2 CUMBRE IA

IA EL NUEVO MATERIAL DEL SECTOR

IA en Sistemas Inteligentes

Santiago Arrubla

Líder Desarro (Yacimientos) con Analítica e IA

ecopetrol

Contenido

I) Eficiencias & IA

II) Eficiencias en Sistemas (Oil & Gas)

III) Ejemplo de IA en sistemas

IV) Futuro de la IA en sistemas

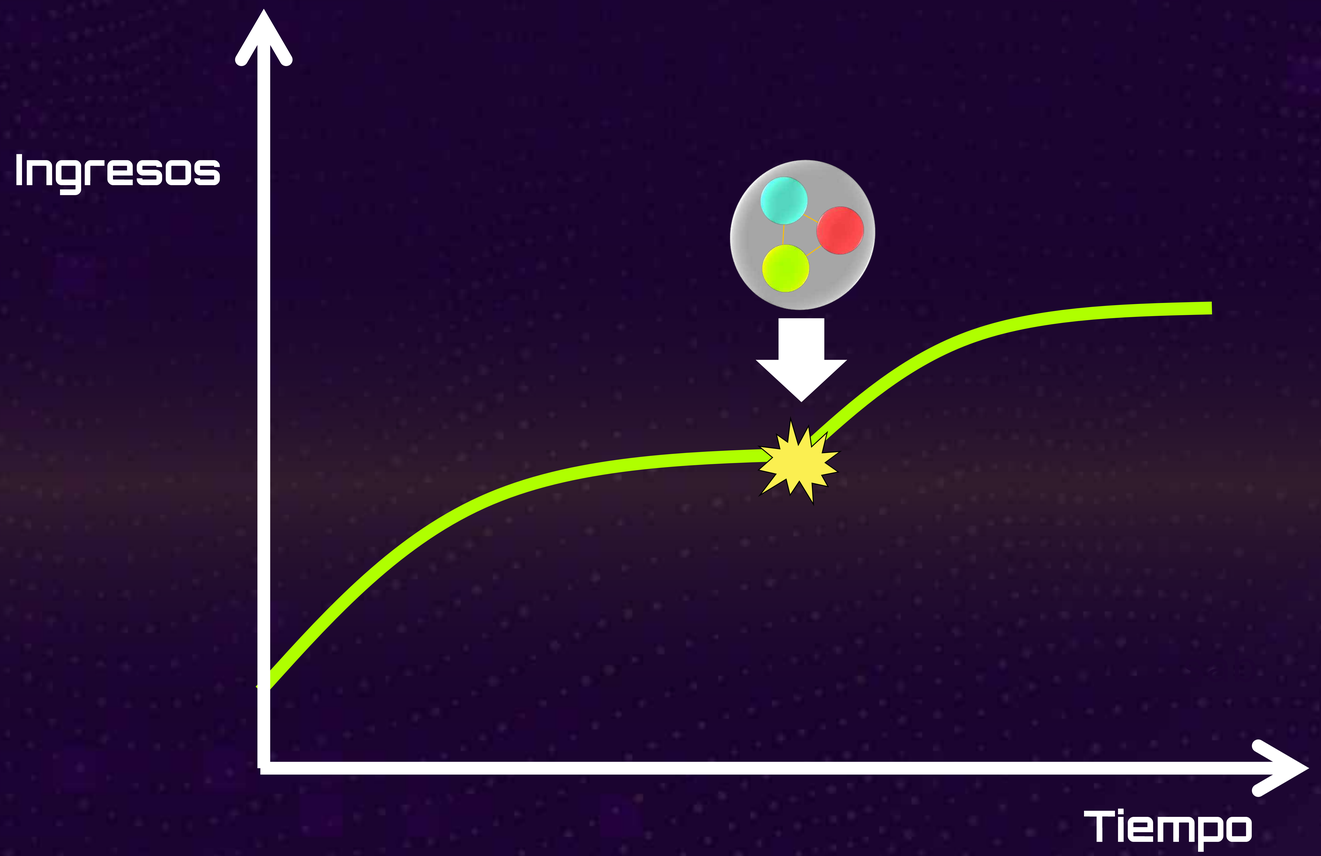
2IA CUMBRE

IA EL NUEVO MATERIAL DEL SECTOR

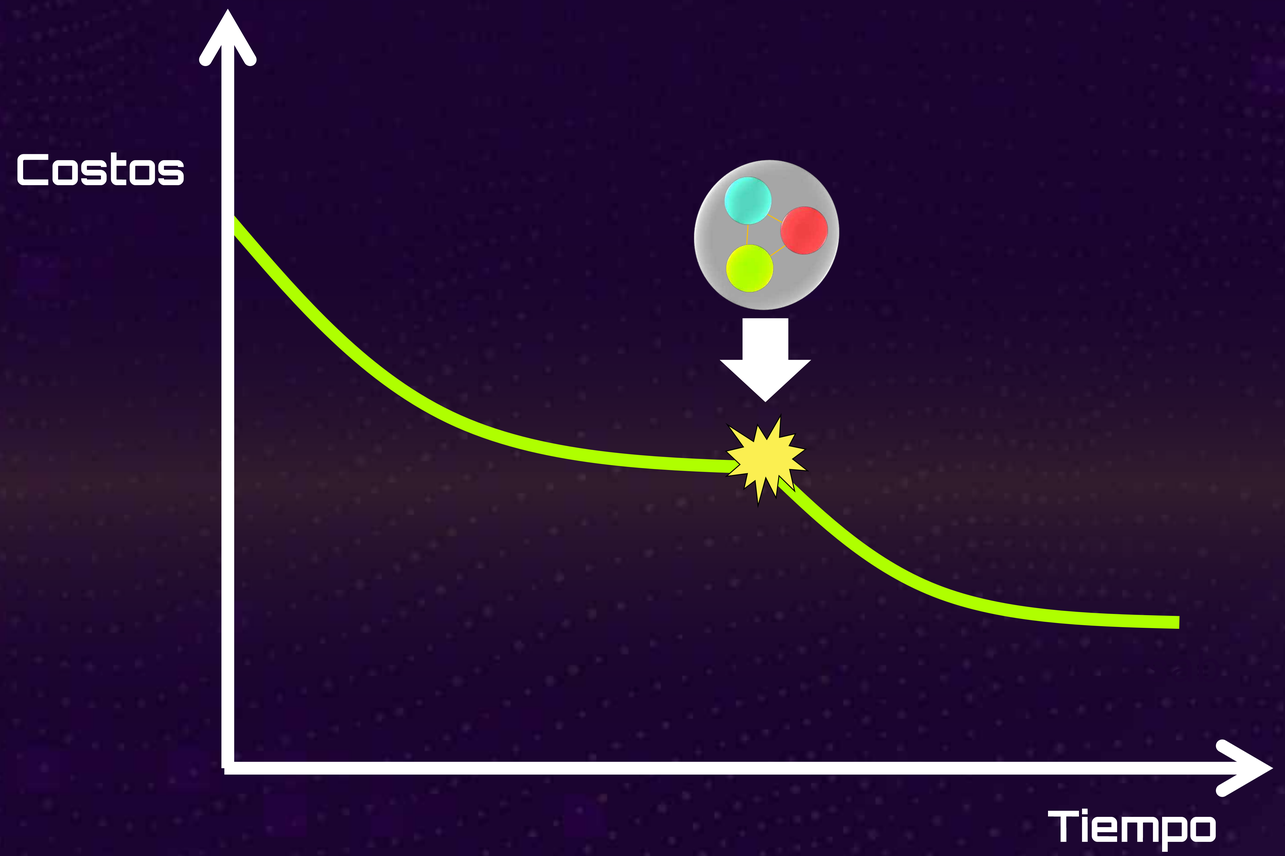
Eficiencia & IA

sab

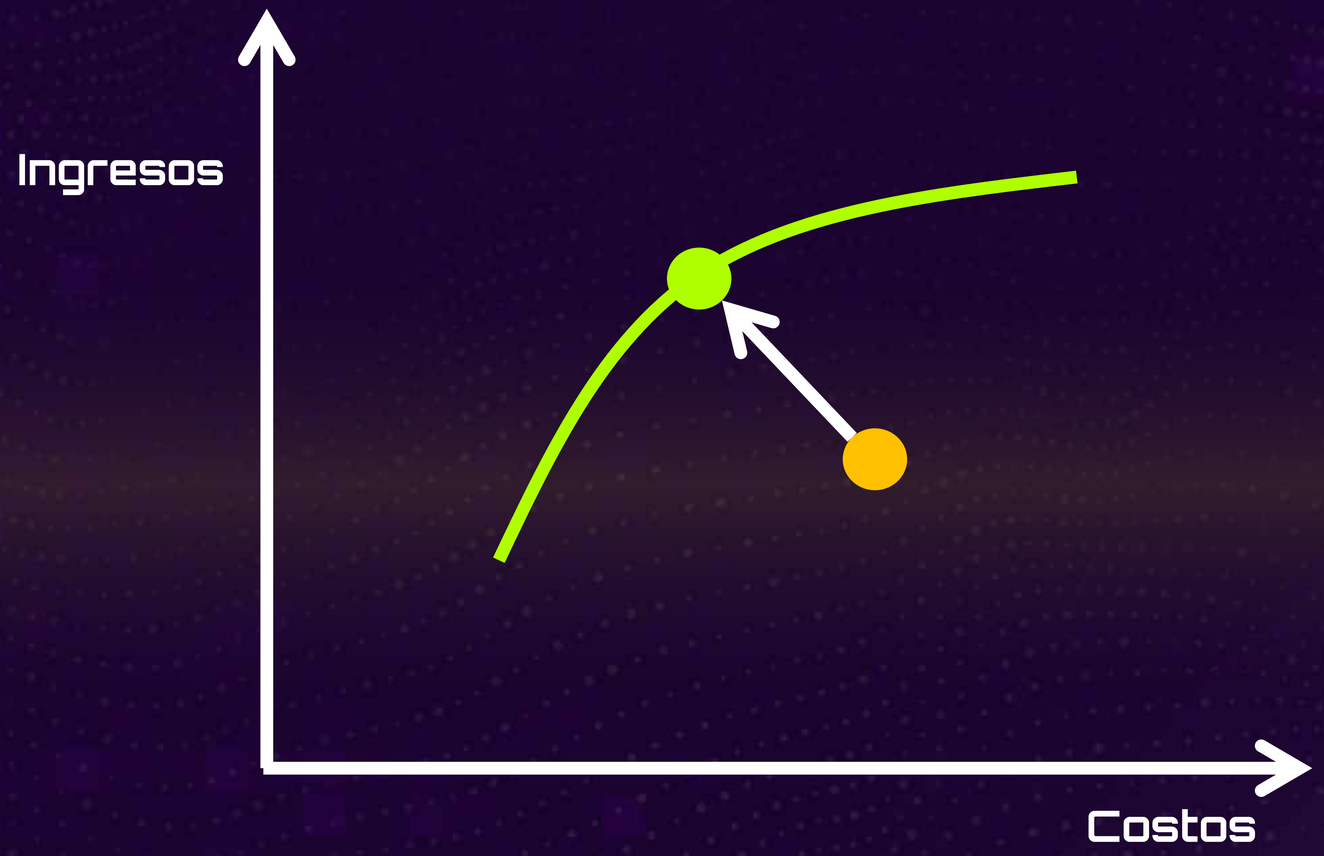
Eficiencia



Eficiencia



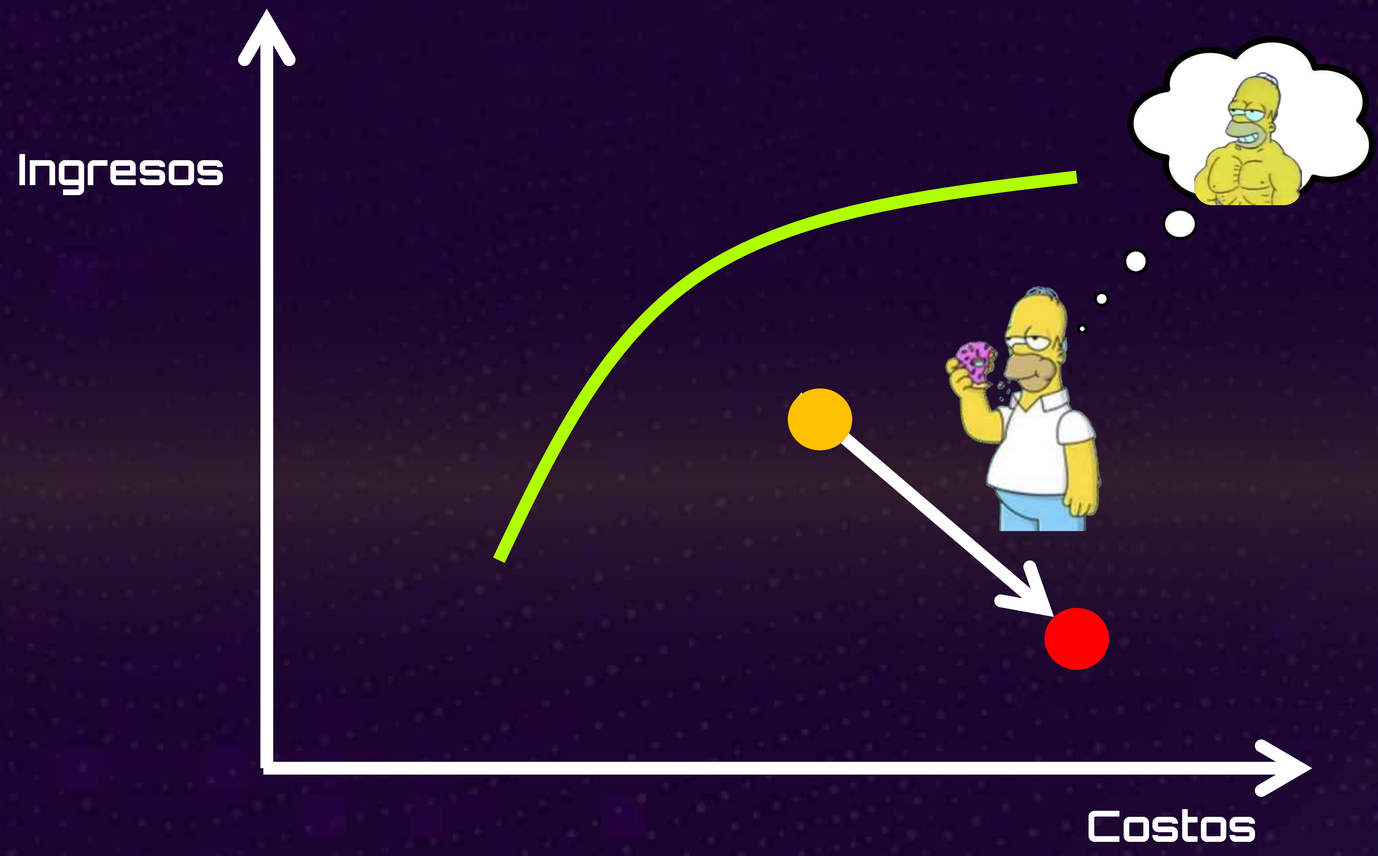
Eficiencia



La importancia de medir

¡Lo que no se puede medir, no se puede mejorar!

La importancia de medir



Eficiencia en la IA

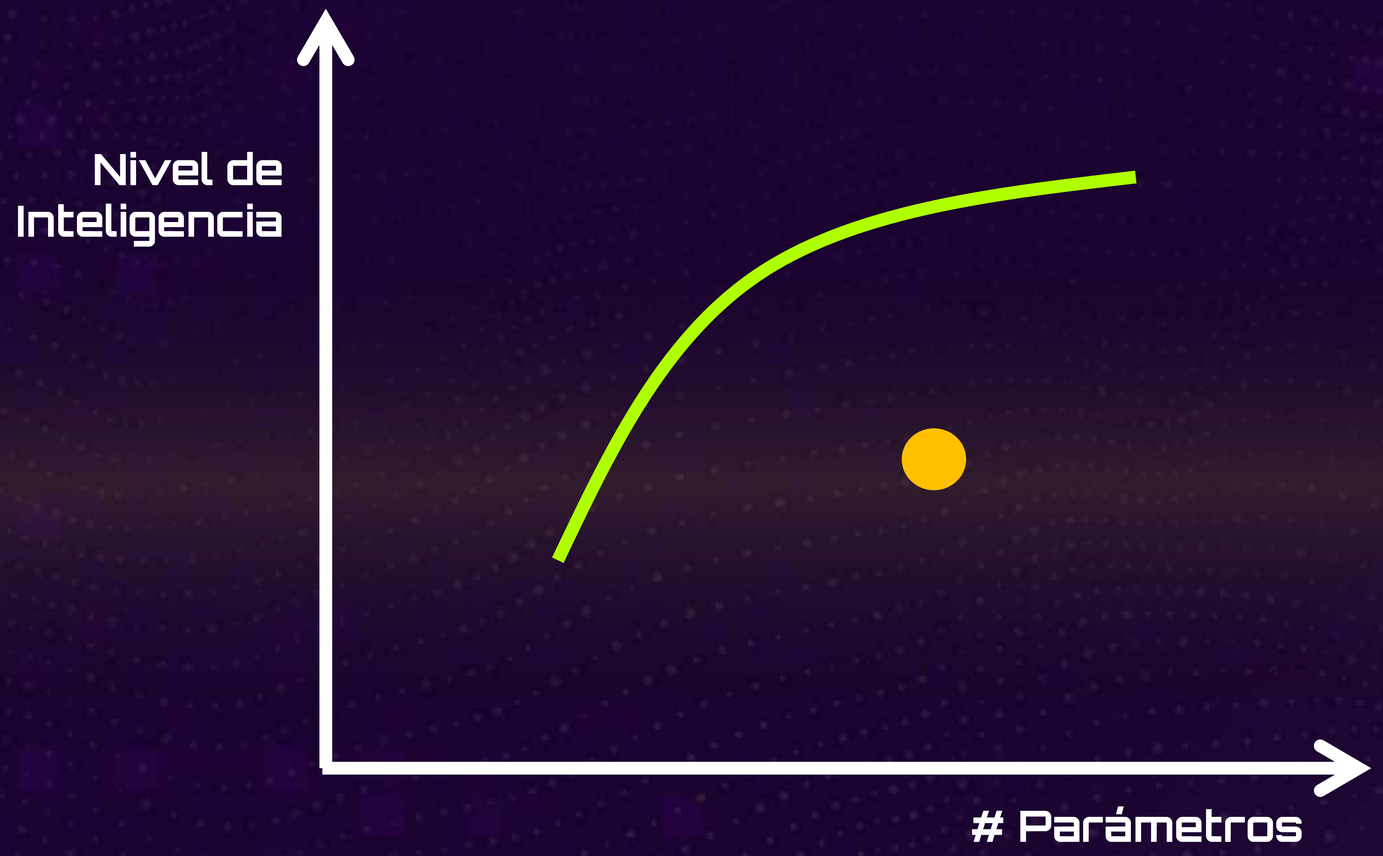
GPT-3

175,000,000,000

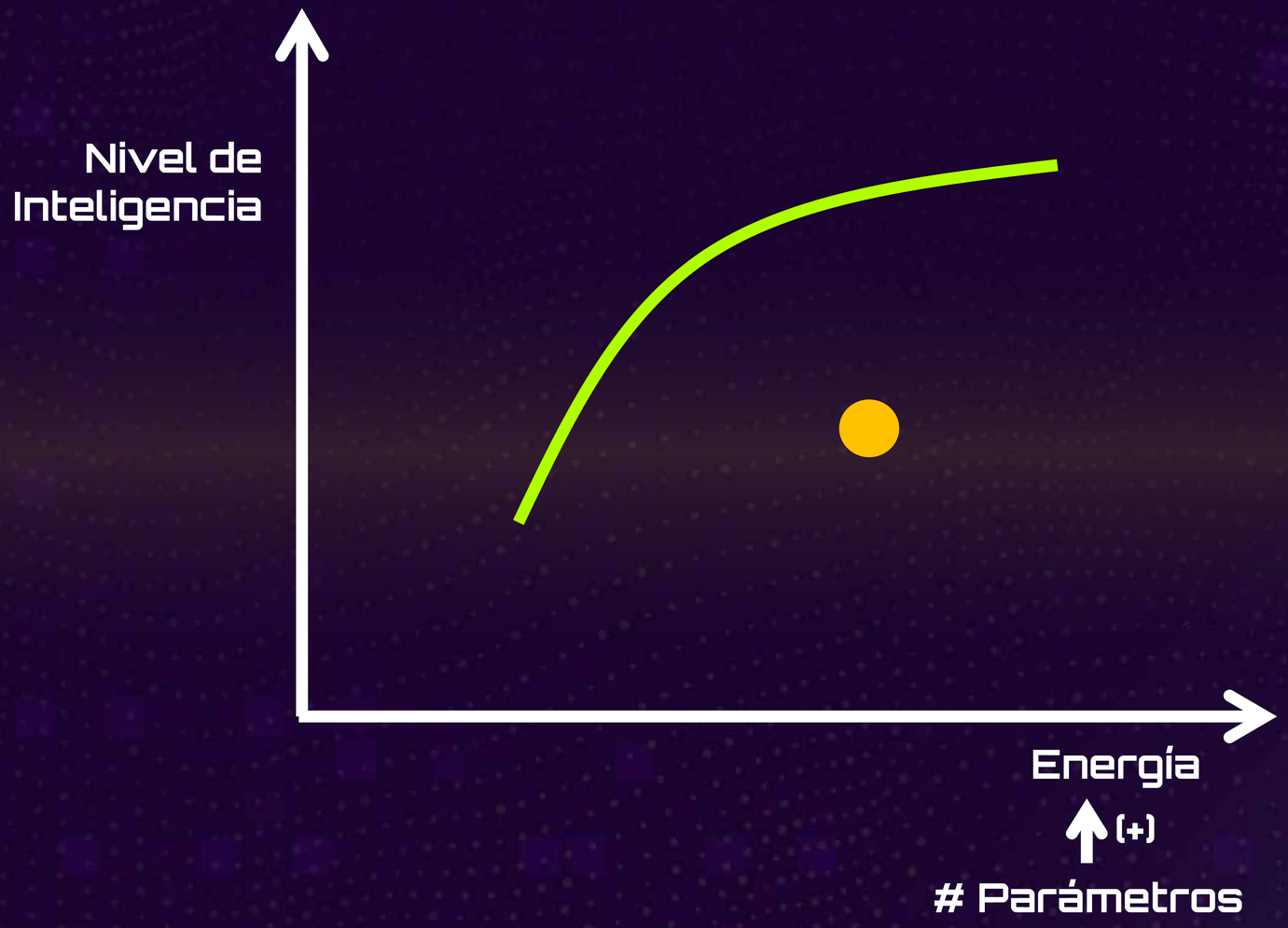
GPT-4

100,000,000,000,000

Eficiencia en la IA



Eficiencia en la IA



Machine Learning Research

Paper | June 2025

The Illusion of Thinking: Understanding the Strengths and Limitations of Reasoning Models via the Lens of Problem Complexity

Parshin Shojaee*†, Iman Mirzadeh*, Keivan Alizadeh, Maxwell Horton, Samy Bengio, Mehrdad Farajtabar

