This is the beginning of the rare disease revolution.

What is your goal?

[I want a diagnosis](#) [I want to know more about my disease](#)

- ✓
- ✓
- ✓



# Integración en los sistemas sanitarios

Comunidad de Madrid

Servicios e información Cultura y turismo Inversión y empresa Acción de gobierno

15 septiembre 2023

Así, lo ha anunciado hoy el consejero de Digitalización, Miguel López-Valverde, quien ha explicado que esta iniciativa comenzará a desarrollarse a finales de septiembre en todos los centros públicos de Atención Primaria de la región.

De este modo, el convenio establece el uso de IA Generativa para ofrecer a los médicos del Servicio Madrileño de Salud una lista de enfermedades compatibles con los síntomas que sufre una persona, de tal manera que cuenten con la mayor información posible a la hora de tomar sus decisiones, agilizando la derivación de los pacientes a los especialistas más adecuados para su valoración y, si procede, el plan terapéutico que deban seguir.

“Cada día son más evidentes las ventajas que ofrece la aplicación de las nuevas tecnologías en el campo de la medicina, especialmente para el diagnóstico, algo que adquiere aún más valor cuando hablamos de patologías consideradas como raras”, ha destacado López-Valverde. En este sentido, el consejero ha añadido que “la IA, utilizada con todos los estándares de responsabilidad y seguridad, está ofreciendo grandes avances para la Sanidad madrileña”.

El acuerdo firmado por la Consejería de Digitalización incluye, igualmente, futuras mejoras y otros posibles usos de la IA en el Servicio Madrileño de Salud, con el objetivo de optimizar los recursos que ofrece la región en este ámbito.

“Physicians are always in control” – Julian Isla

## Madrid Health Service, a pioneer in applying Generative Artificial Intelligence to improve diagnosis for patients with rare diseases

septiembre 15, 2023 | Microsoft Prensa



- The project, the first in Spain and across the world in this area, stems from a collaboration agreement between the Community of Madrid (Department of Digitalization), Fundación 29 and Microsoft, to develop and implement innovative technological solutions that improve patient care and facilitate the work of healthcare professionals.
- As a pilot project, this web application will be accessible at Primary Care centers in the Community of Madrid from the end of September. It is based on OpenAI's Artificial Intelligence language model, GPT-4, with Microsoft's Azure OpenAI Service and is backed by full security and ethical development standards.
- It will enable Primary Care medical professionals in the Community of Madrid to improve their skills and diagnose patients with rare diseases more accurately and quickly, expediting patient referrals to the appropriate specialists for the right treatment.
- This agreement also opens up future routes for AI application to improve healthcare service delivery, optimizing the resources available in the Community of Madrid.