The Illusion of Thinking: Understanding the Strengths and Limitations of Reasoning Models via the Lens of Problem Complexity - Apple Machine Learning Research

Inteligencia

Computador

Imaginar

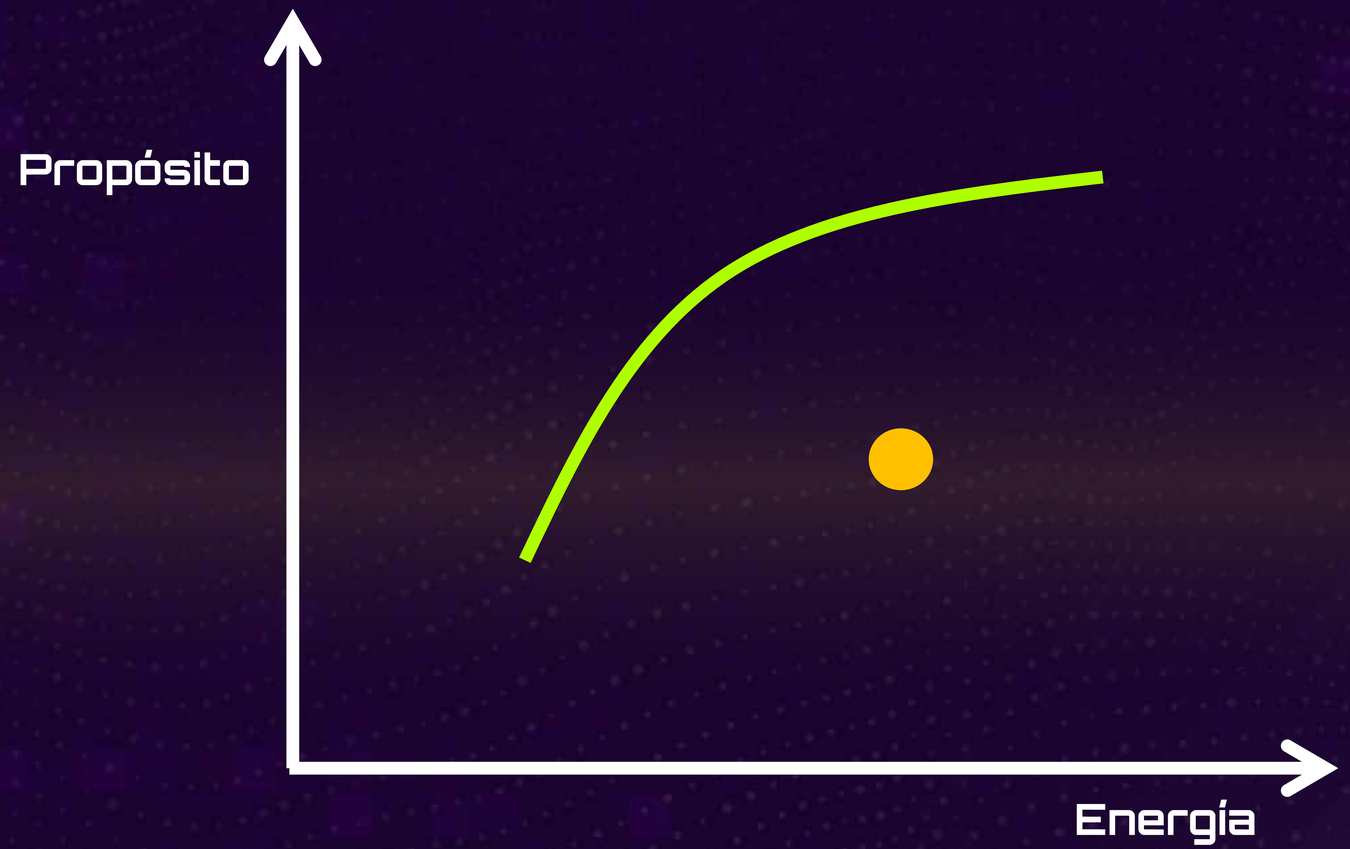
Todo el mundo es un genio. Pero si juzgas a un pez por su capacidad para trepar a un árbol, vivirá toda su vida creyendo que es estúpido.

- Albert Einstein

Inteligencia: Habilidad para alcanzar un objetivo en un ambiente

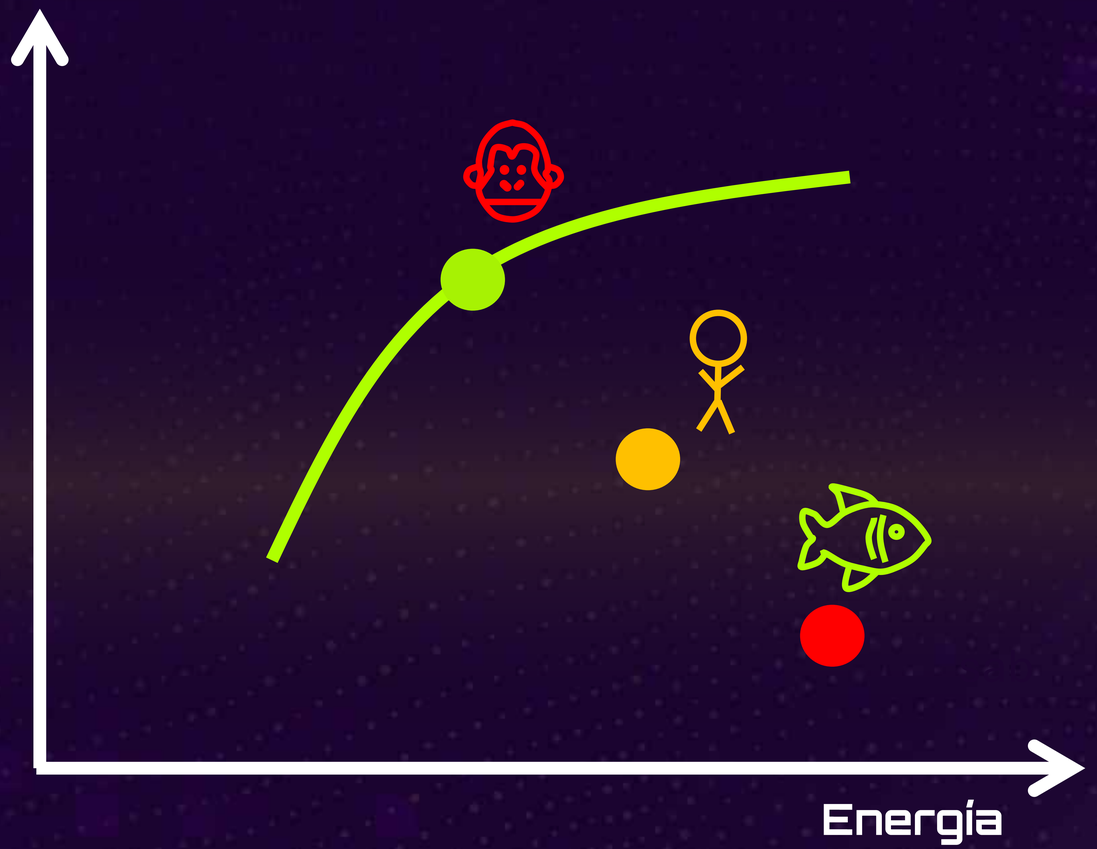
¿Cuál es el propósito?

Eficiencia en la IA



Eficiencia en la IA

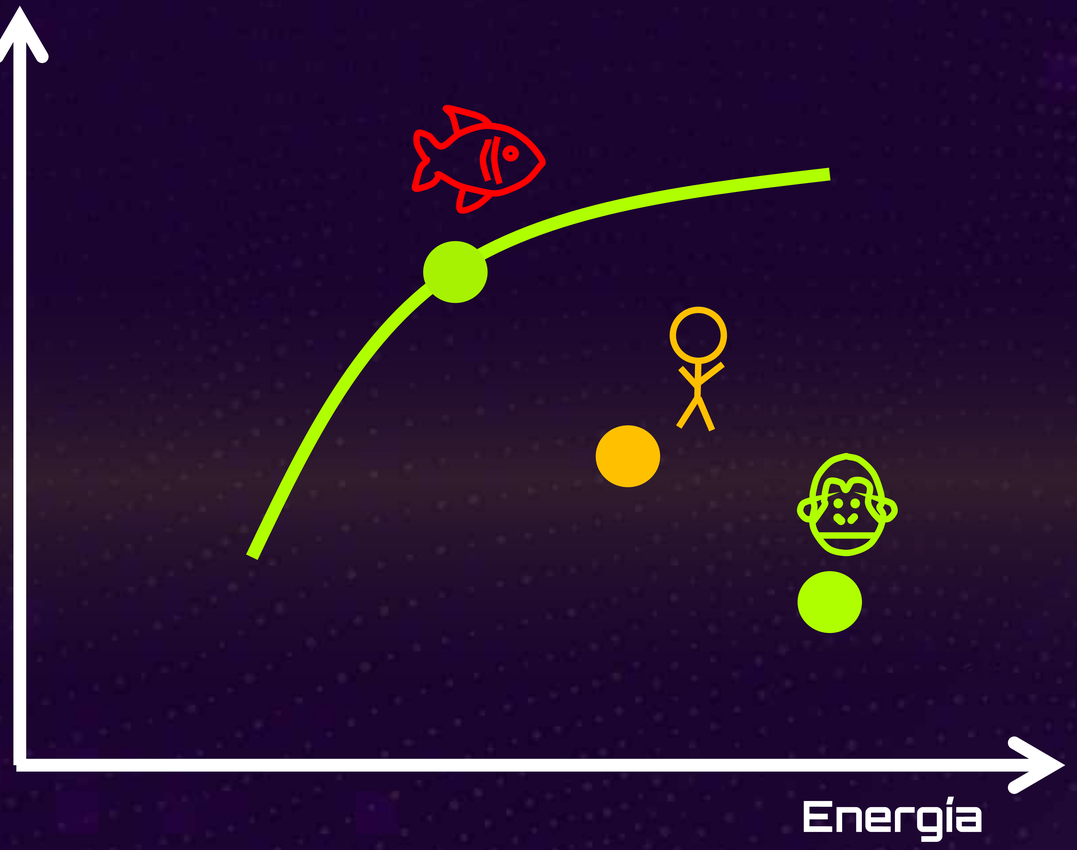
Propósito:
Trepar arboles



$\langle Perceptores, Razonamiento, Actuadores \rangle$

Eficiencia en la IA

Propósito:
Nadar

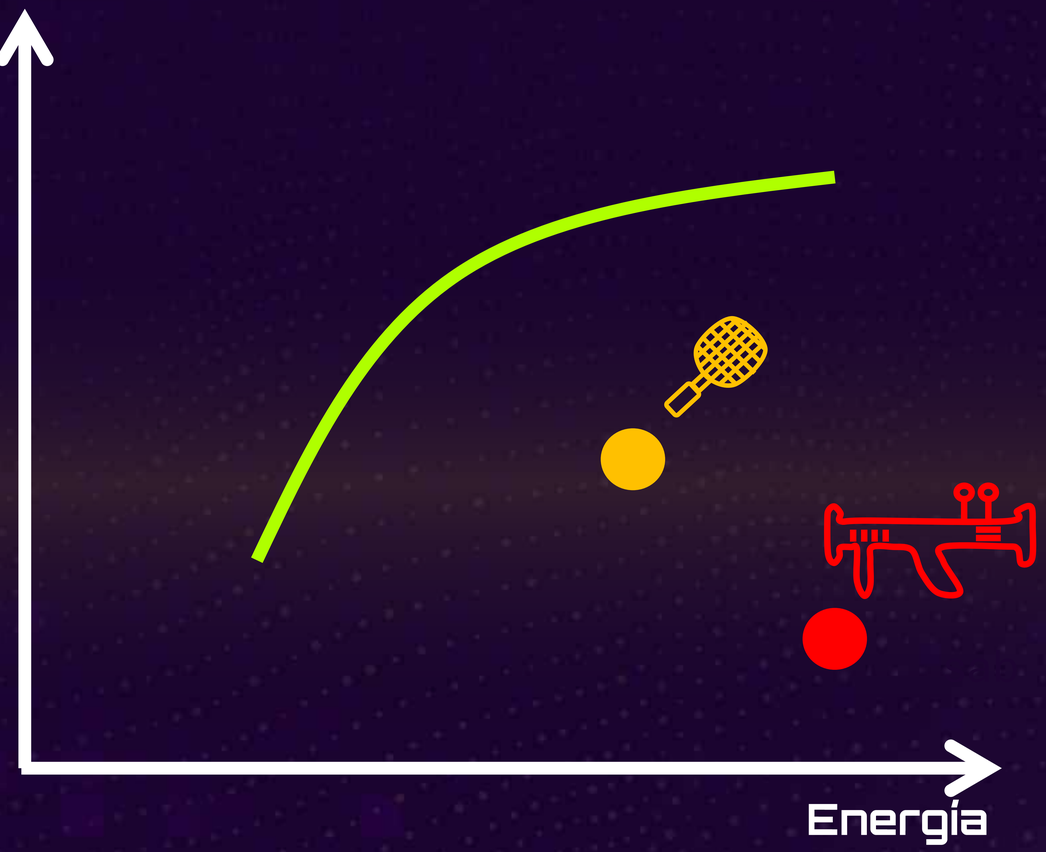


$$\langle Perceptores, Razonamiento, Actuadores \rangle$$

Eficiencia en la IA

Propósito:

Matar una mosca

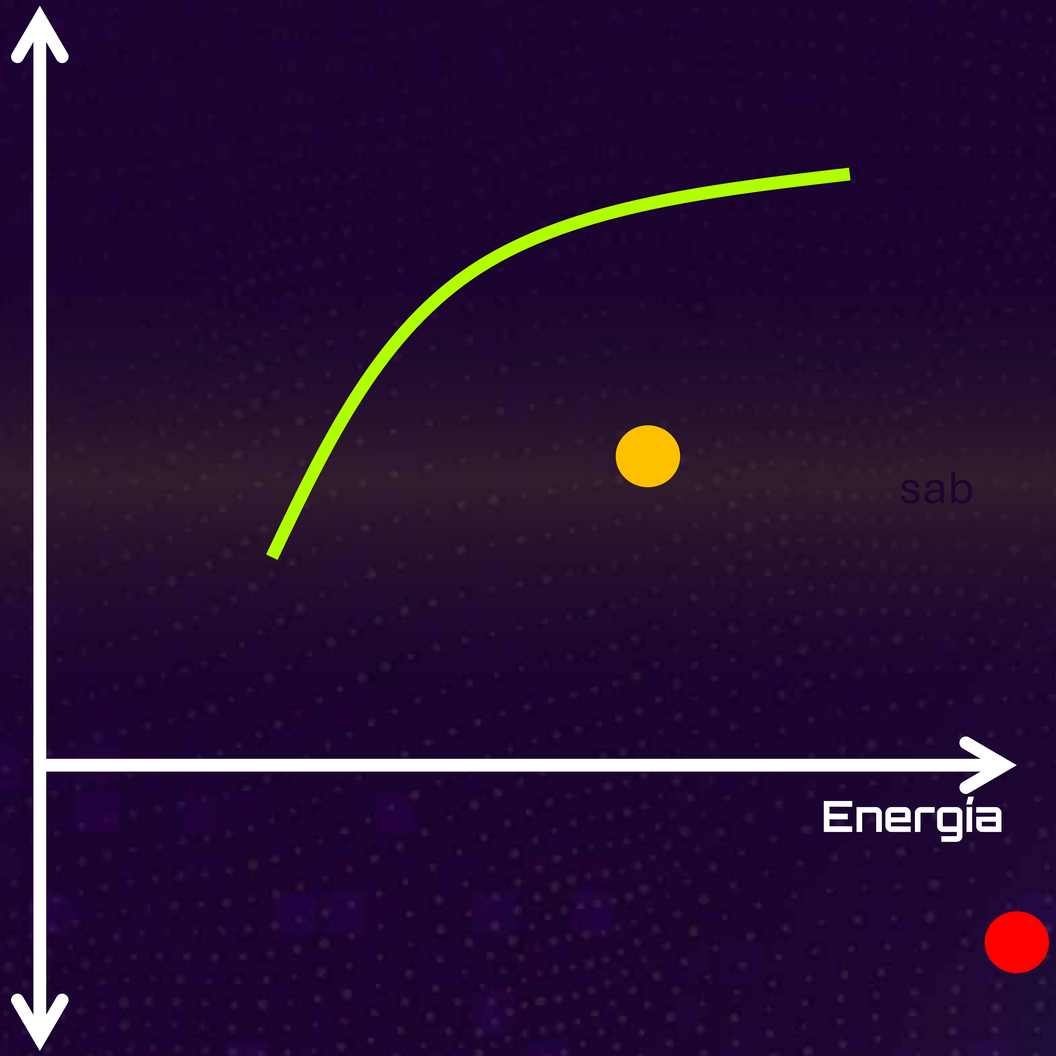


Criticar la IA es como culpar a un martillo de no ser un destornillador

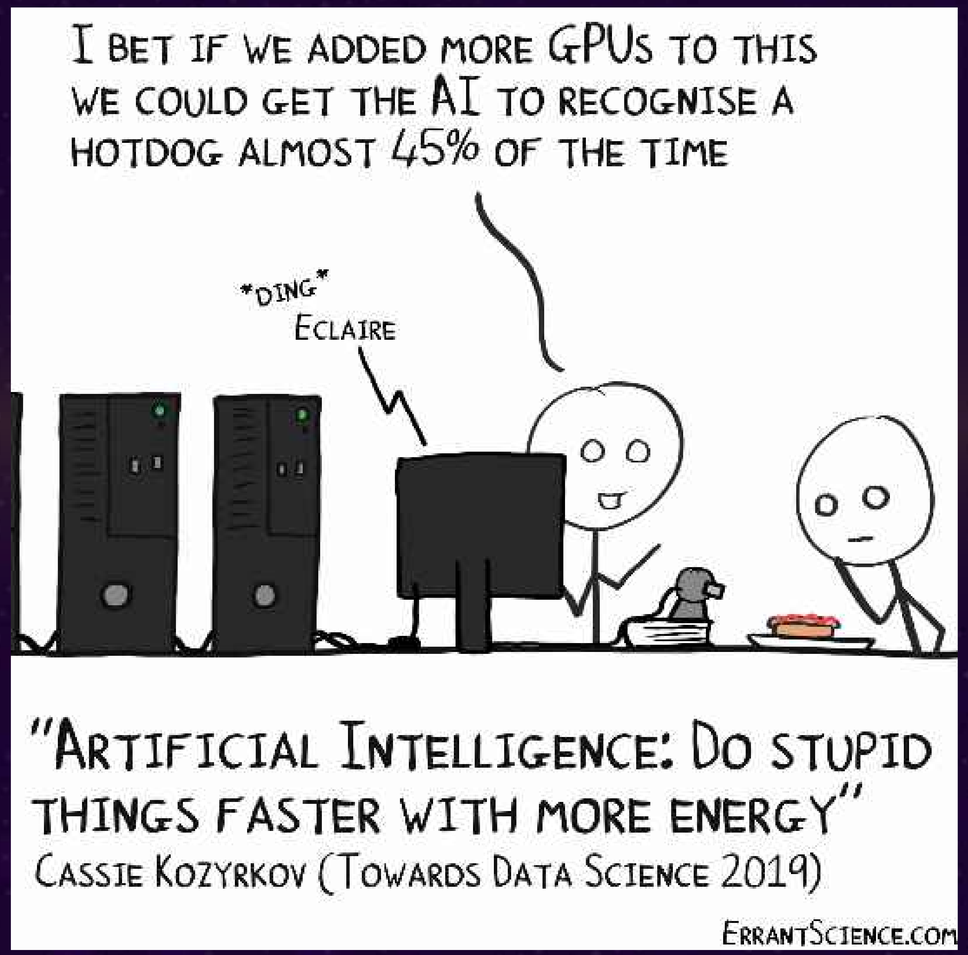
Propósito en la IA

Propósito:

Convertir Foto a cartoon



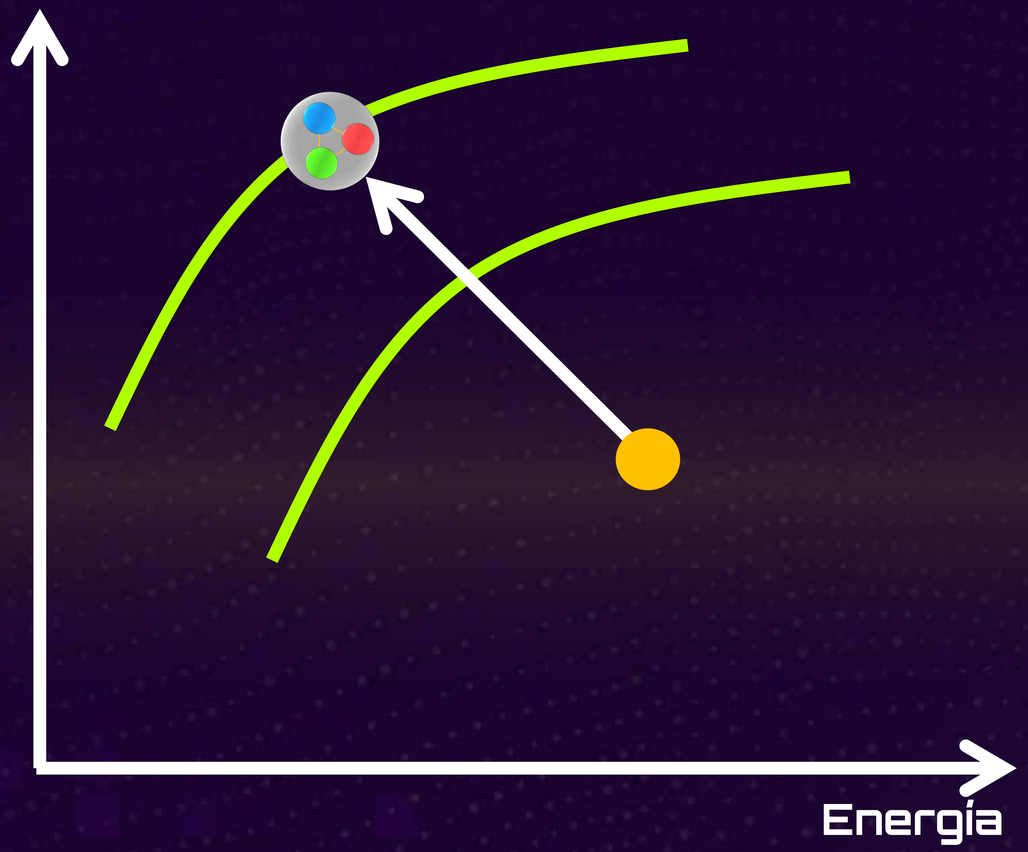
Cual es el propósito?



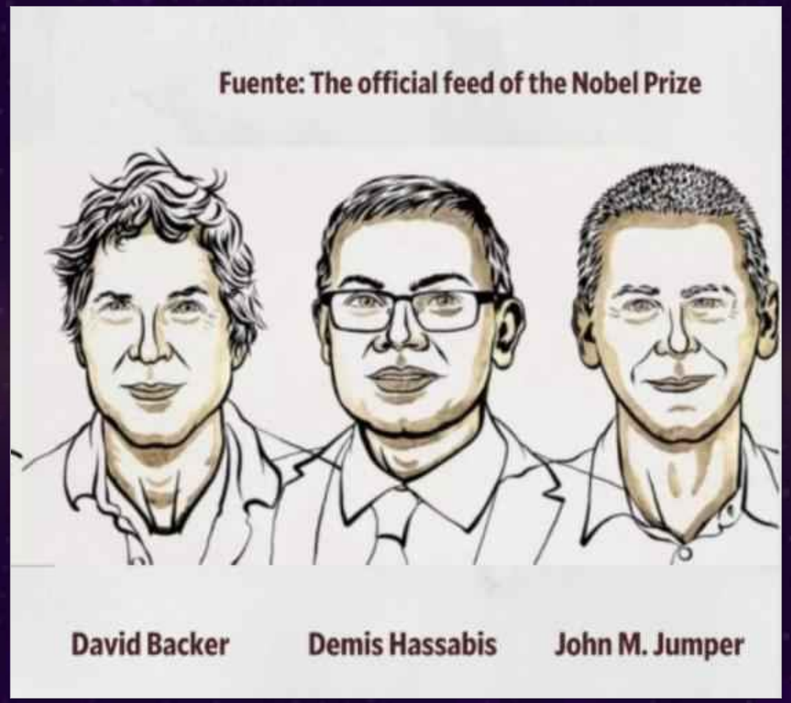
Propósito en la IA

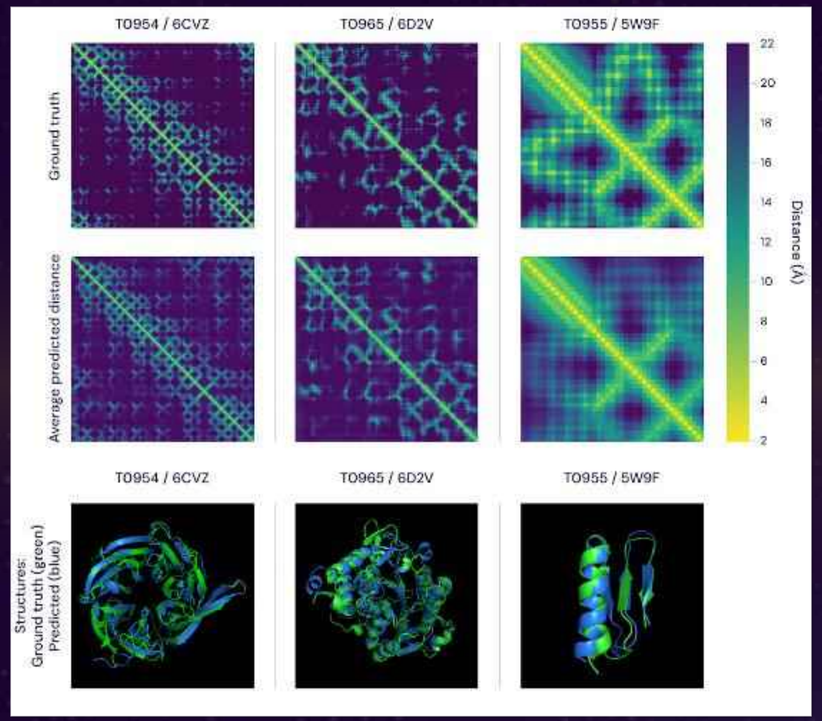
Propósito:

Predecir el Desdoblamiento de proteínas



Alpha-fold

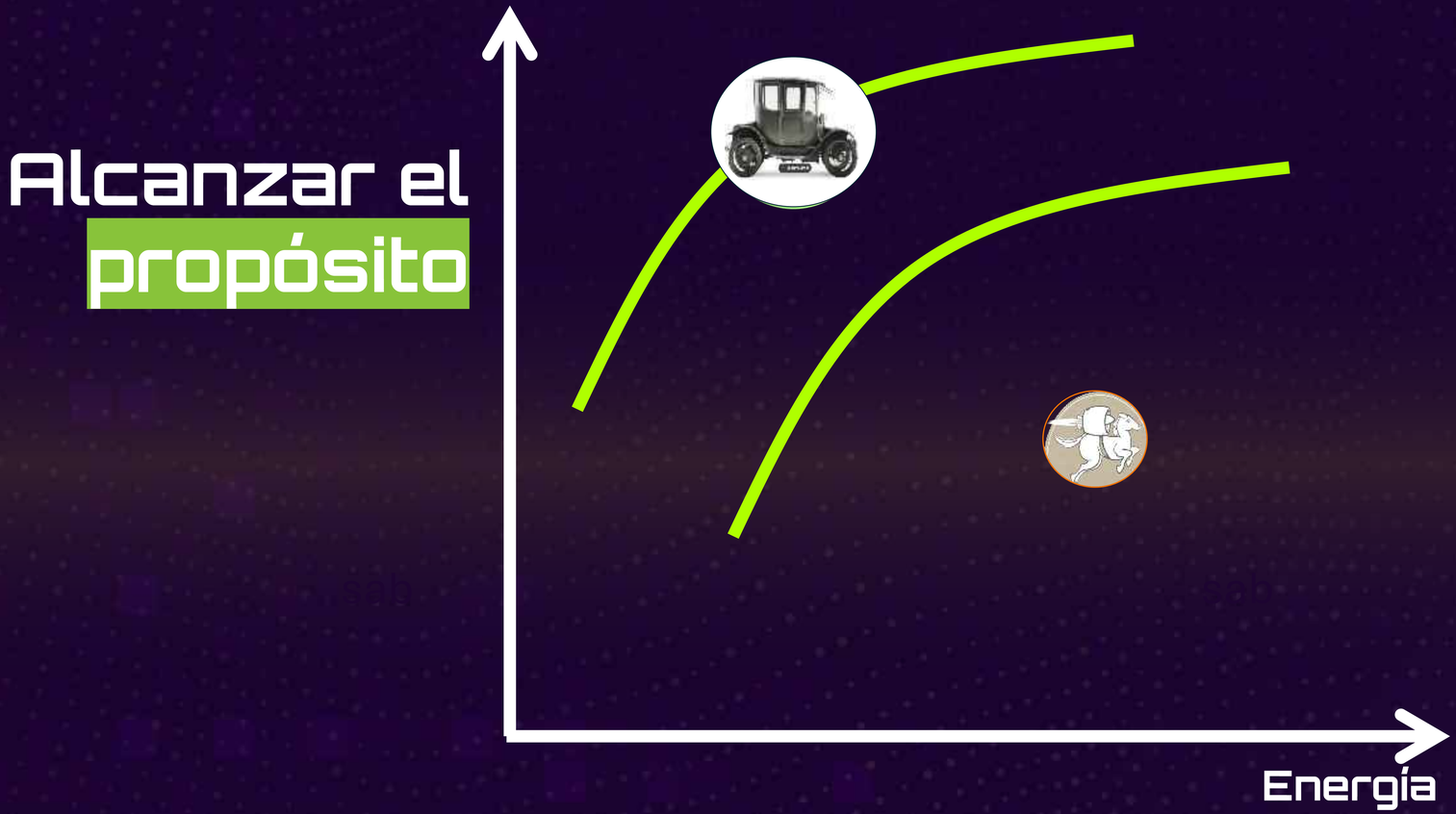


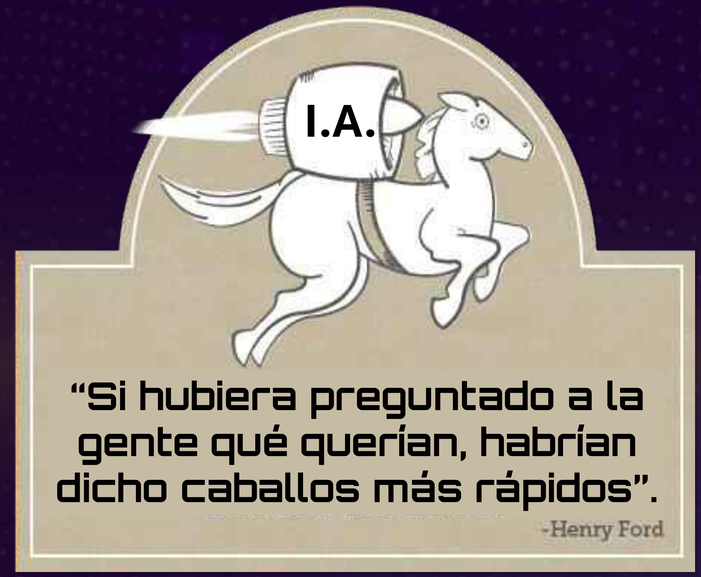


Demis Hassabis (fundador de DeepMind) y John Jumper, que dirigió el desarrollo del modelo de IA AlphaFold -que predice las estructuras de las proteínas basándose en sus secuencias químicas

Propósito en la IA

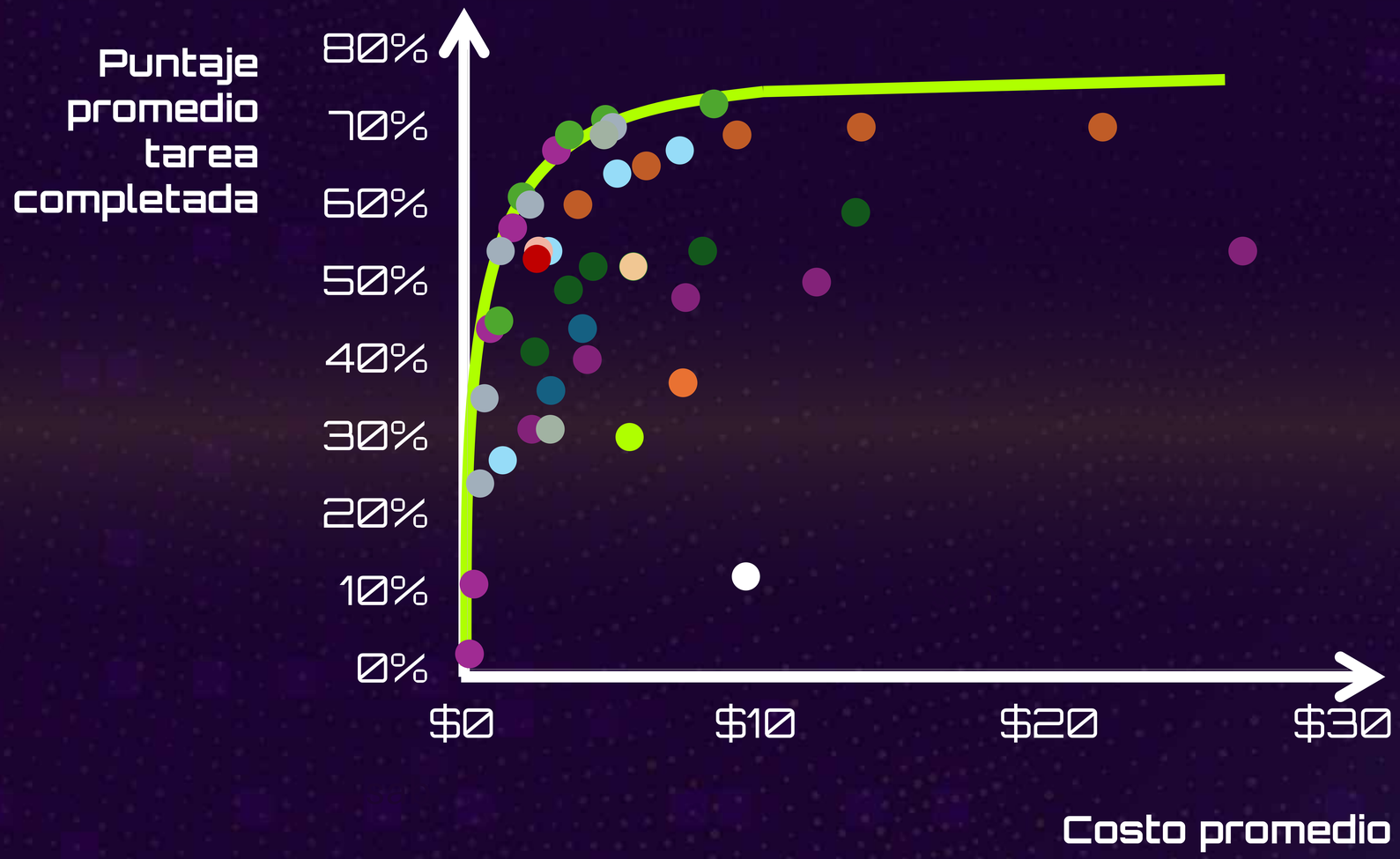
Alcanzar el propósito





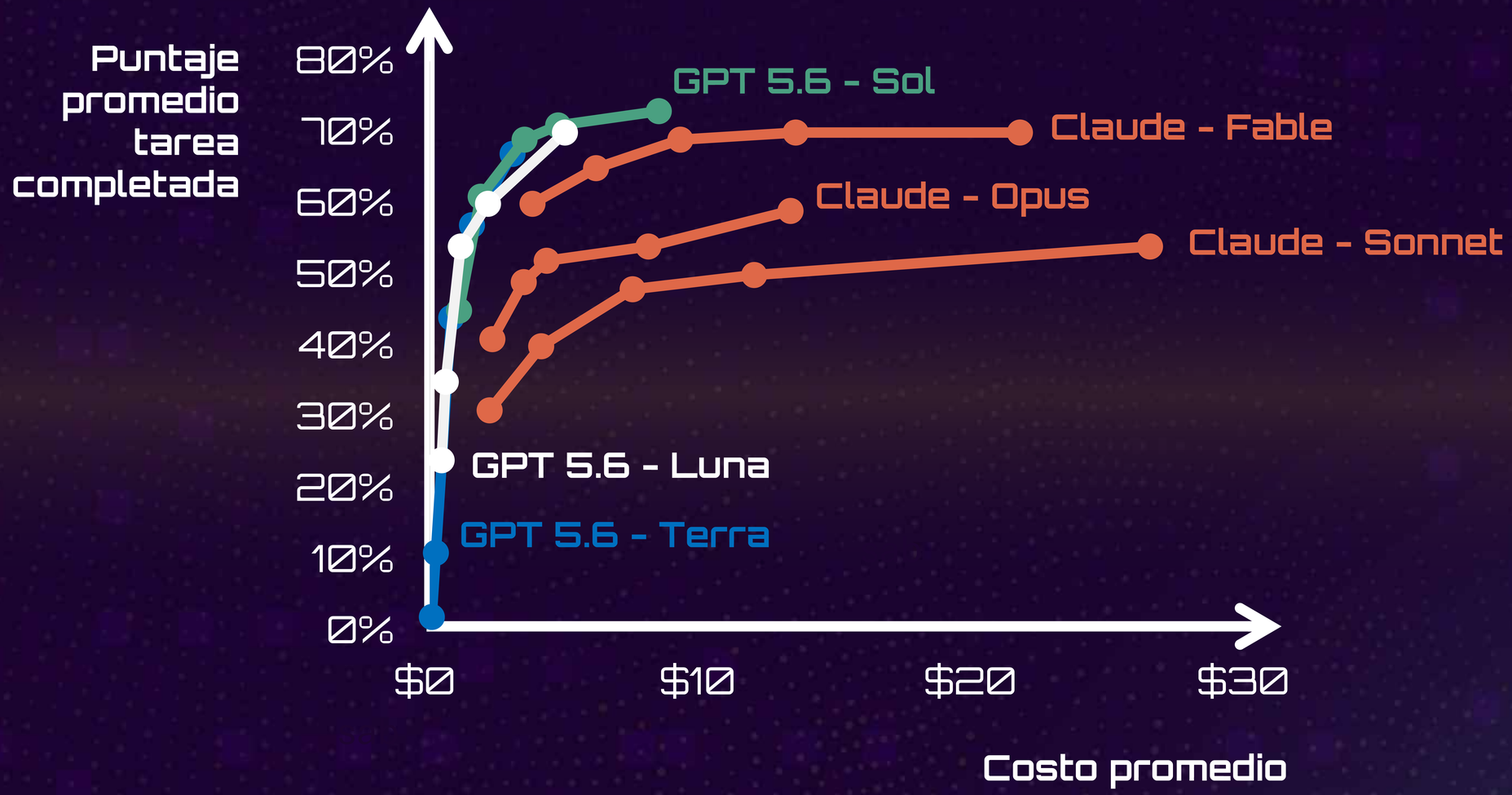
Un meme vale más que mil imágenes

Eficiencia en la IA



Fuente: DeepSWE Benchmark, datacurve.ai (consultado en julio 2026)

Eficiencia en la IA



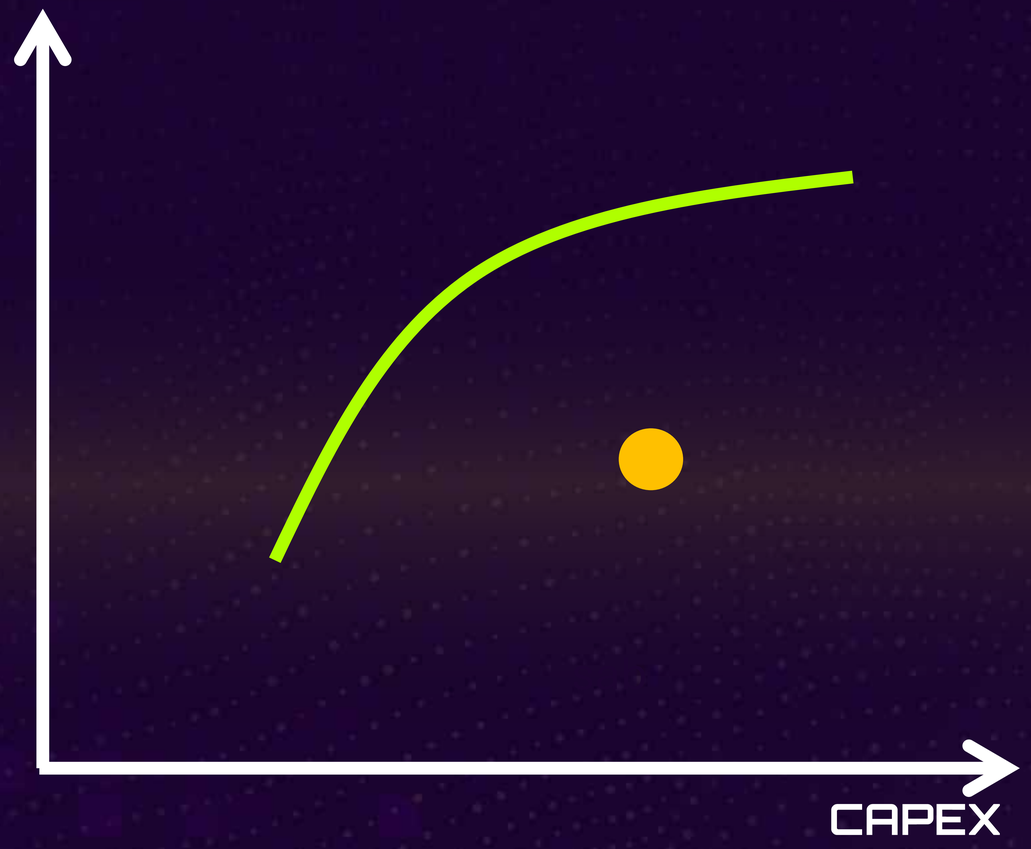
Fuente: DeepSWE Benchmark, datacurve.ai (consultado en julio 2026)

Eficiencia en Sistemas (Oil & Gas) II

Objetivos en Oil & Gas

Propósito:

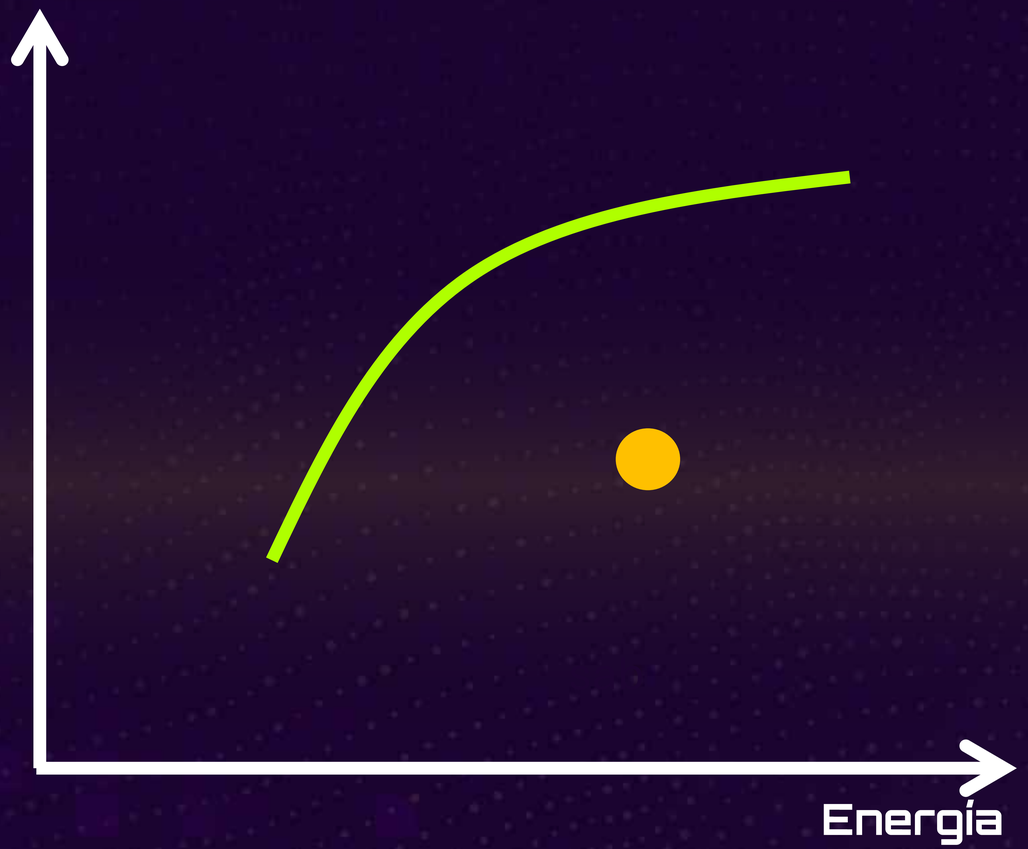
Valor Generado



Objetivos en Oil & Gas

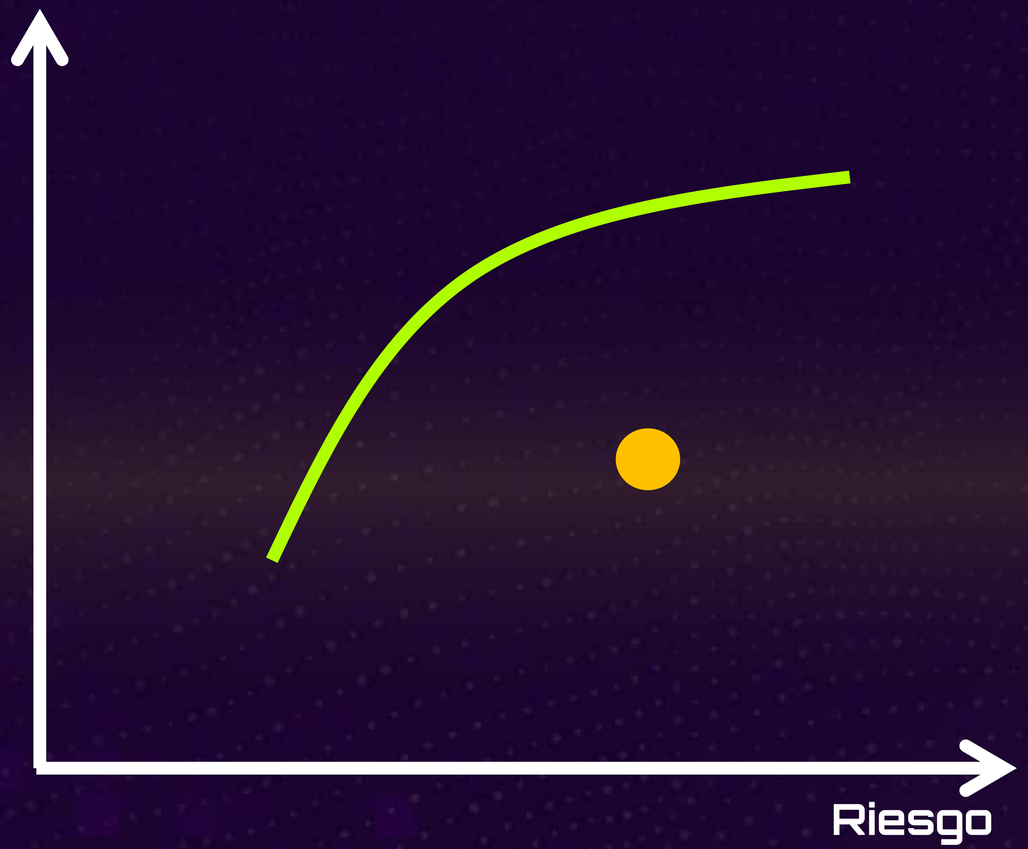
Propósito:

Producción [bbl]

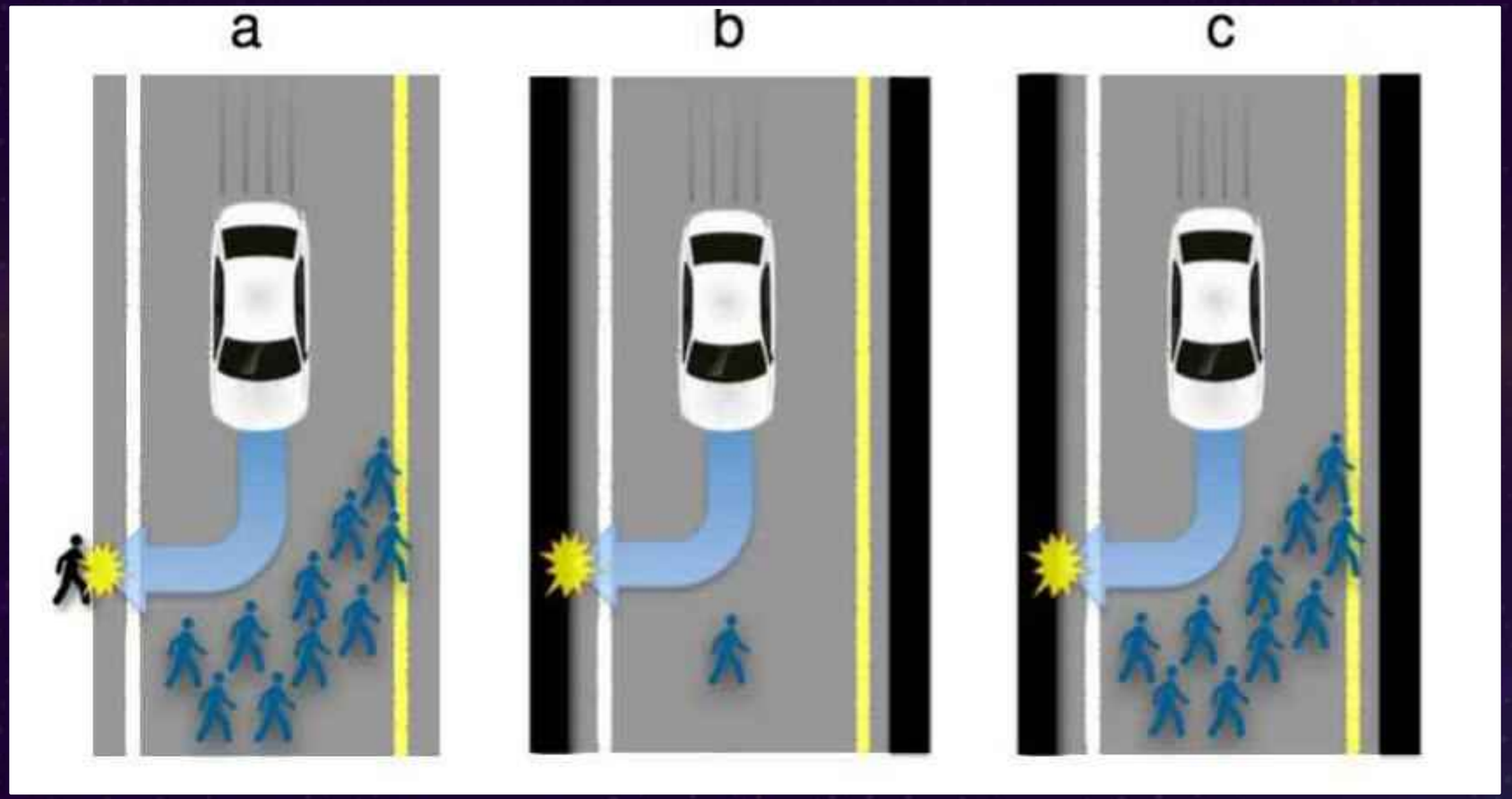


Objetivos en Oil & Gas

Propósito:
Retorno esperado

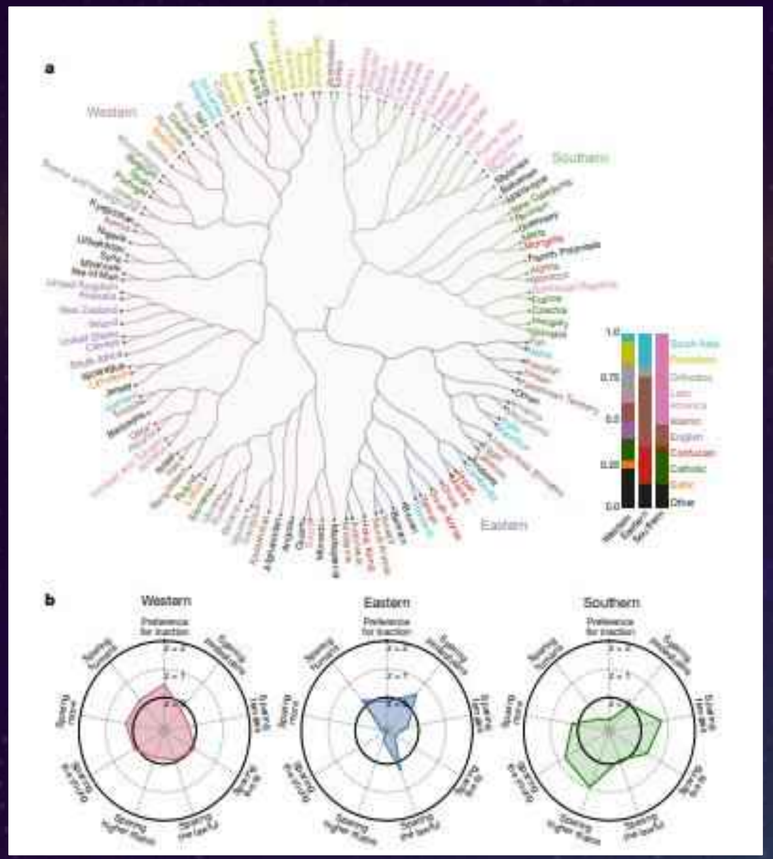


Dilemas

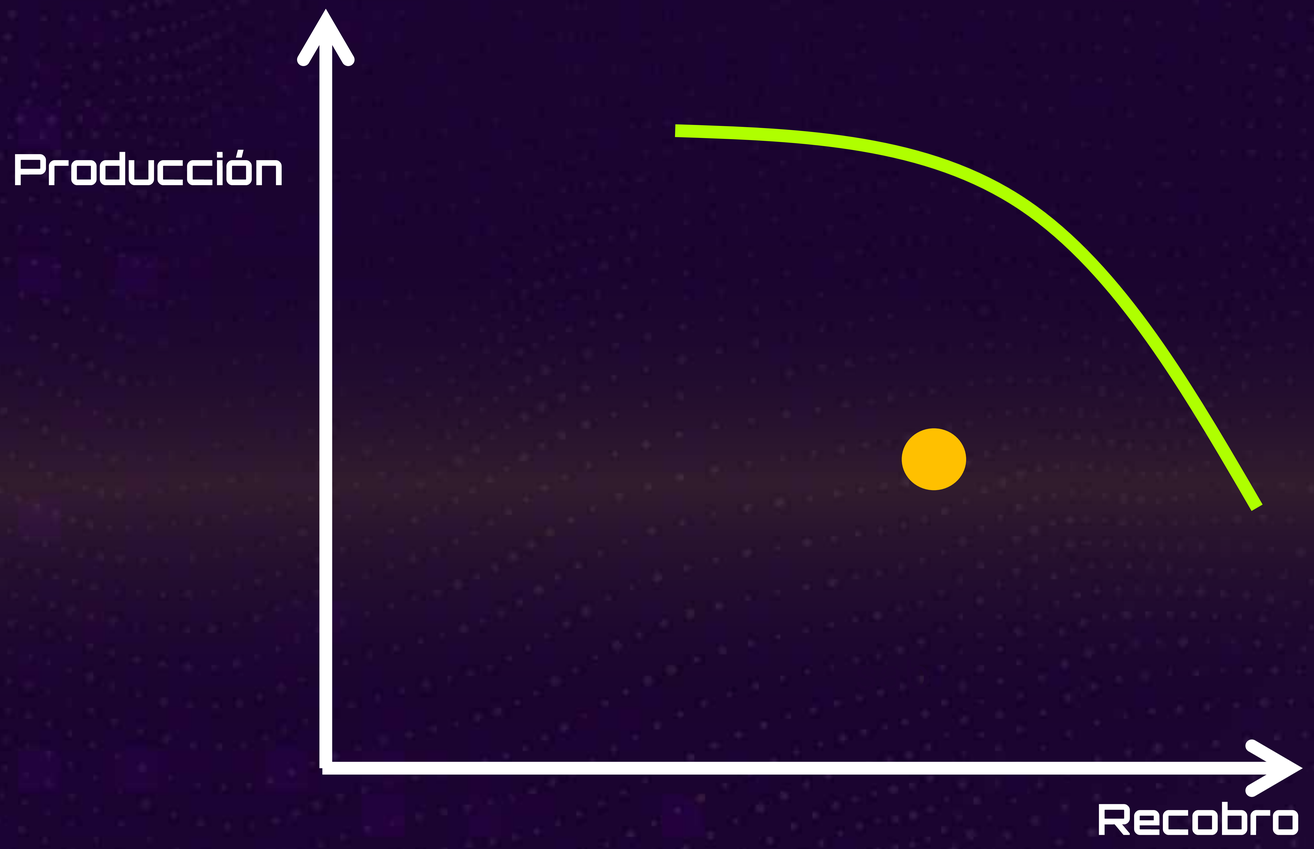


The Moral Machine experiment

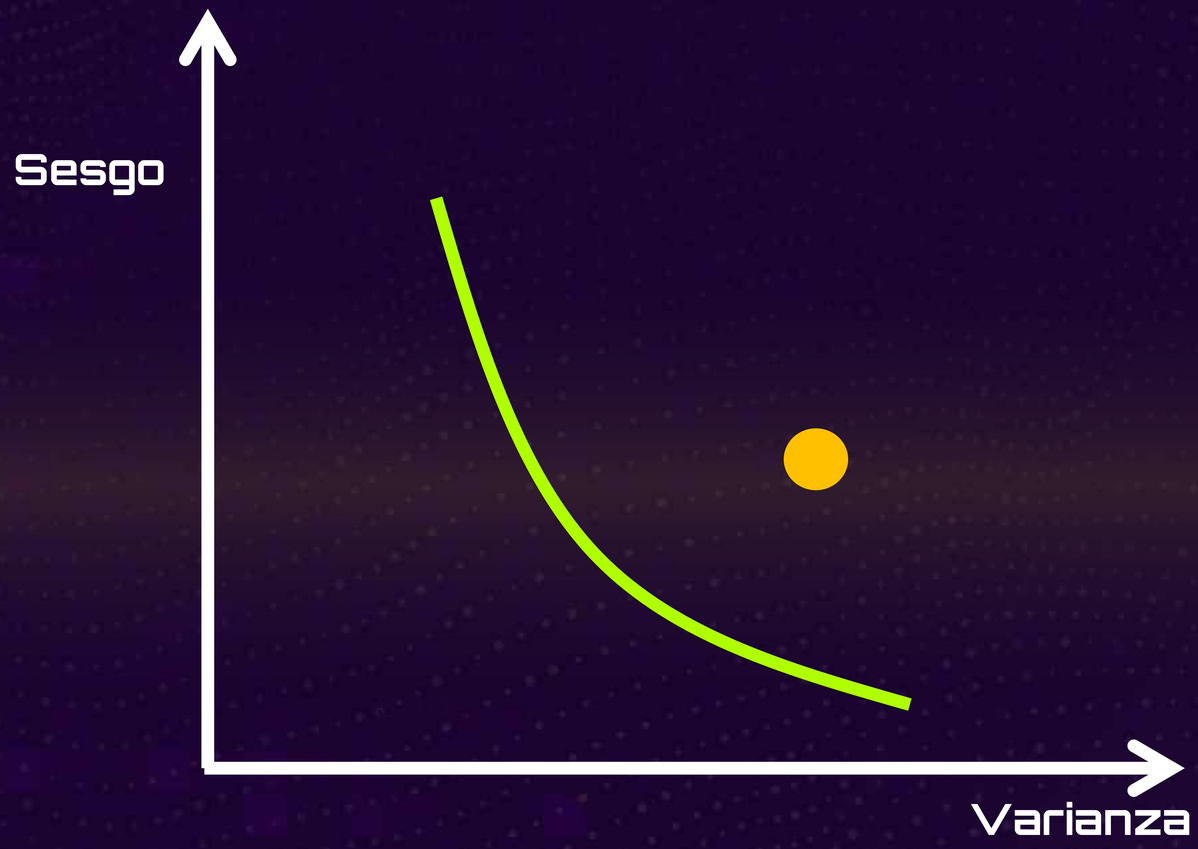
Edmond Awad[1], Sohan Dsouza[1], Richard Kim[1], Jonathan Schulz[2], Joseph Henrich[2], Azim Shariff[3]*, Jean-François Bonnefon[4]* & Iyad Rahwan[1,5]*