# Cirurgía segura, cirugía global

## PROJECT AiACCESS | The Team



**ADESOCI O. ADEMUYIWA**  
University of Lagos



**MARÍA LORENA AGUILERA ARÉVALO**  
General San Juan de Dios Hospital



**JEREMY BALCH**  
University of Florida



**DAVID BARNES**  
US Army Artificial Intelligence  
Integration Center



**CHARLES BINKLEY**  
Hackensack Meridian Health



**LEO ANTHONY CELI**  
Massachusetts Institute of Technology



**RACHEL CHORON**  
Rutgers Robert Wood Johnson  
Medical School



**JUAN VARAS COHEN**  
Pontif. Universidad Católica de Chile



**JULIA R. COLEMAN**  
The Ohio State University,  
Wexner Medical Center



**DHURVA GOSH**  
Christian Medical College Ludhiana



**DIVYA KEWALRAMANI**  
UPMC Children's Hospital of Pittsburgh



**MAYUR NARAYAN**  
Rutger's Robert Wood Johnson  
Medical School

## PROJECT AiACCESS | The Team



**ANDREW GUMBS**  
American Hospital of Tbilisi



**EWEN HARRISON**  
University of Edinburgh



**ALEX KARARGYRIS**  
M.I. Commons



**MESKEREM KEBEDE**  
London School of Economics  
and Political Science



**INAS KHAYAL**  
The Dartmouth Institute



**JOSEPH KVEDAR**  
Massachusetts General Hospital



**ISMAIL LAWANI**  
University of Abomey-Calavi



**TYLER LOFTUS**  
University of Florida, Gainesville



**AMIN MADANI**  
University of Toronto/ UHN



**HANIYEH MAHMOUDIAN**  
National AI Advisory Committee



**JULIO MAYOL**  
San Carlos Hospital in Madrid



**ANTONIO RAMOS-DE LA  
MEDINA**  
Hospital Español Veracruz



**ASHISH NARAYAN**  
Mount Sinai, Icahn School of Medicine



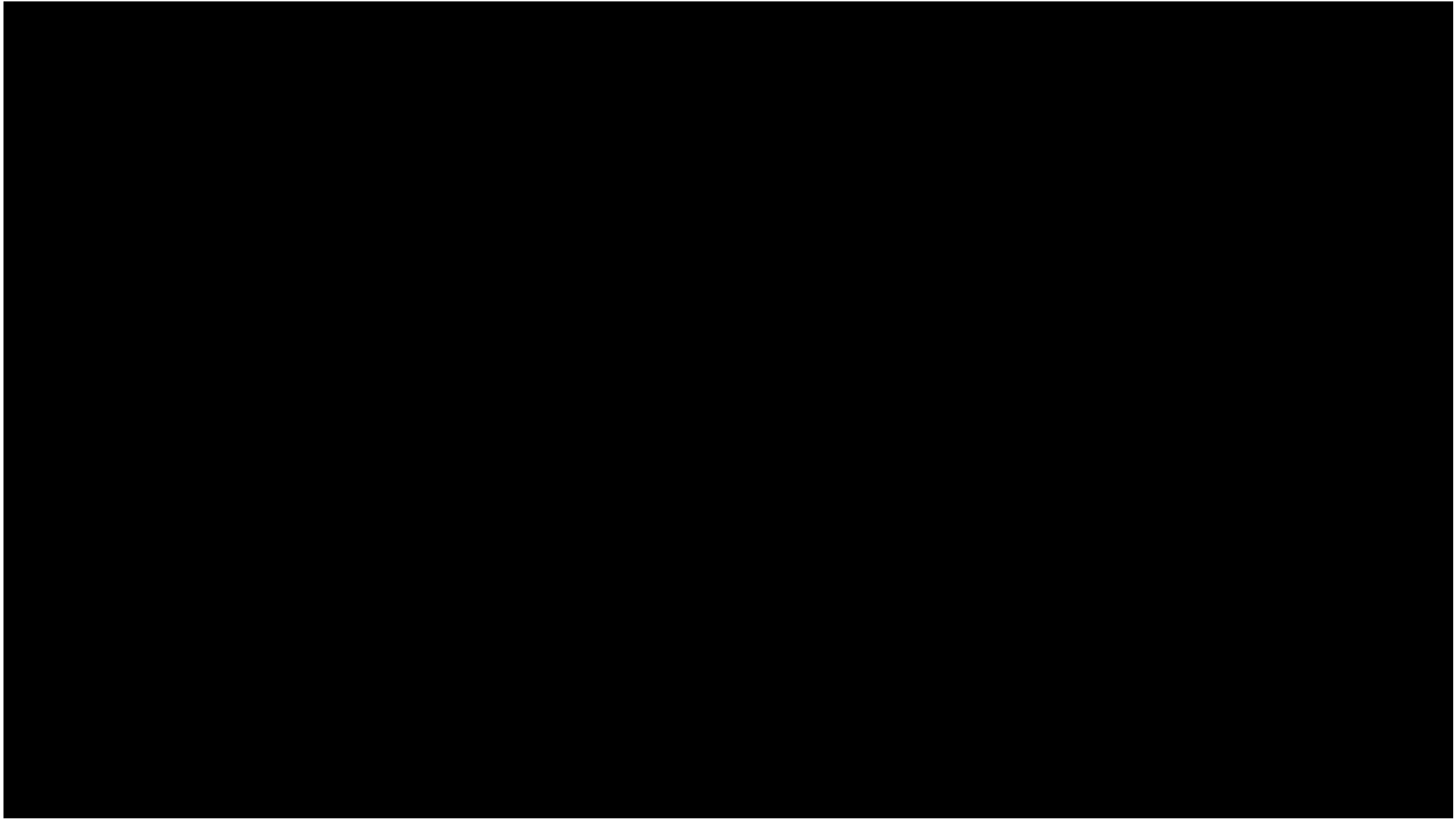
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Stanford University



**STEPHEN TABIRI**  
University for Development Studies  
Tamale

Redes  
neuronales y  
cirugía robótica

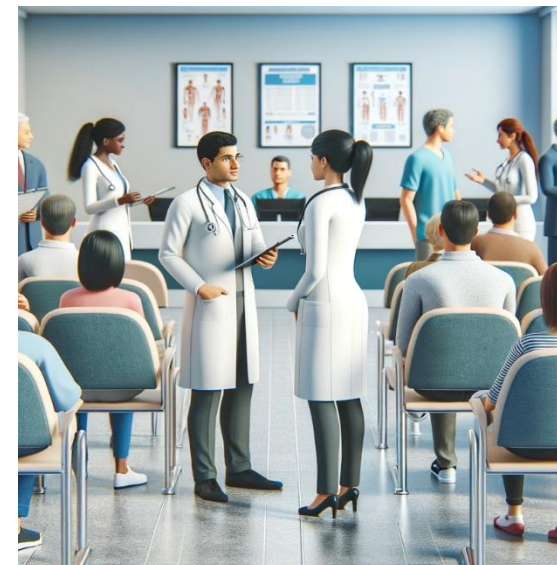
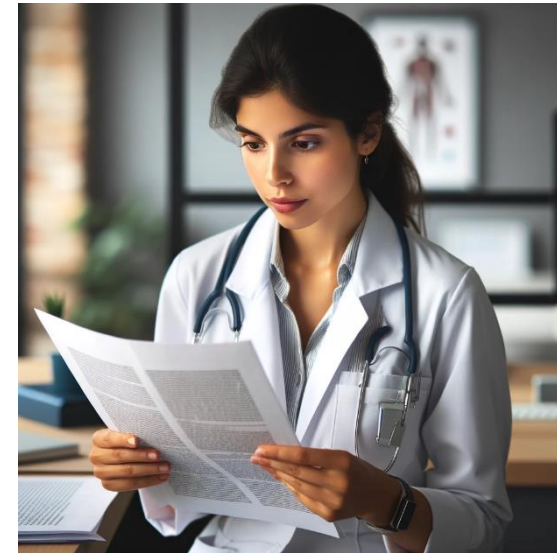






# La gran revolución

La IA Generativa



# La sustitución como agente









# Inteligencia artificial

Es la capacidad de una máquina de presentar las mismas habilidades cognitivas que los seres humanos:

1. Razonar
2. Aprender
3. Planear
4. Crear
5. Alucinar
6. Olvidar
7. ¿Mentir?

# ¿Y la empatía?

**This Issue**

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## Original Investigation

April 28, 2023

# Comparing Physician and Artificial Intelligence Chatbot Responses to Patient Questions Posted to a Public Social Media Forum

John W. Ayers, PhD, MA<sup>1,2</sup>; Adam Poliak, PhD<sup>3</sup>; Mark Dredze, PhD<sup>4</sup>; [et al](#)

» [Author Affiliations](#)