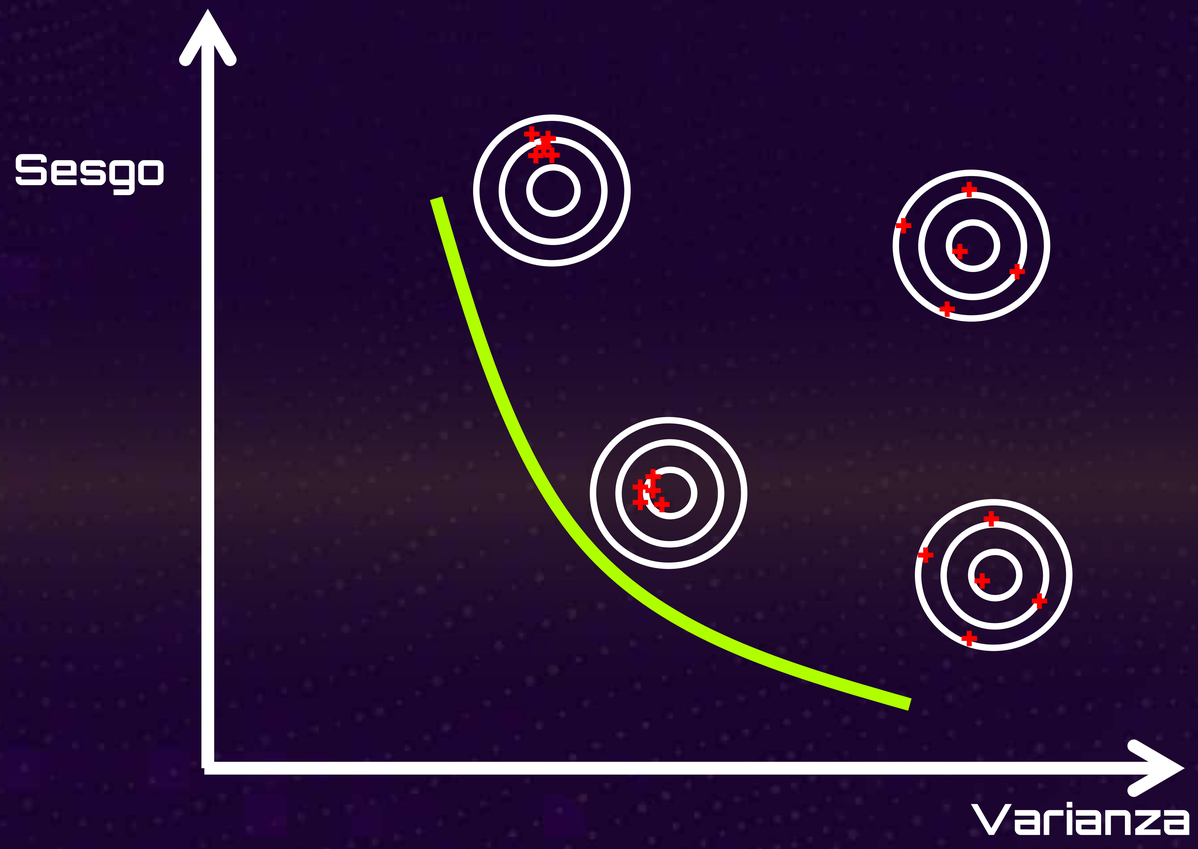
Dilemas



Dilemas

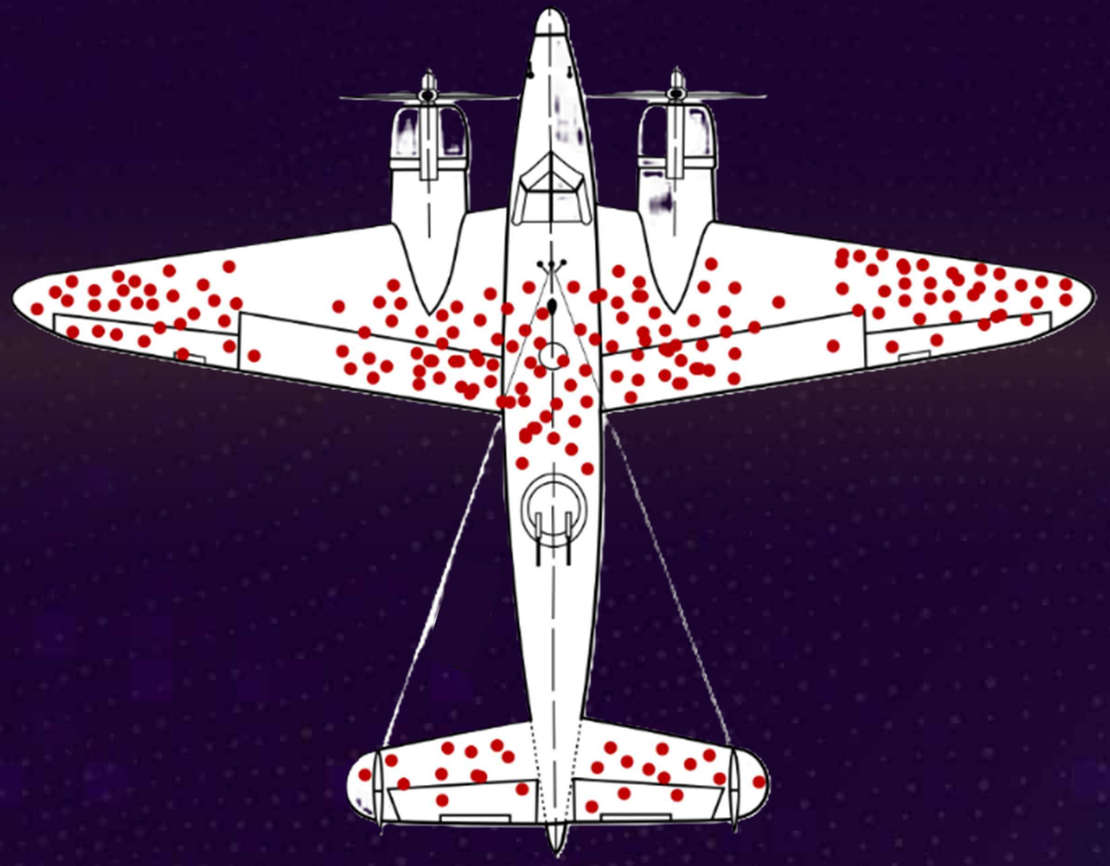


Dilemas

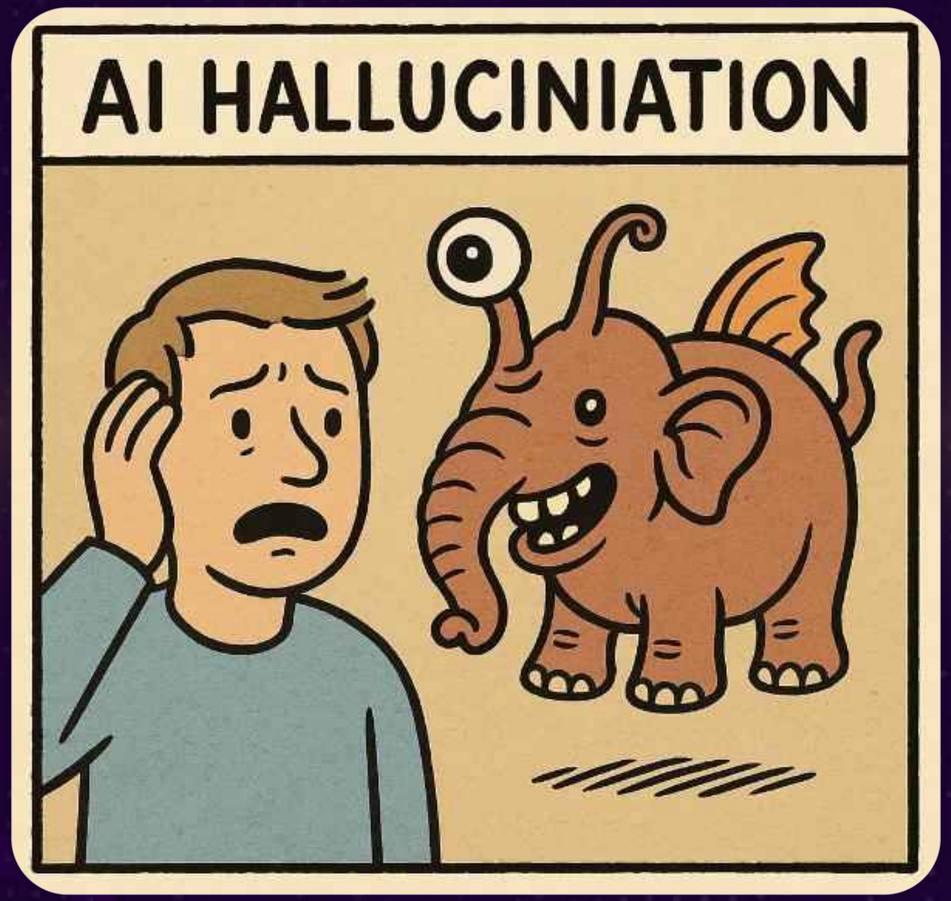


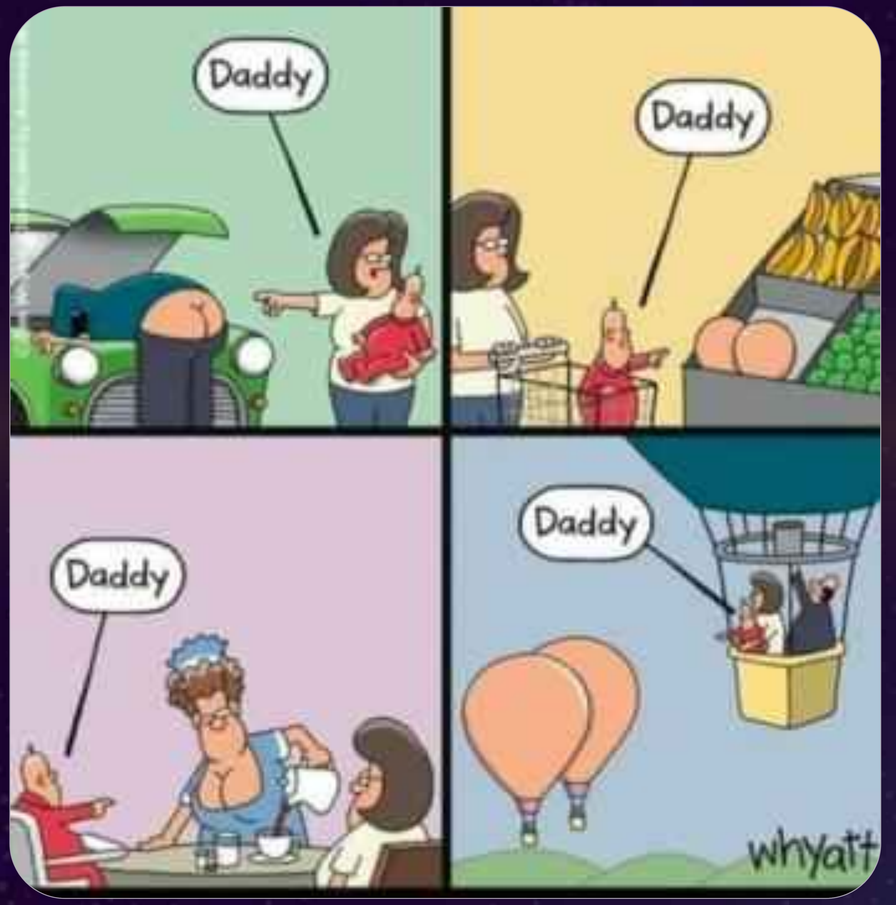
2IA CUMBRE
IA EL NUEVO MATERIAL DEL SECTOR

Sesgo de lo que observamos



Generalización





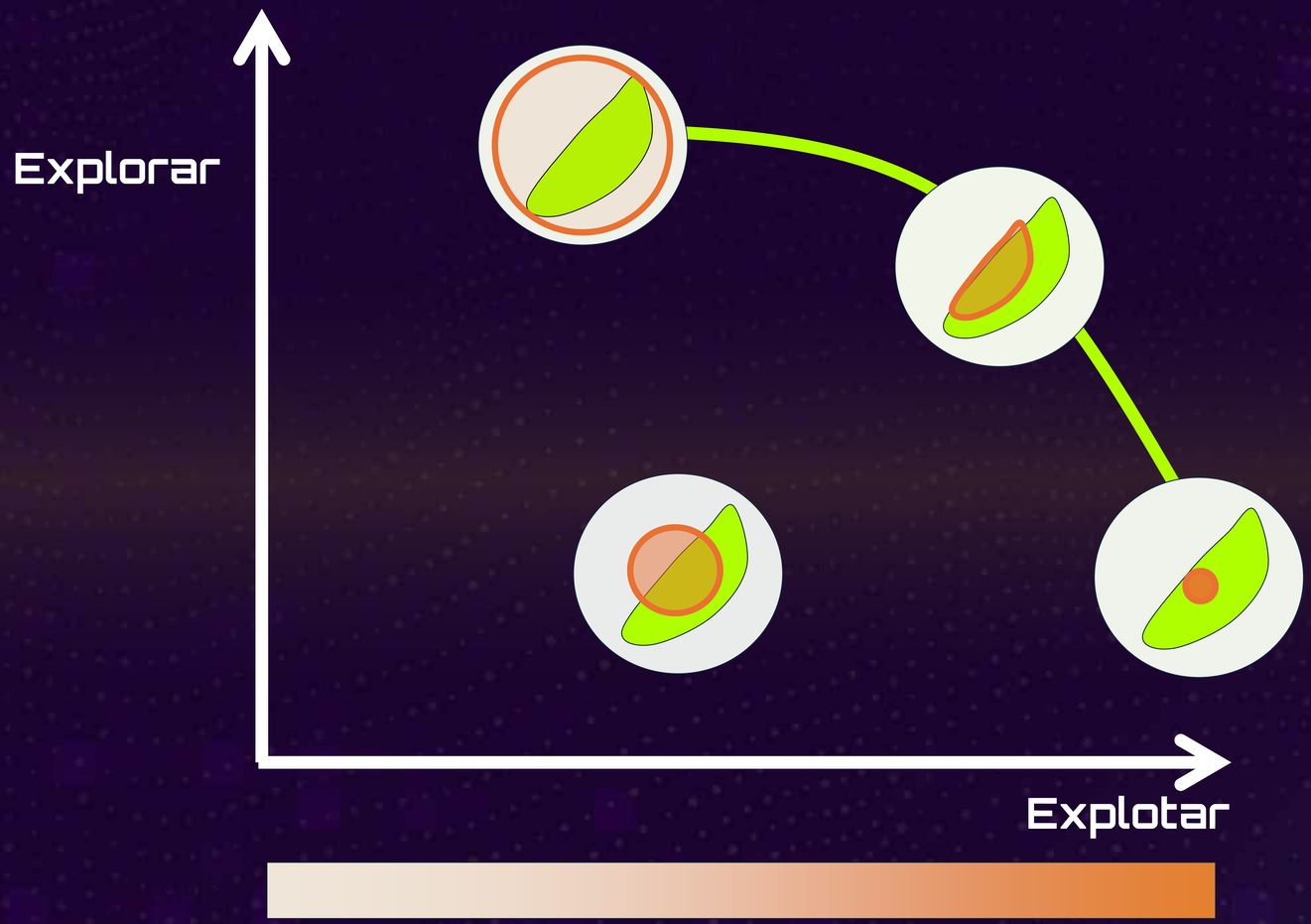
Generalización

Dilema: Principio de incertidumbre

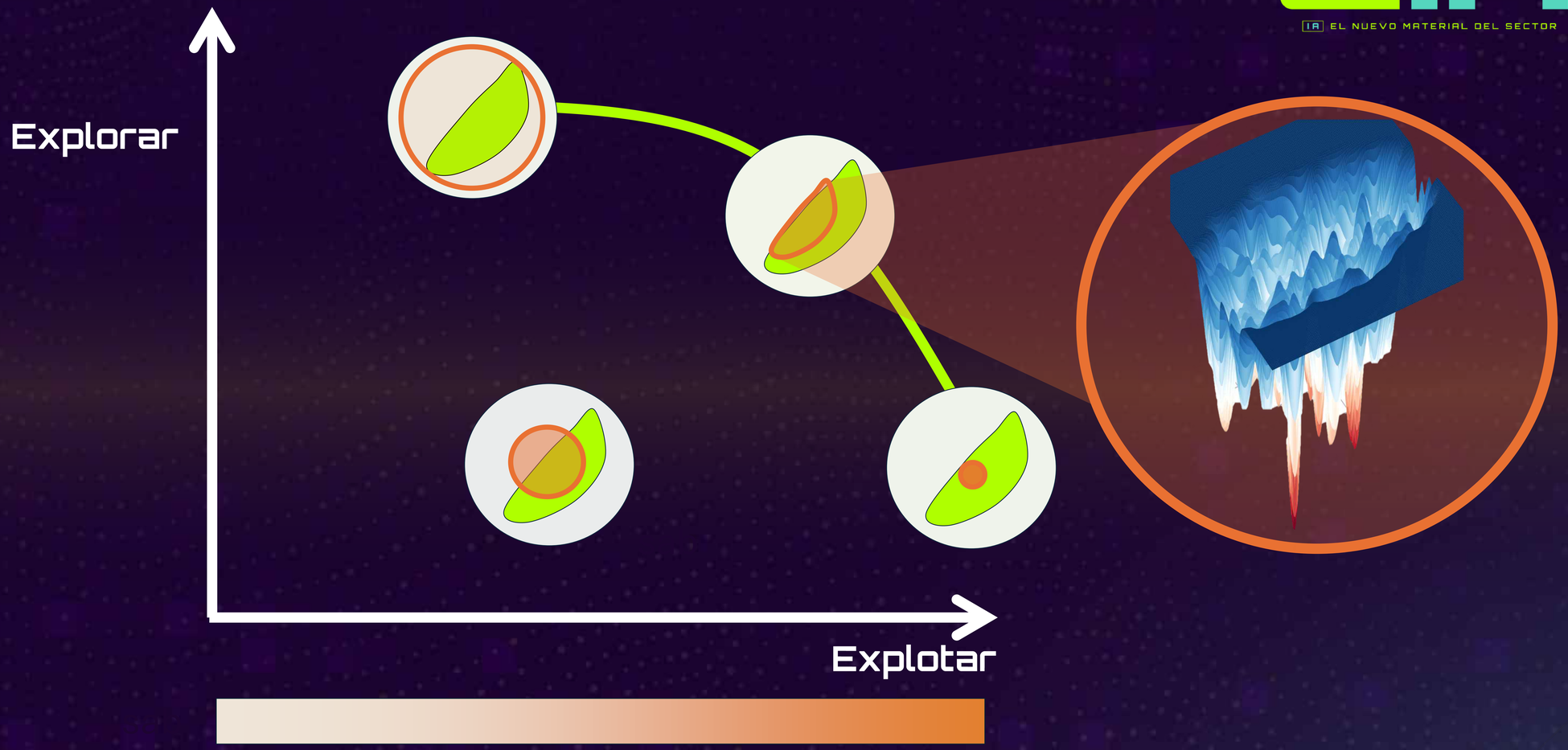
Conocer la velocidad

Conocer la posición

Dilema: Explorar vs. Explotar



Dilema: Explorar vs. Explotar



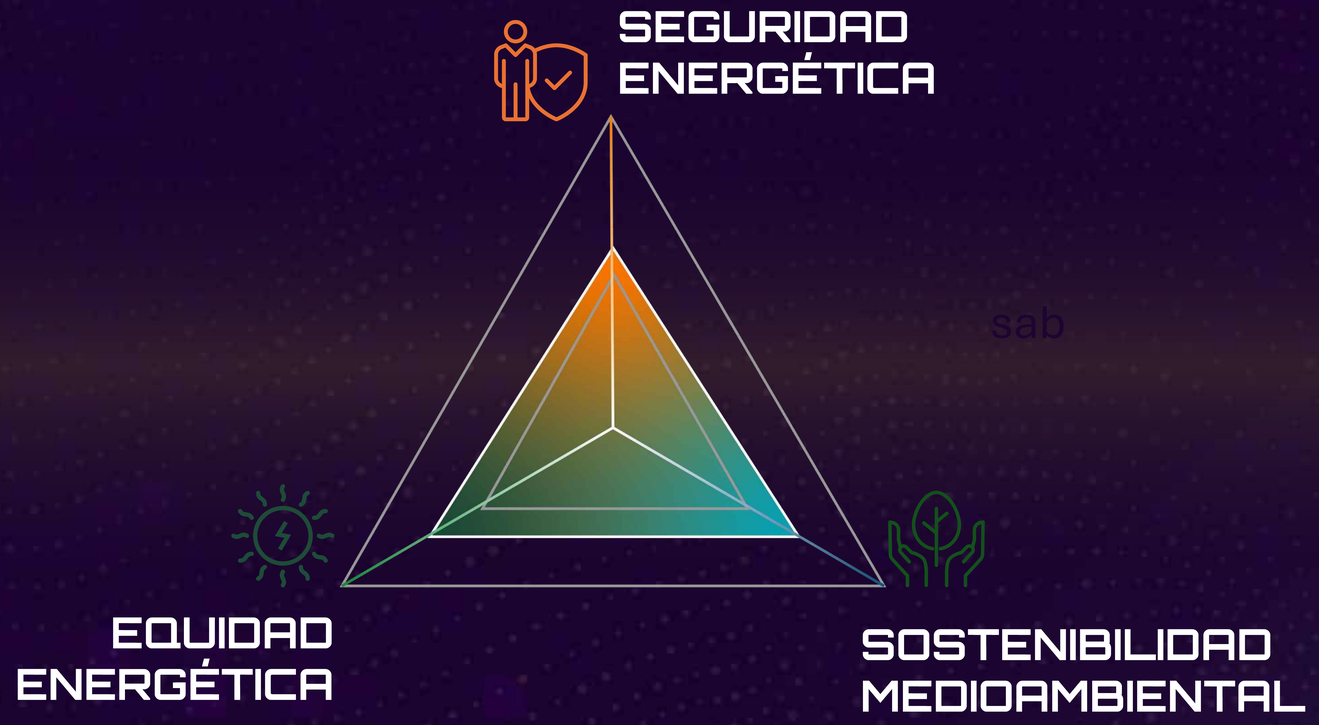
Explorar Vs. Explotar

** Refiriéndose al Aprendizaje por refuerzo*

Explorar

Explotar

Trilema Energético



Trilema Energético

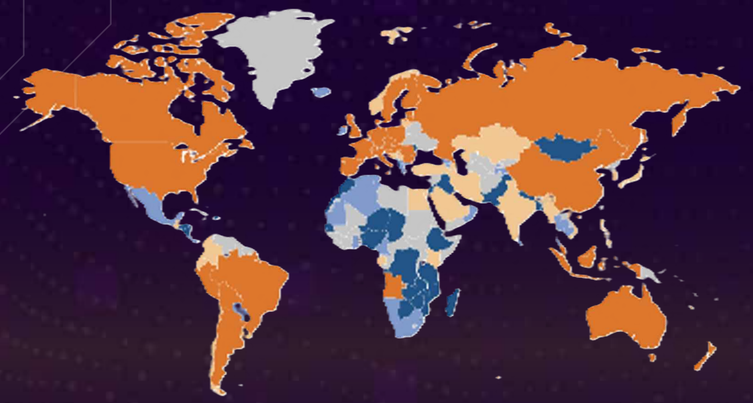
Seguridad energética

Sostenibilidad Ambiental

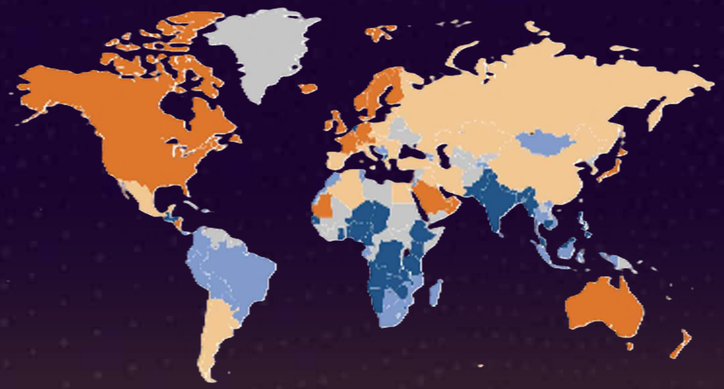
Acceso a energía

Trilema Energético

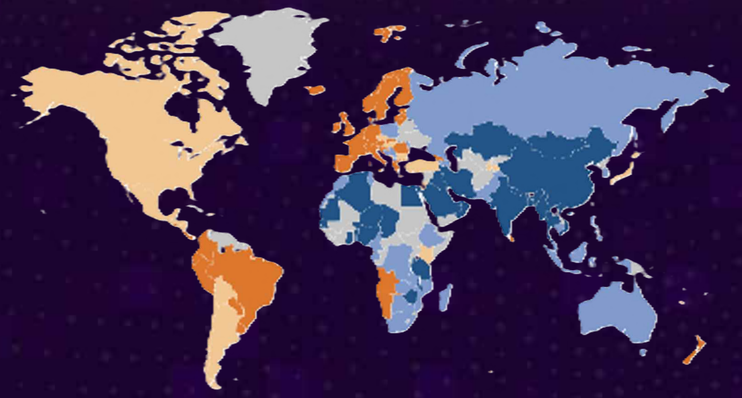
Security



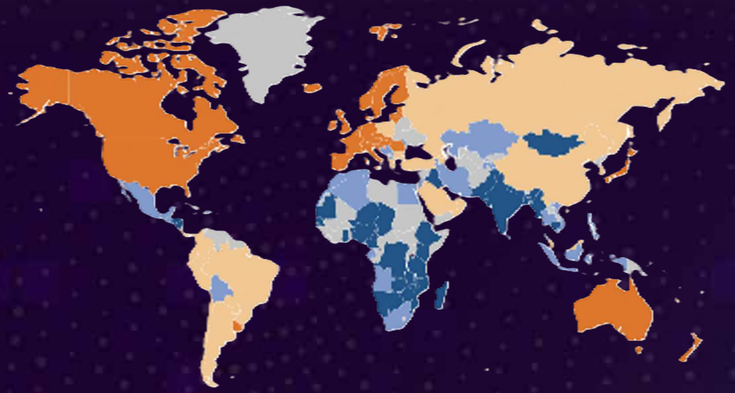
Equity



Enviromental Sustainability



Total Score (Index)



Energy Performance

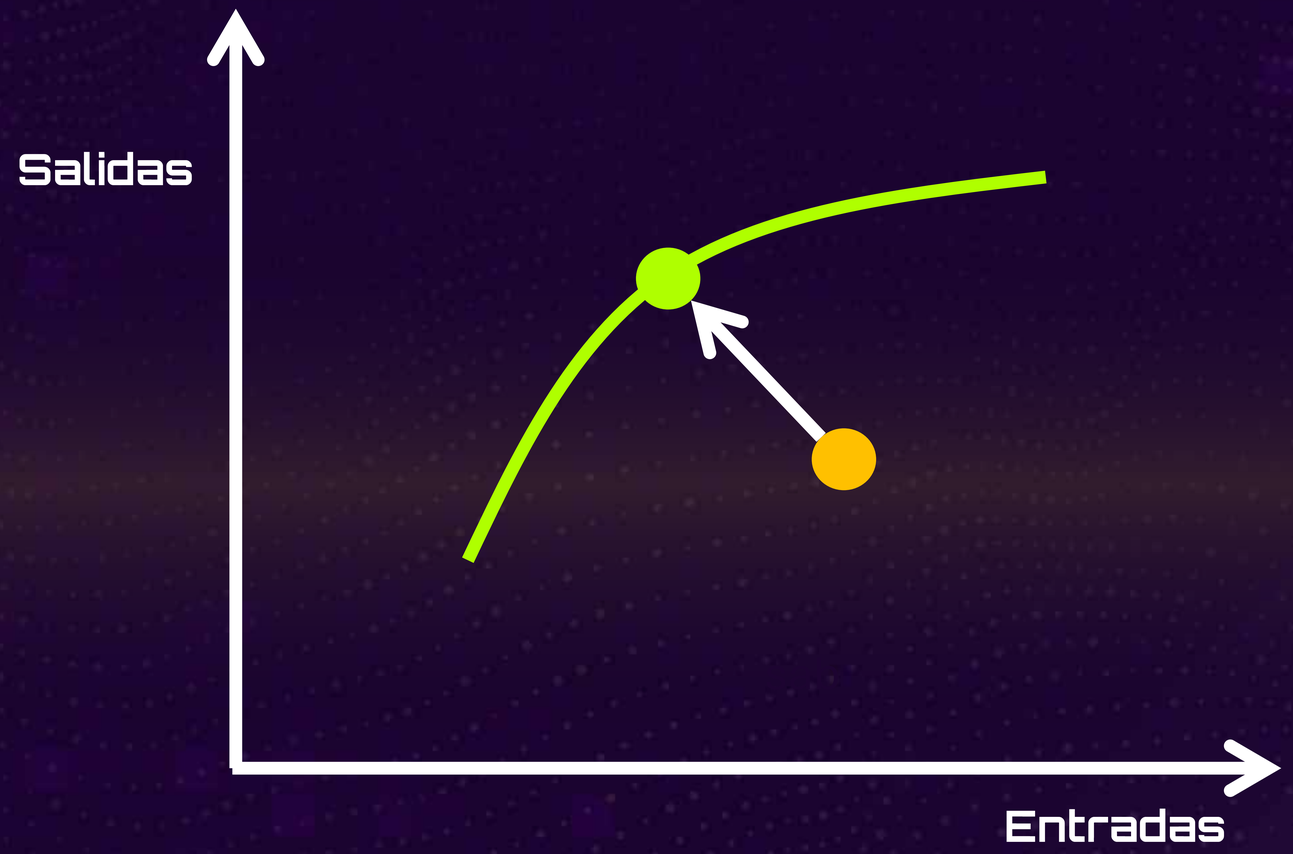
(+)

(–)

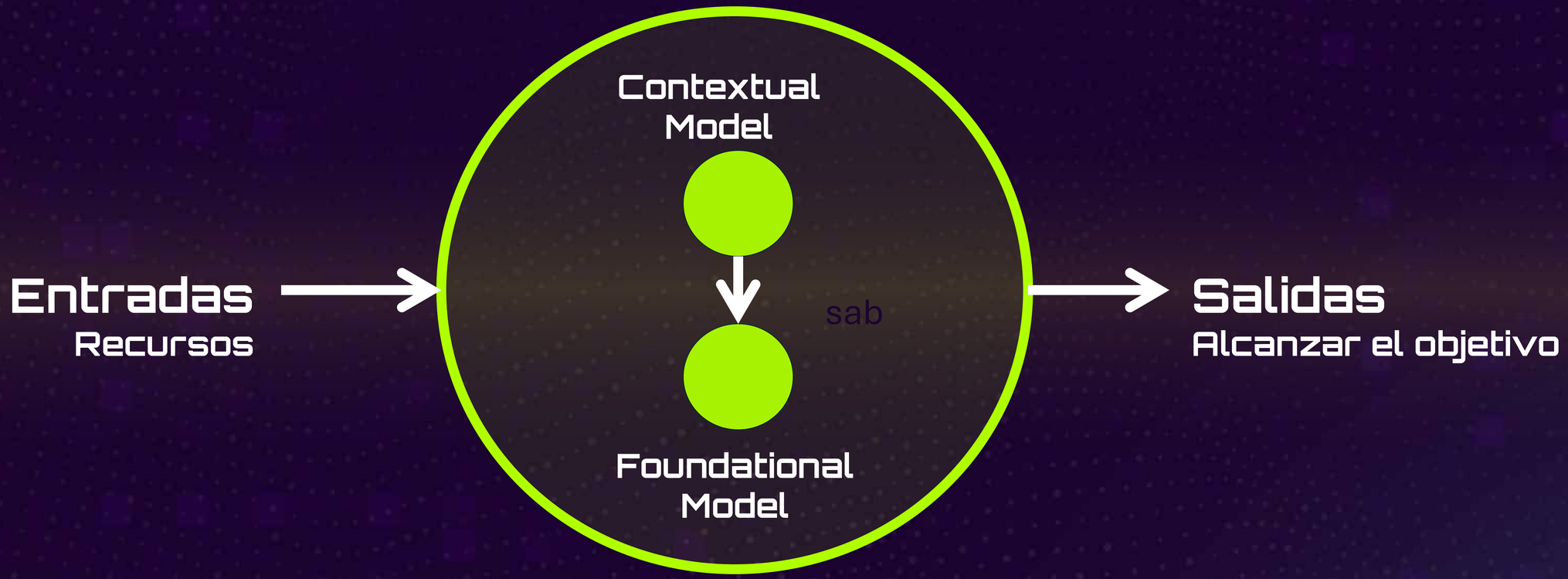
Trilema producción en Oil & Gas

Ejemplo de IA en Sistemas III

Eficiencia (Recap)



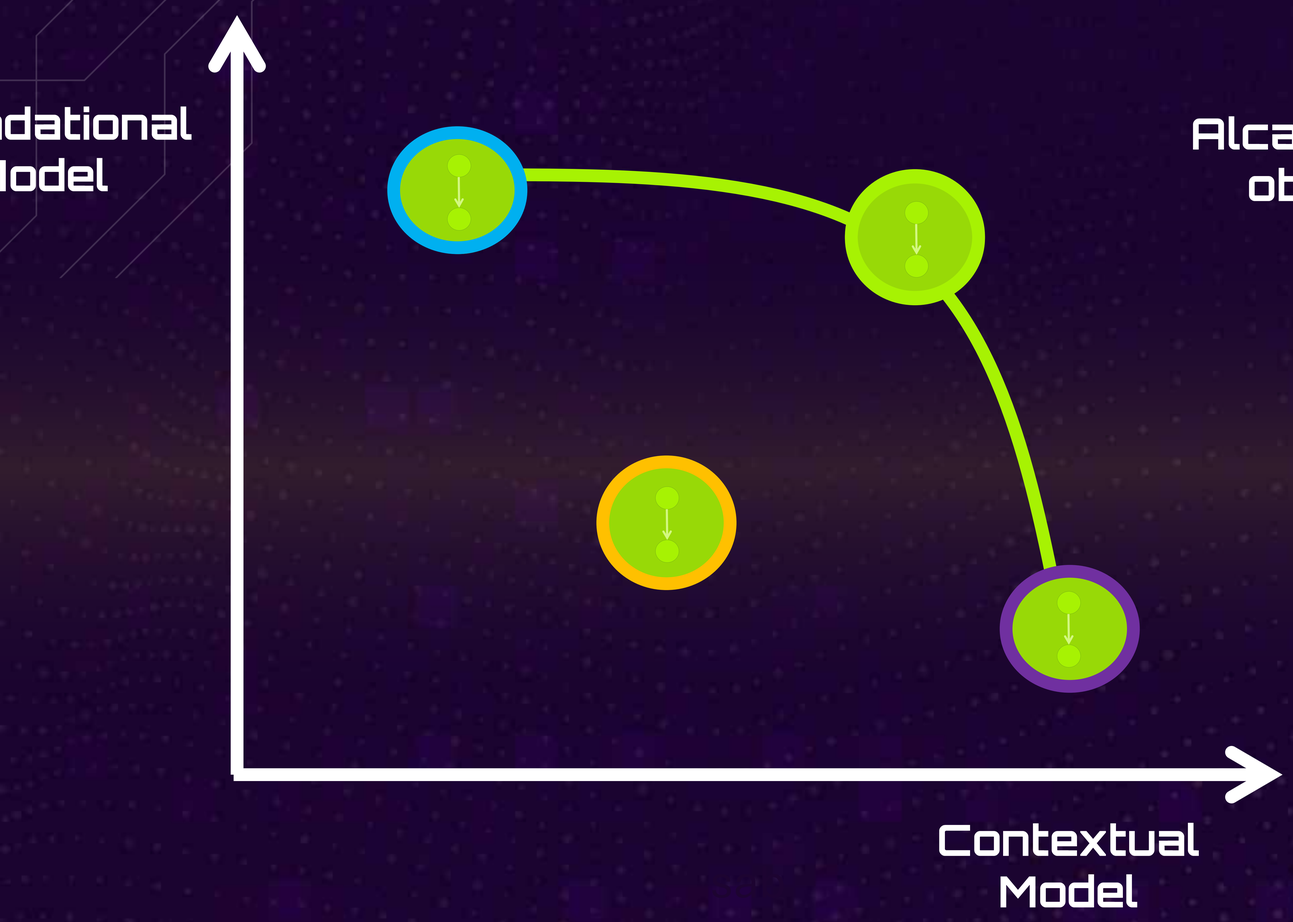
Eficiencia de la IA en sistemas

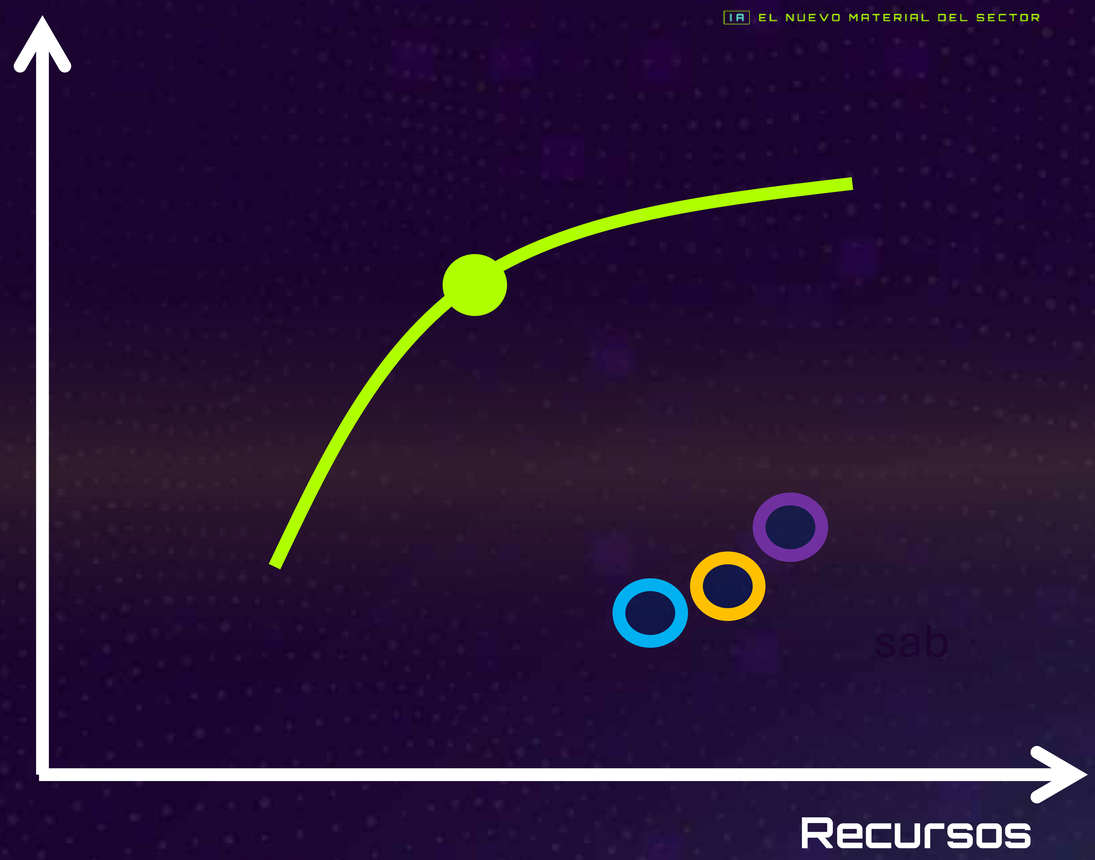


Eficiencia de la IA en sistemas

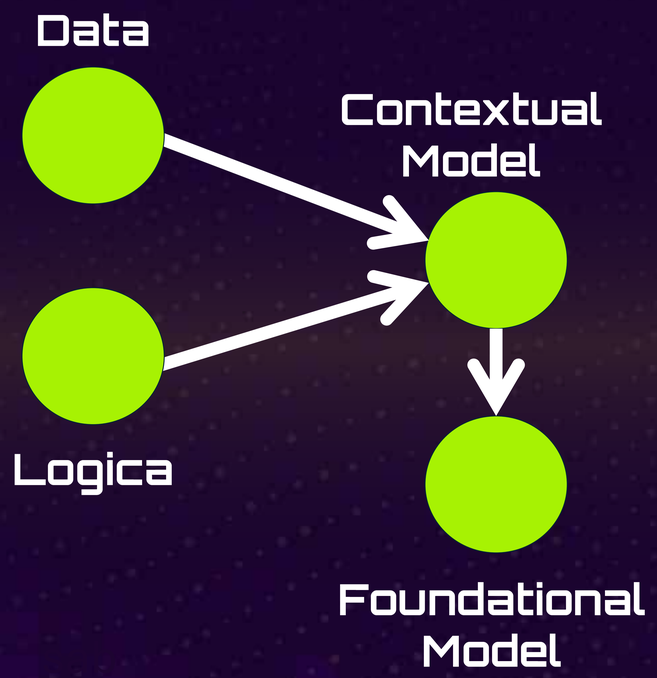
CUMBRE 2IA

IA EL NUEVO MATERIAL DEL SECTOR



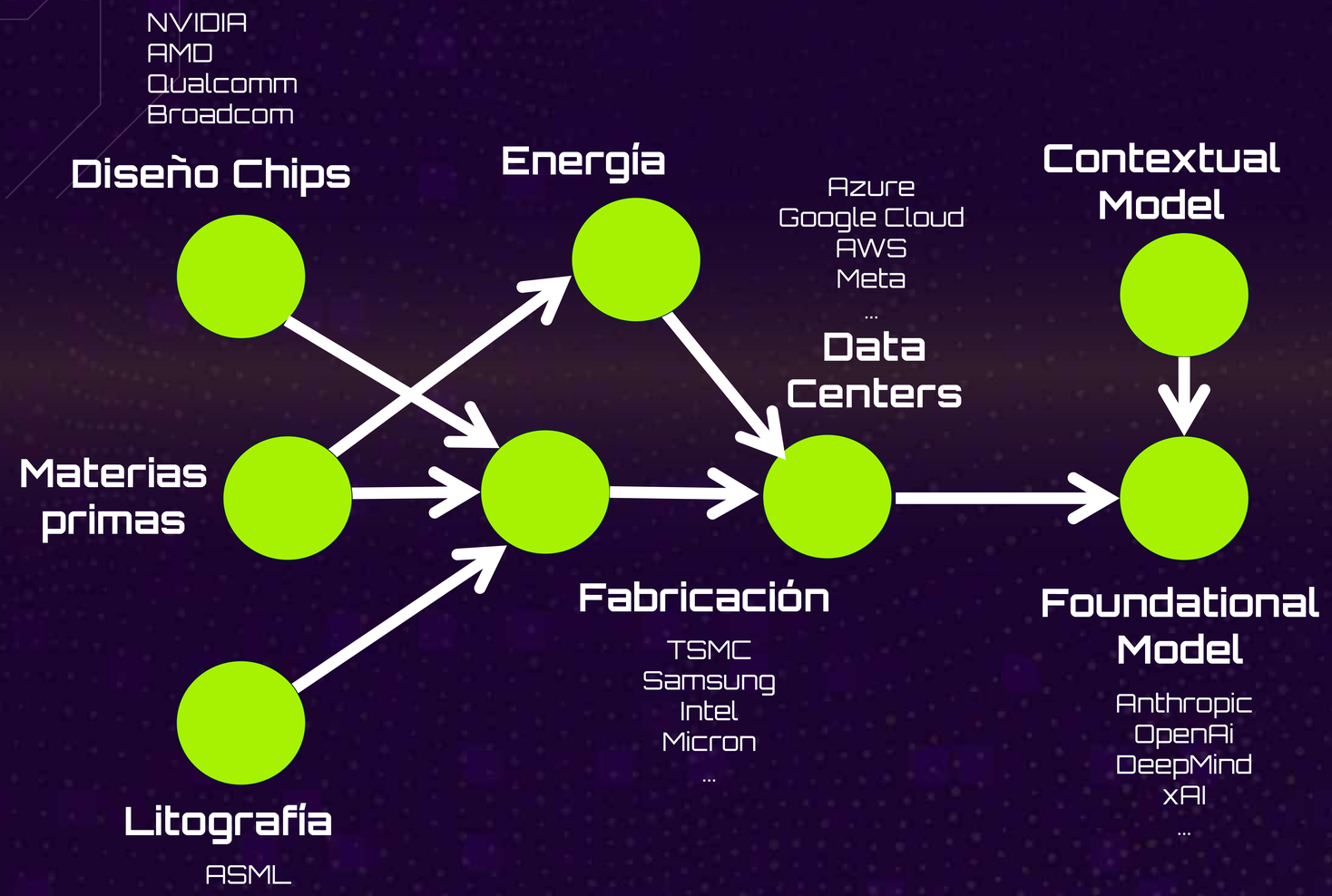


Eficiencia de la IA en sistemas

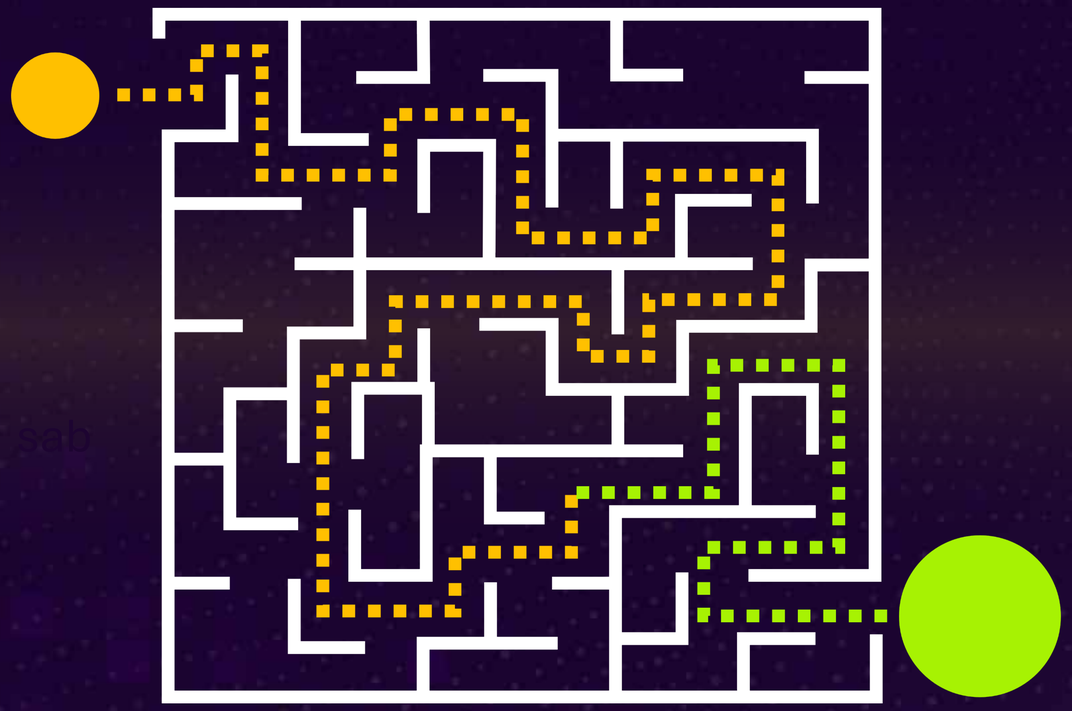


La diferencia entre programar y construir modelos. Lo segundo, tiene que ver mas con saber preguntar.