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# Turing y su test

RESEARCH ARTICLE | ECONOMIC SCIENCES | 



## A Turing test of whether AI chatbots are behaviorally similar to humans

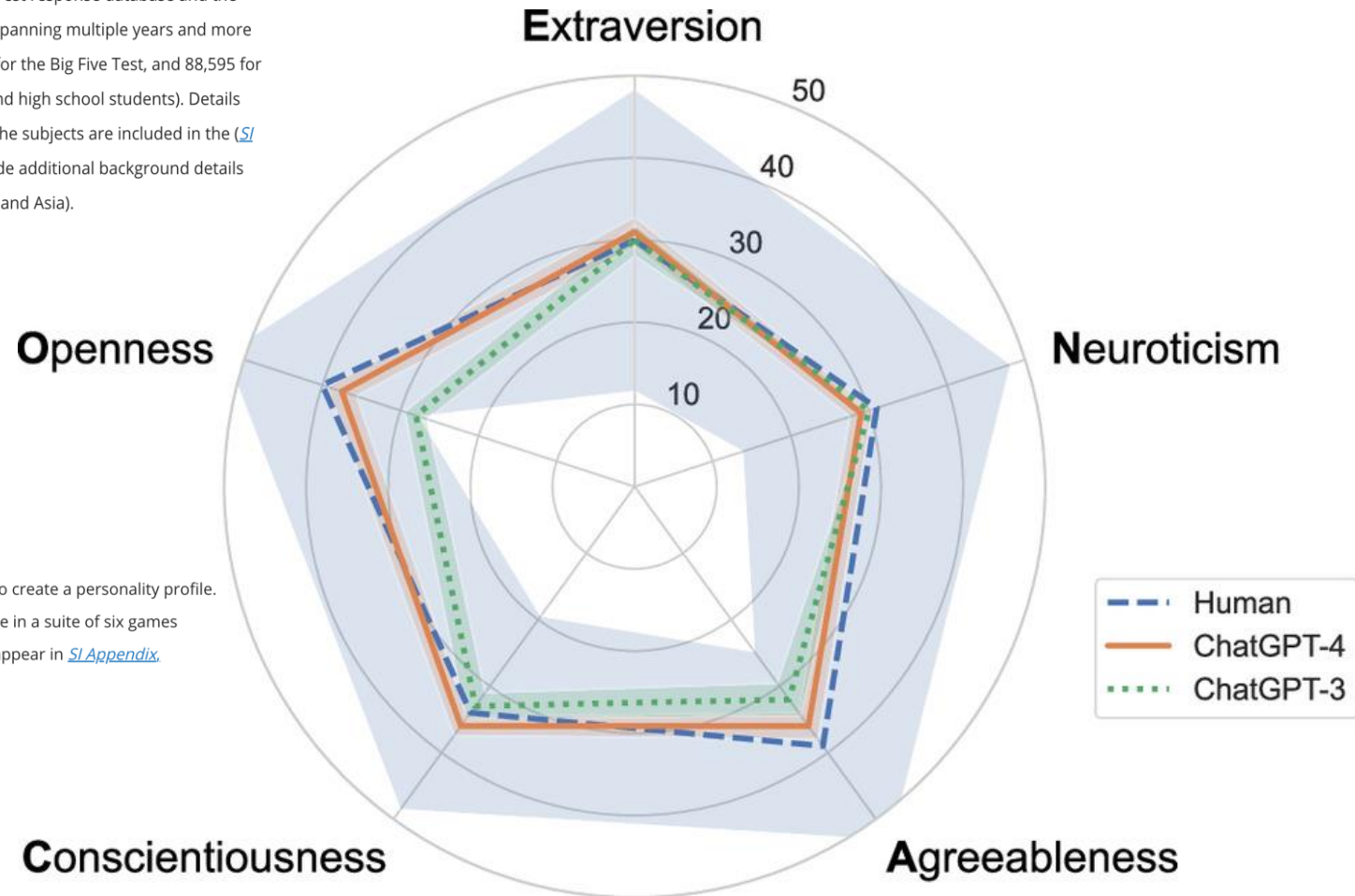
Qiaozhu Mei , Yutong Xie, Walter Yuan, and Matthew O. Jackson   [Authors Info & Affiliations](#)

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# Test de personalidad

The human subject data are derived from a public Big Five Test response database and the MobLab Classroom economics experiment platform, both spanning multiple years and more than 50 countries, encompassing 108,314 subjects (19,719 for the Big Five Test, and 88,595 for the behavioral economics games, who are mostly college and high school students). Details about the human datasets, including the demographics of the subjects are included in the ([SI Appendix, section 1.B](#)); and see also Lin et al. (13) who provide additional background details about the human data which cover North America, Europe, and Asia).



We administer the OCEAN Big Five questionnaire to each chatbot to create a personality profile. Following this, we ask each chatbot what actions they would choose in a suite of six games designed to illuminate various behavioral traits (and fuller details appear in [SI Appendix, section 1.A](#)):

# Cómo preparar a tu organización para la IA



Actuar con rapidez



Comprender los principios básicos de la IA en tu área



Desarrollar una estrategia: por qué y para qué



Identificar los casos de uso que generan mejor valor



Invertir en innovación y en cambio cultural



Formación: re-skilling y upskilling



Afrontar los problemas legales y éticos



# Leyes de una nueva tecnología

- Toda nueva tecnología descubre nuevas responsabilidades
- Si genera poder, la nueva tecnología desatará una carrera para controlarla
- Si no se coordina, la carrera terminará en tragedia

Aza Raskin y Tristan Harris



Resistance is futile

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@juliomayol