Eficiencia de la IA en sistemas

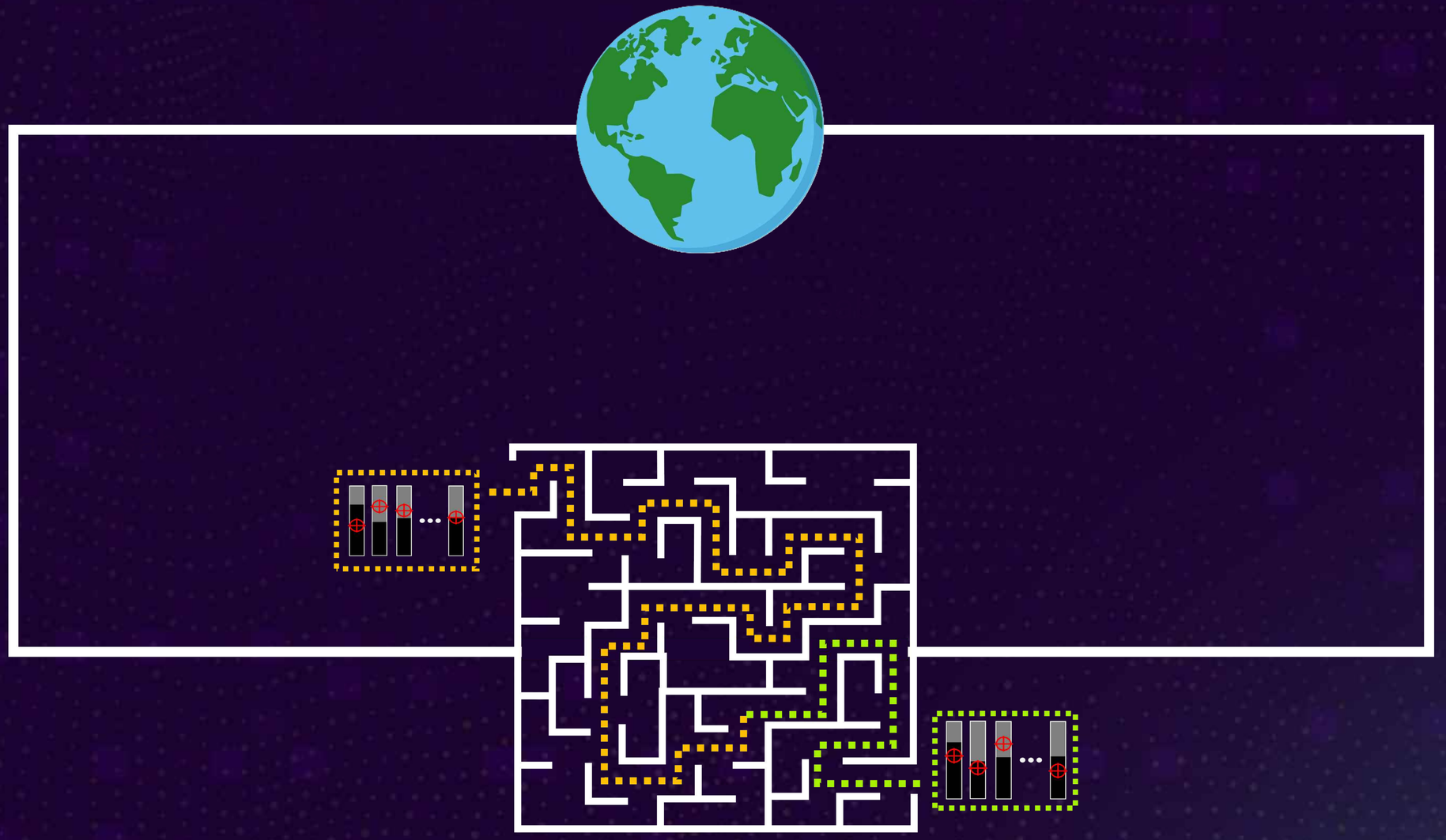


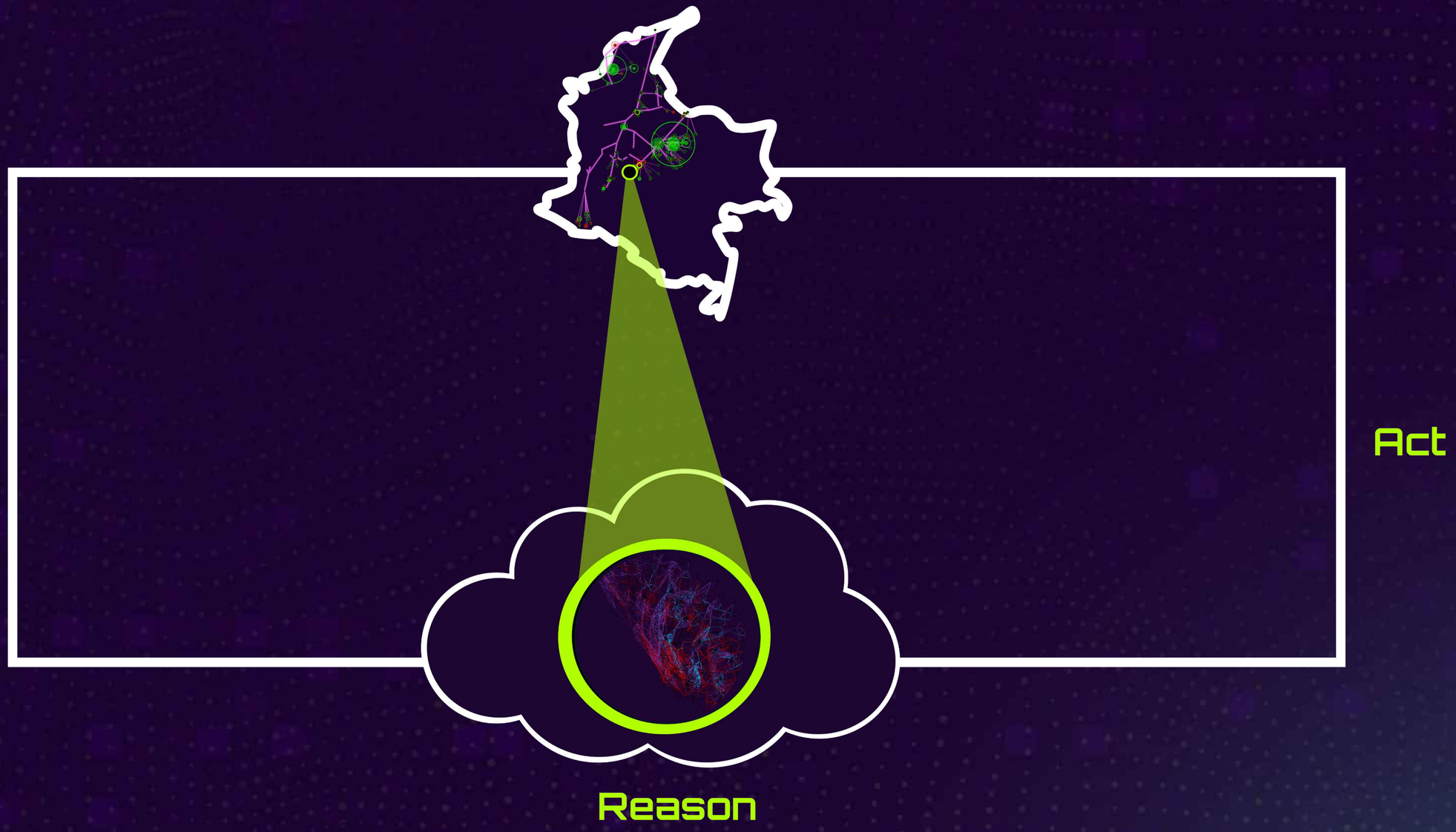
Eficiencia de la IA en sistemas

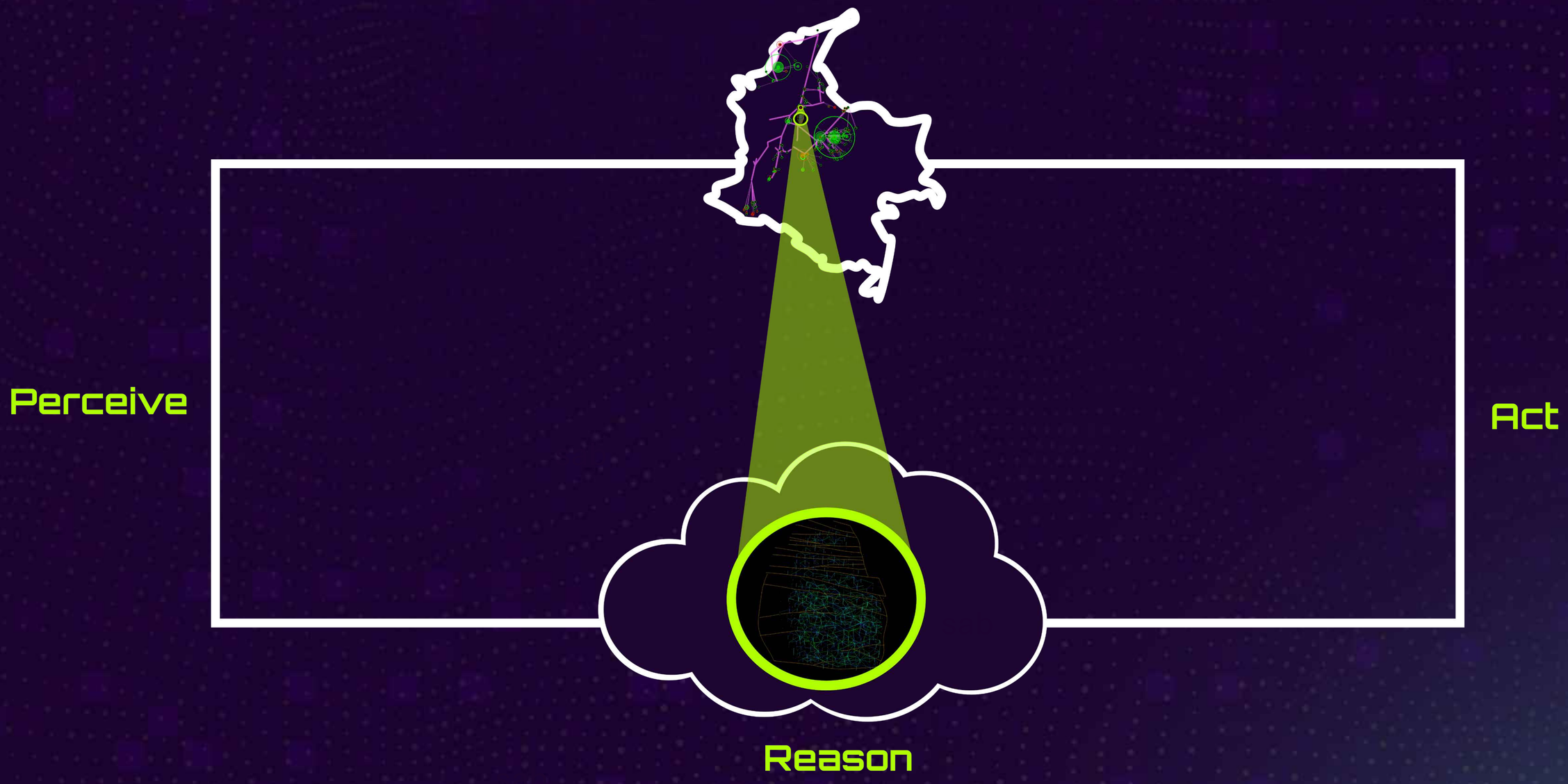


1. “Mapear” el tablero completo (explorar / experimentar inteligentemente)

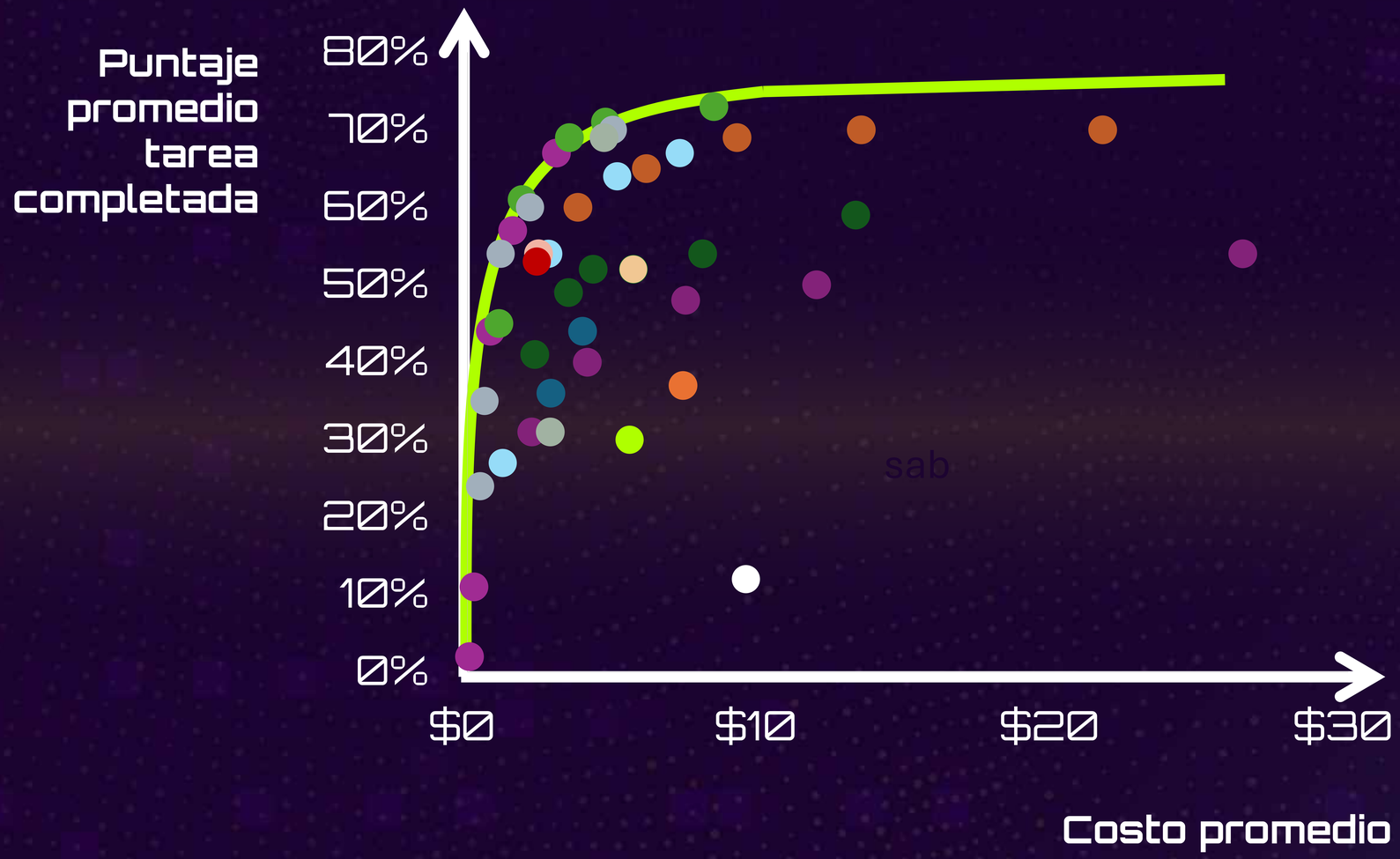
2. Cual es el mejor curso de acción (decisiones & controles)?


Perceive
Act
Reason


Perceive
Act
Reason

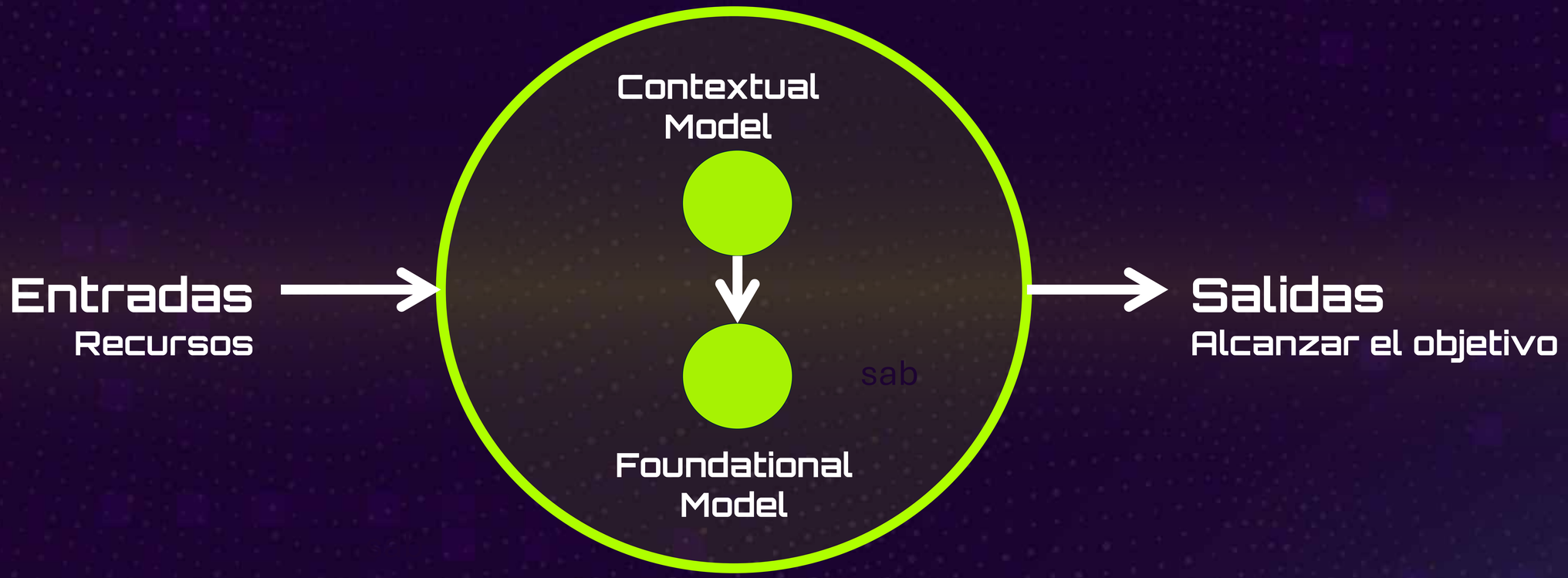

Perceive
Act
Reason

Eficiencia en la IA (Recap)

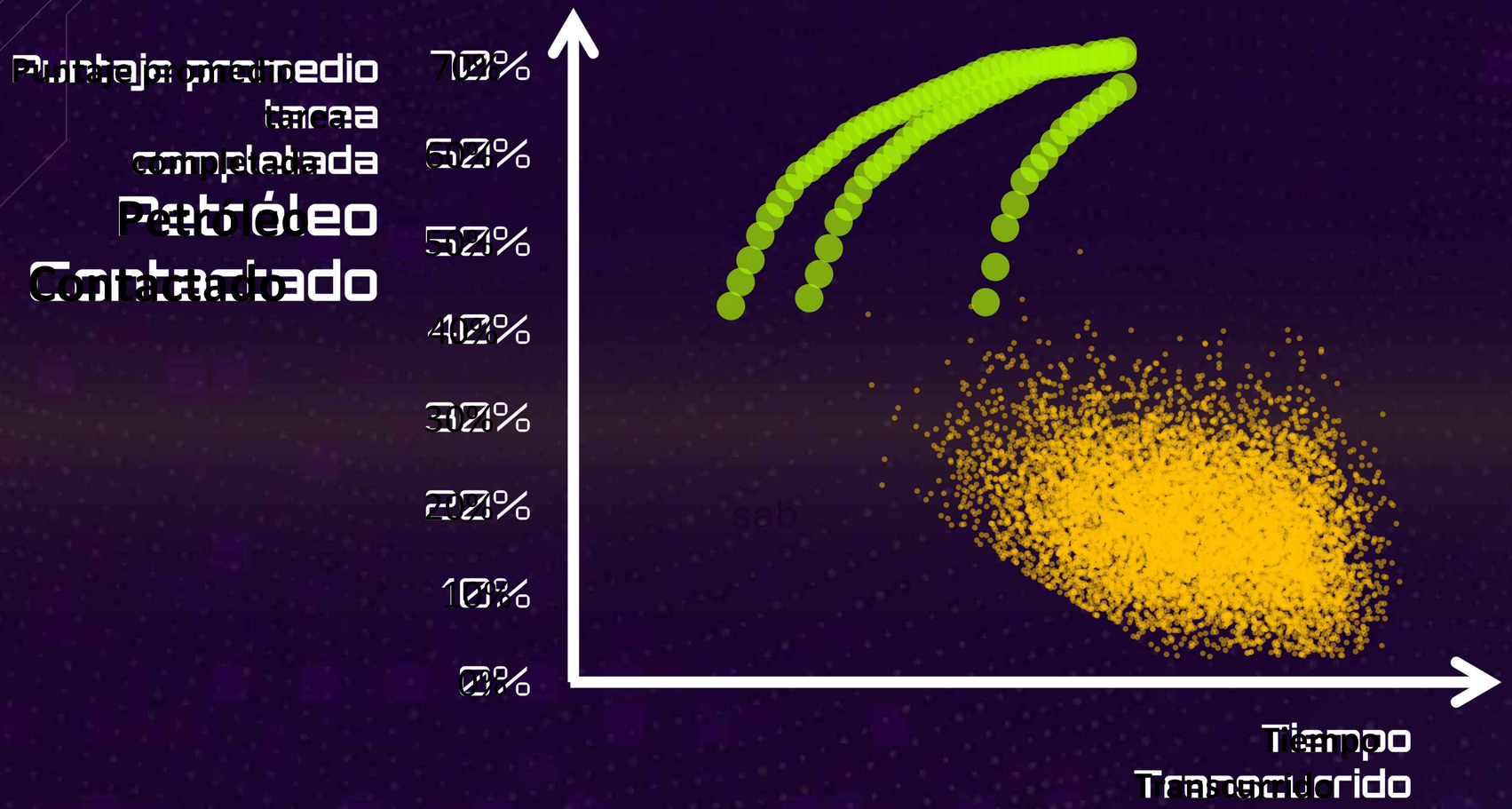


Fuente: DeepSWE Benchmark, datacurve.ai (consultado en julio 2026)

Eficiencia de la IA en sistemas (recap)

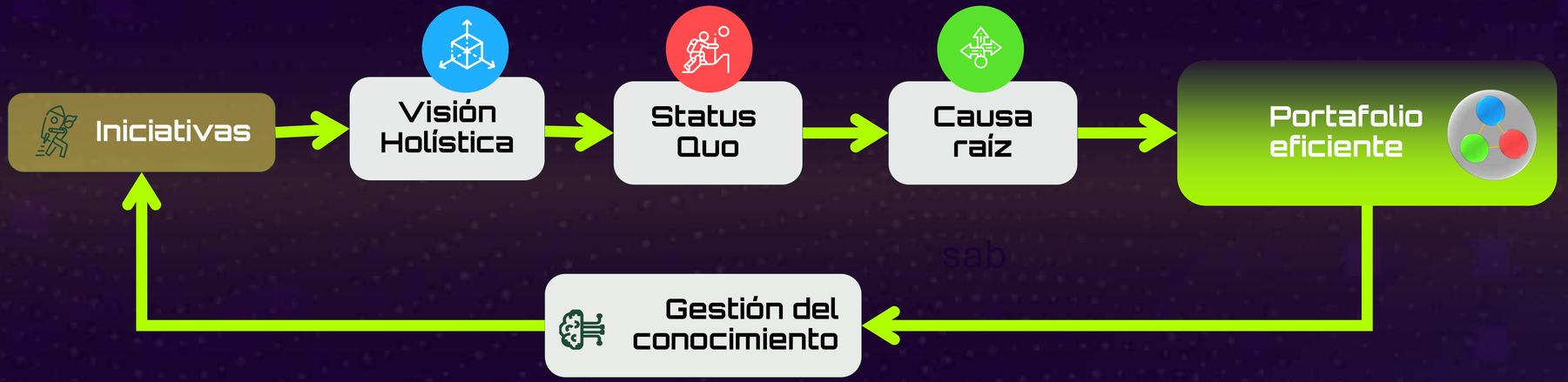


Eficiencia en Oil & Gas

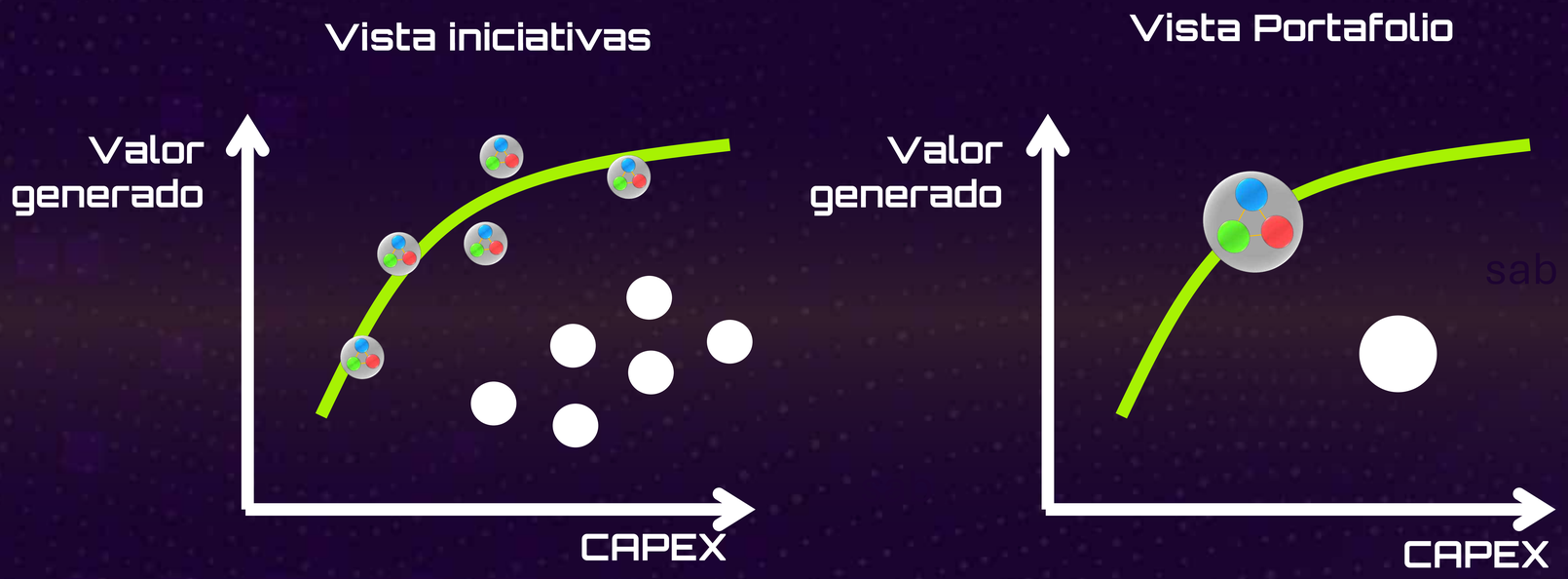


Futuro del IA en sistemas IV

Priorización



Portafolio eficiente

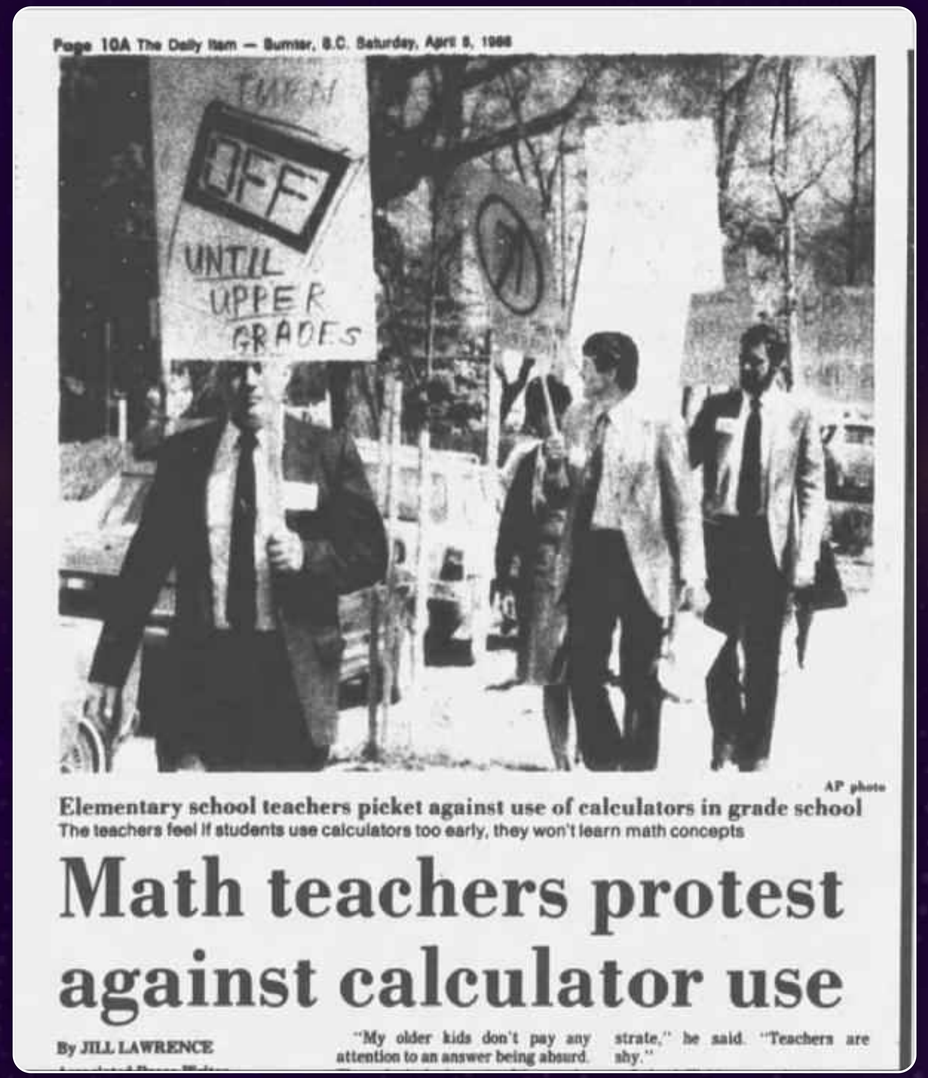


⇒ Iniciativas de IA orientadas a impactar la generación de valor

No solo disminuir costos,

Sino que aumentar ingresos!

Status Quo



Page 10A The Daily Item — Sumter, S.C. Saturday, April 9, 1988

AP photo

Elementary school teachers picket against use of calculators in grade school

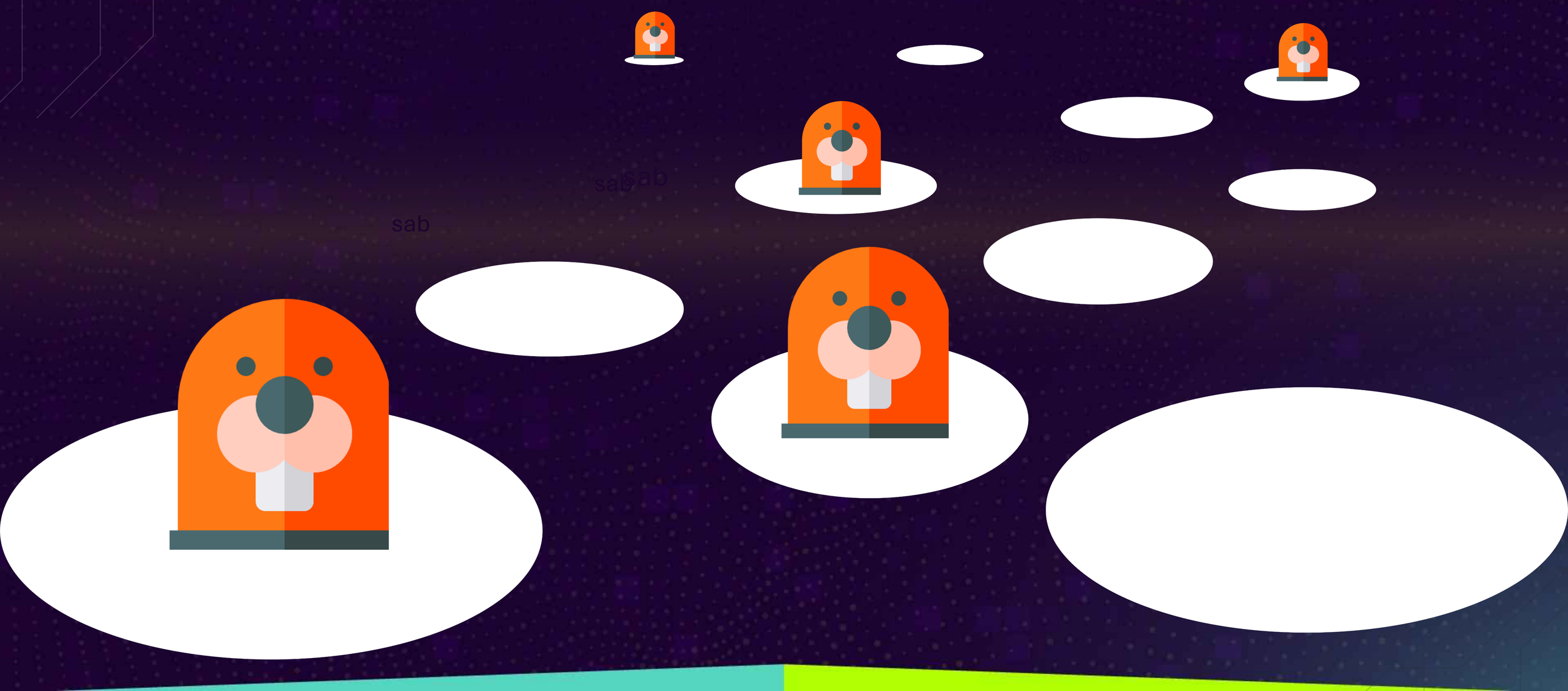
The teachers feel if students use calculators too early, they won't learn math concepts

Math teachers protest against calculator use

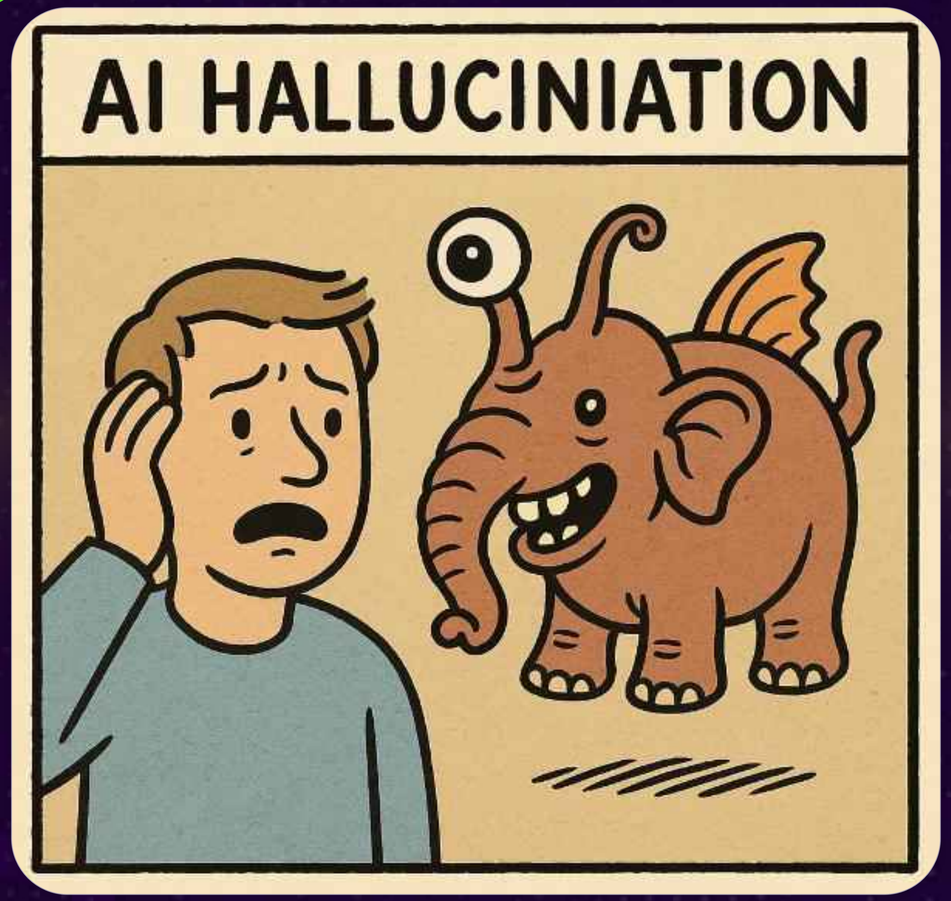
By JILL LAWRENCE

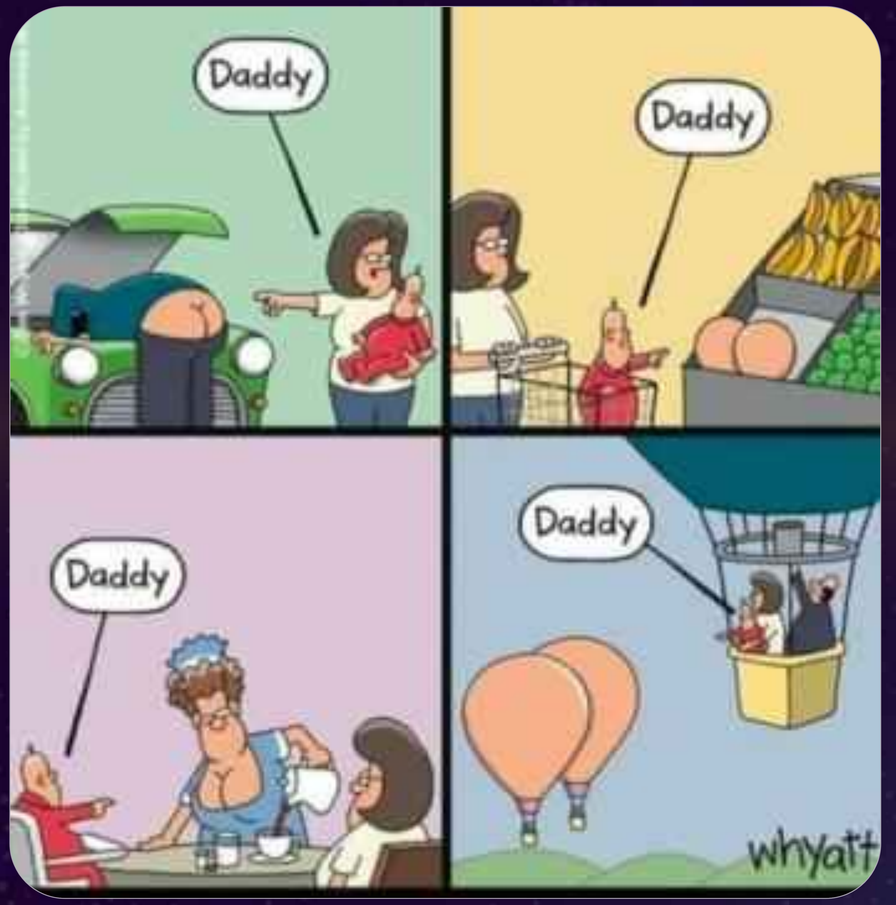
"My older kids don't pay any attention to an answer being absurd. strate," he said. "Teachers are shy."

Visión holística

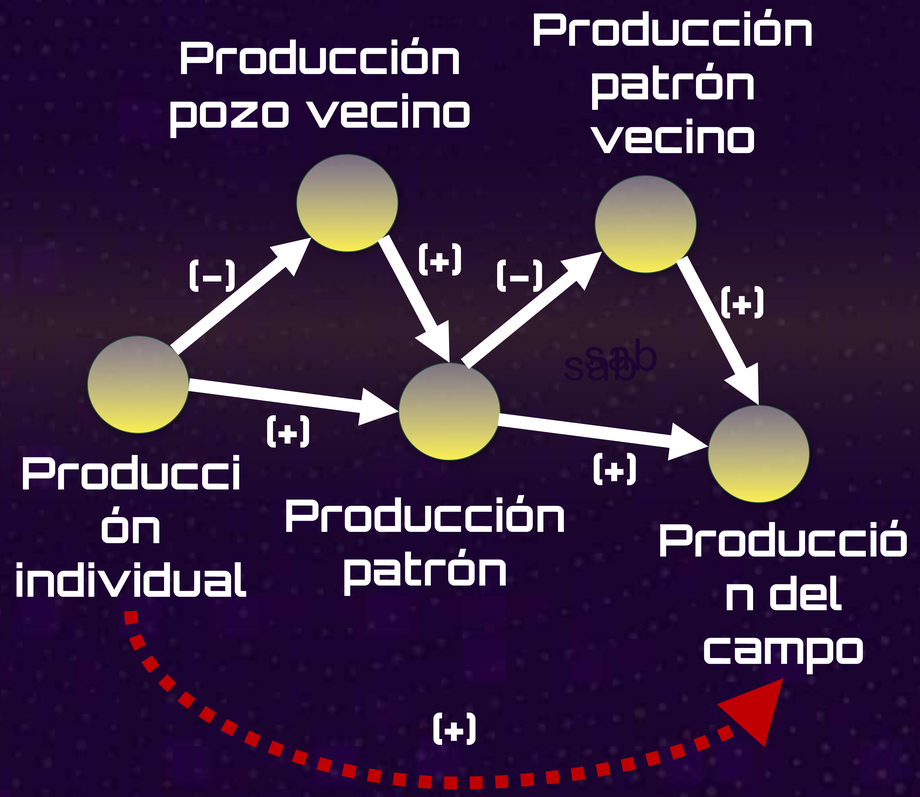


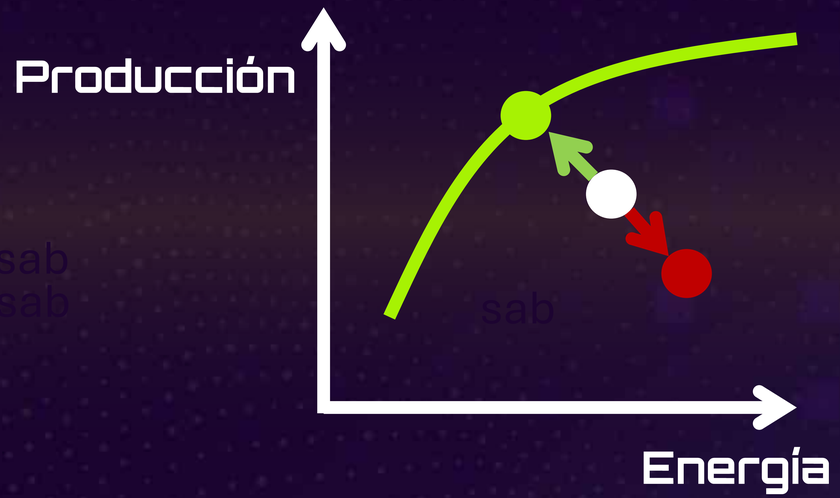
Causa Raiz



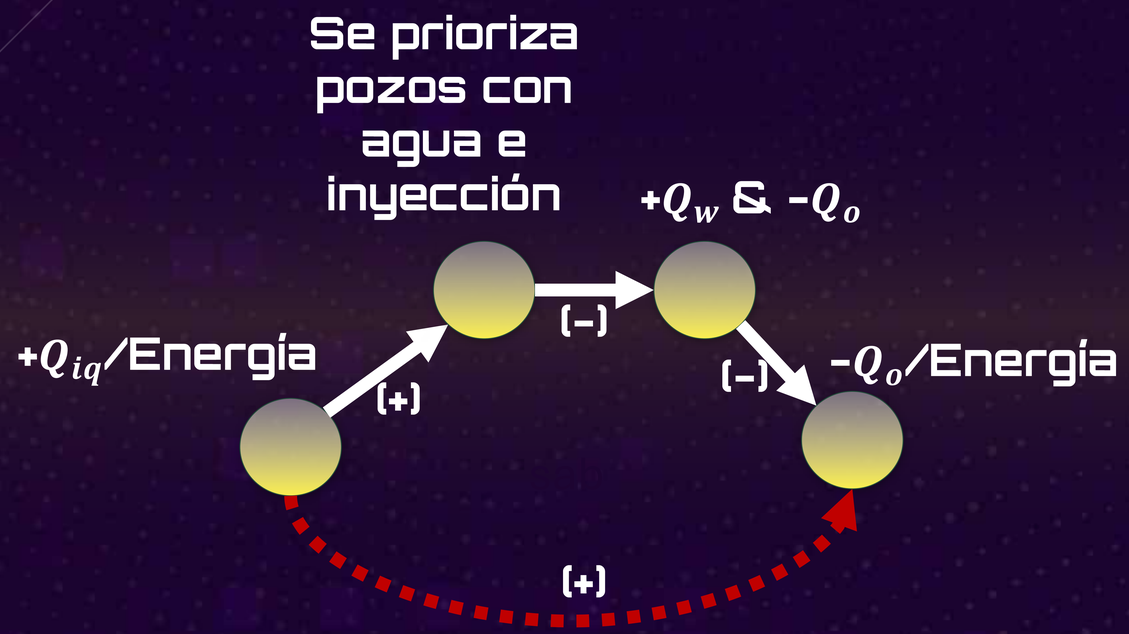


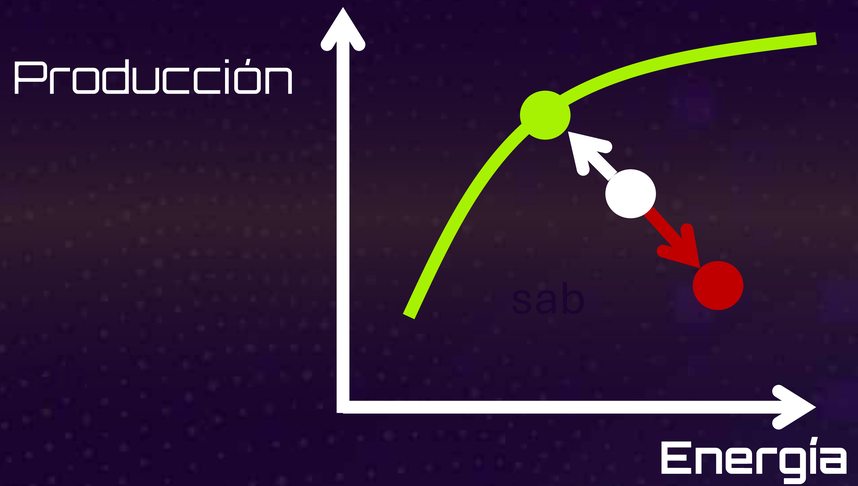
Causa raíz & propósito : +producción



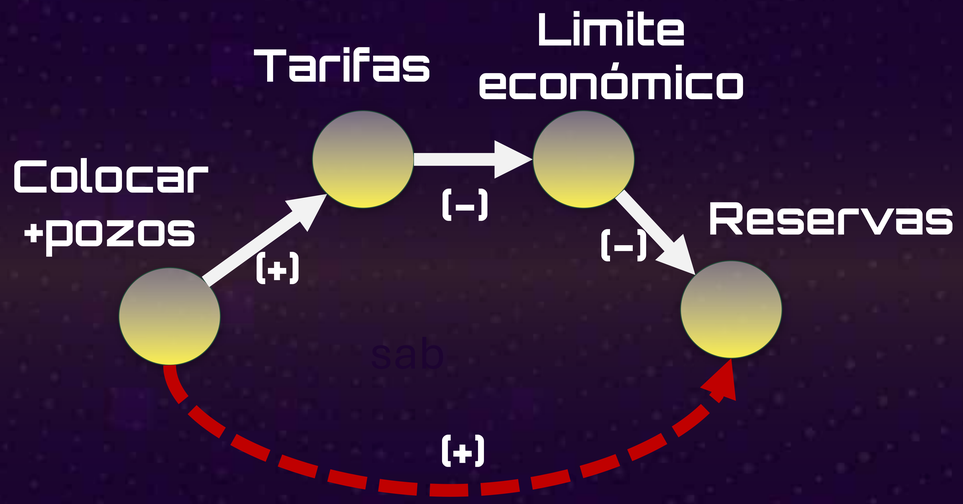


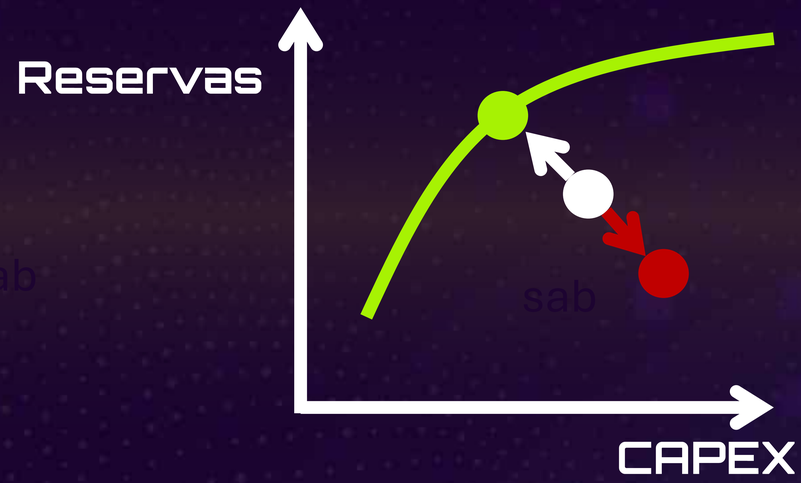
Causa raíz & propósito : +producción / energía



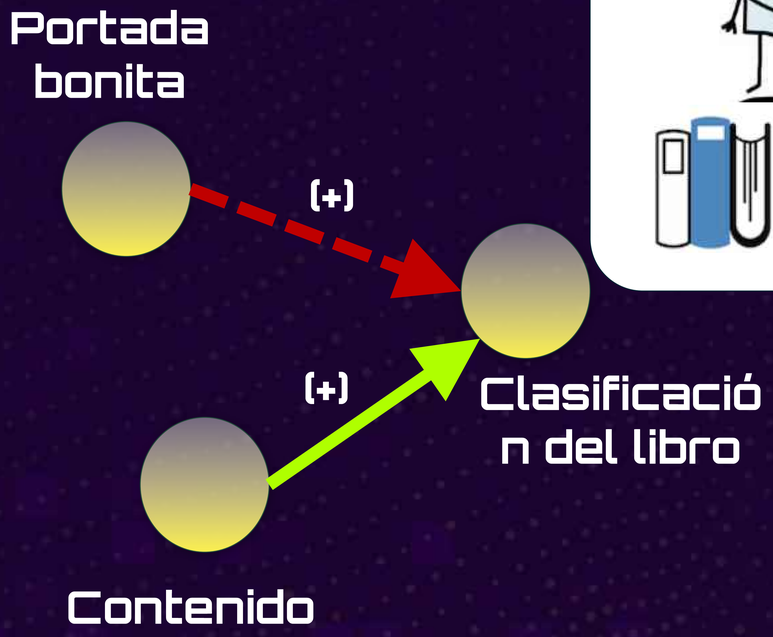


Causa raíz & propósito : +producción





“No juzgues un libro por su portada”



Usar IA (en sistemas) sin causalidad

Se ve muy bien... pero el problema seguirá ahí...

Recap

Y todo eso fue para decir...

1) La IA tiene el potencial de energizar las eficiencias
   La IA es un cambio tecnológico en la gestión de sistemas complejos
   No solo IA para reducir costos, sobre todo para generar ingresos (+ barriles)

2) Hay varios tipos de IA: la orientada a sistemas ⇒ genera valor

- i) Visión Holística ⇔ Sinergias ⇔ Cooperación
- ii) Status quo ⇔ Explorar y aprender ⇔ Cultura Organizacional
- iii) Causa raíz ⇔ Propósito ⇔ Alineación de intereses

3) Si es posible! ⇒ No es una moda (hay evidencia)
   Casos concretos que queremos repetir y replicar

ecopetrol

Un meme vale más que mil imágenes

CAMACOL

Construyendo MÁS+

¡Gracias!

CUMBRE 2IA

IA EL NUEVO MATERIAL DEL SECTOR