
amv
Autorregulador del Mercado de Valores de Colombia

# Mercado de Capitales

¿Cómo generar un entorno apropiado para impulsar su desarrollo en Colombia?

***Hernán Alzate Arias***,
Presidente

Octubre 2, 2025

# Agenda Temática

1. AMV Promotor del Mercado de Capitales
2. Nuevos Servicios
3. Su Majestad '***La Data***'
4. La ***Computación Cuántica*** y los mercados financieros
5. ***IA*** y su aporte al mercado de capitales
6. Trading Algorítmico
7. ***Estructura*** AlgoTrading

Conclusiones

# AMV como promotor del mercado de capitales

## Participación en discusiones de política pública con impacto en mercado de capitales

**Potenciales impactos de la reforma tributaria sobre el mercado de capitales**


Agosto, 2022

**Impactos de la reforma pensional en el mercado de capitales**


Abril, 2023

**Caso Fonpet**
**Fondos públicos dinamizadores del mercado de capitales**


Noviembre, 2023

**Reforma pensional**
**Desafíos e impactos para el ahorro y el crecimiento económico**


Junio, 2024

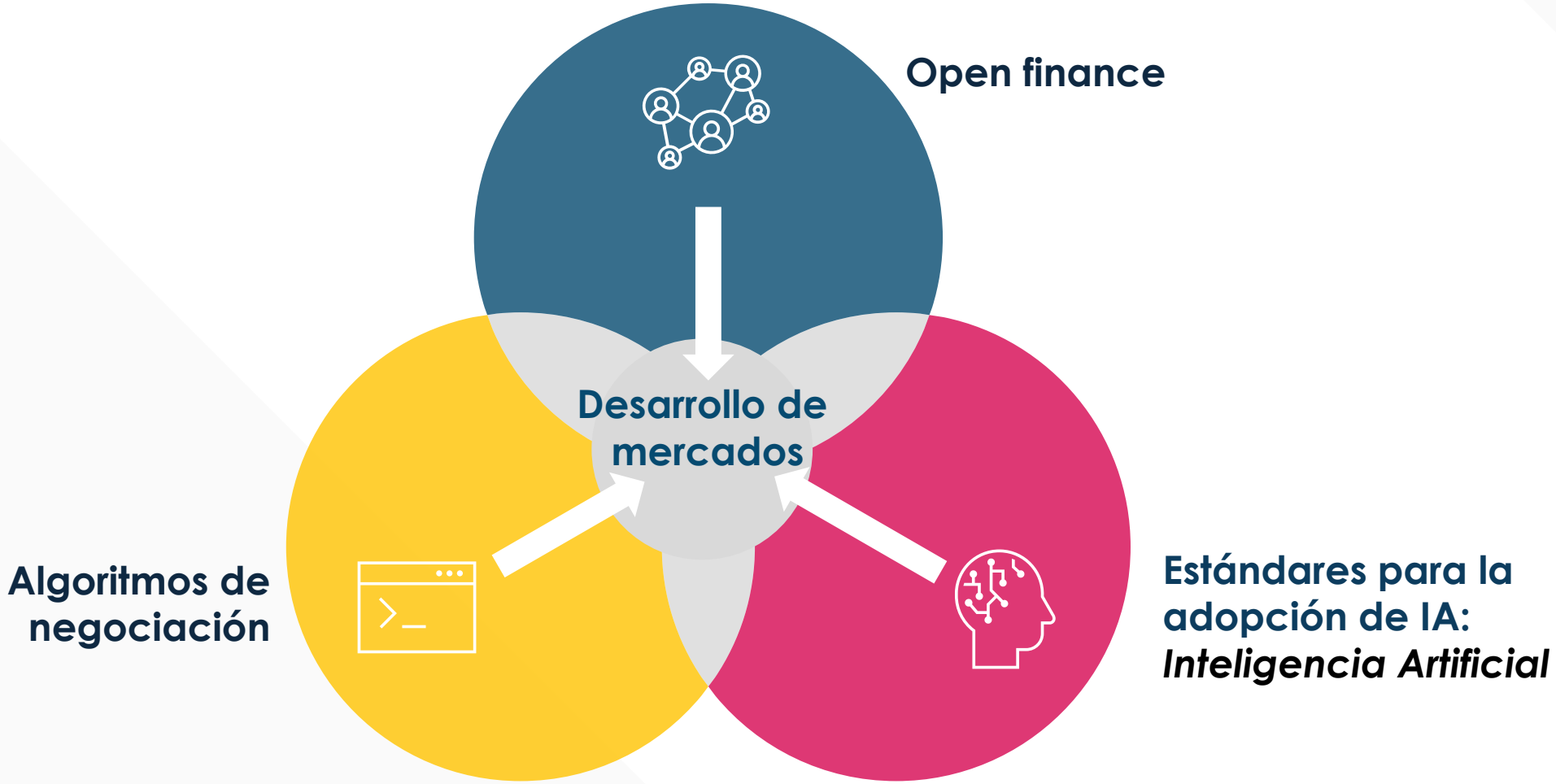
**Manteniendo altos estándares en el manejo de recursos pensionales**


Agosto, 2025

# AMV como promotor del mercado de capitales

## Agenda normativa

### Iniciativas de impacto en el impulso y desarrollo de mercados



# AMV como promotor del mercado de capitales

## Agenda normativa

### Enfoque en evaluar oportunidades para robustecer la liquidez del mercado

**Promoción de la Oferta**


**Especuladores/ *Tomadores de riesgo***

# AMV como promotor del mercado de capitales

## Participación en Mesas SFC → *Colombia Destino de Inversión*

### Liquidez

★ *Vocero*

- Encuesta actividad de asesoría
- Análisis certificación Asesor base
- Operaciones mercado monetario
- Temas nuevos: Contenido mínimo de órdenes

### Asesoría Independiente

★ *Vocero*

- Propuesta Asobolsa/ Bancolombia: Asesoría por fuerza comercial externa
- Propuesta AMV: creación de la figura de asesoría independiente

### Fomento emisores y estructuración

- Participación en el cuestionario de prospecto de información
- País de análisis: **Singapur**

### Innovación

- Evaluación de casos de innovación en el mercado de capitales
- ★ **Sandbox Digital (SFC)**

# AMV como promotor del mercado de capitales

## Nueva certificación
## *Asesor base*

**Opción más sencilla** para la certificación de Asesores, permitiendo realizar las diferentes etapas de la **Actividad de Asesoría** para productos simples

### Jurisdicciones de estudio

# AMV como promotor del mercado de capitales

## Diseño Sandbox Digital en Colombia

### Acciones realizadas

- **Diagnóstico: modernización tecnológica** en **plataformas de negociación** y fortalecimiento de infraestructura como habilitadores de **negociación algorítmica**
- **Evaluación** casos de uso
- Trabajo conjunto **AMV-SFC (Centro de Excelencia)**

### Elementos para el diseño

- **Objetivos y alcance** definidos
- **Acceso** ágil a los datos
- **Acompañamiento** técnico
- **Seguimiento y evaluación** de resultados
- **Plataforma tecnológica**

# AMV como promotor del mercado de capitales


## Integración regional

### Homologación de certificaciones

- **Esfuerzo pionero en la región**, que permitirá a los profesionales de Colombia y Chile validar sus competencias de manera recíproca

### Pasos siguientes

- **Convenio de cooperación** ACHAI- Chile
- **Construcción de sinergias con Perú** en materia de certificaciones
- Minimizar **arbitrajes regulatorios**

# Comité Local para FX Global Code

## Espacio de diálogo técnico para el desarrollo de un mercado de divisas más eficiente y resiliente

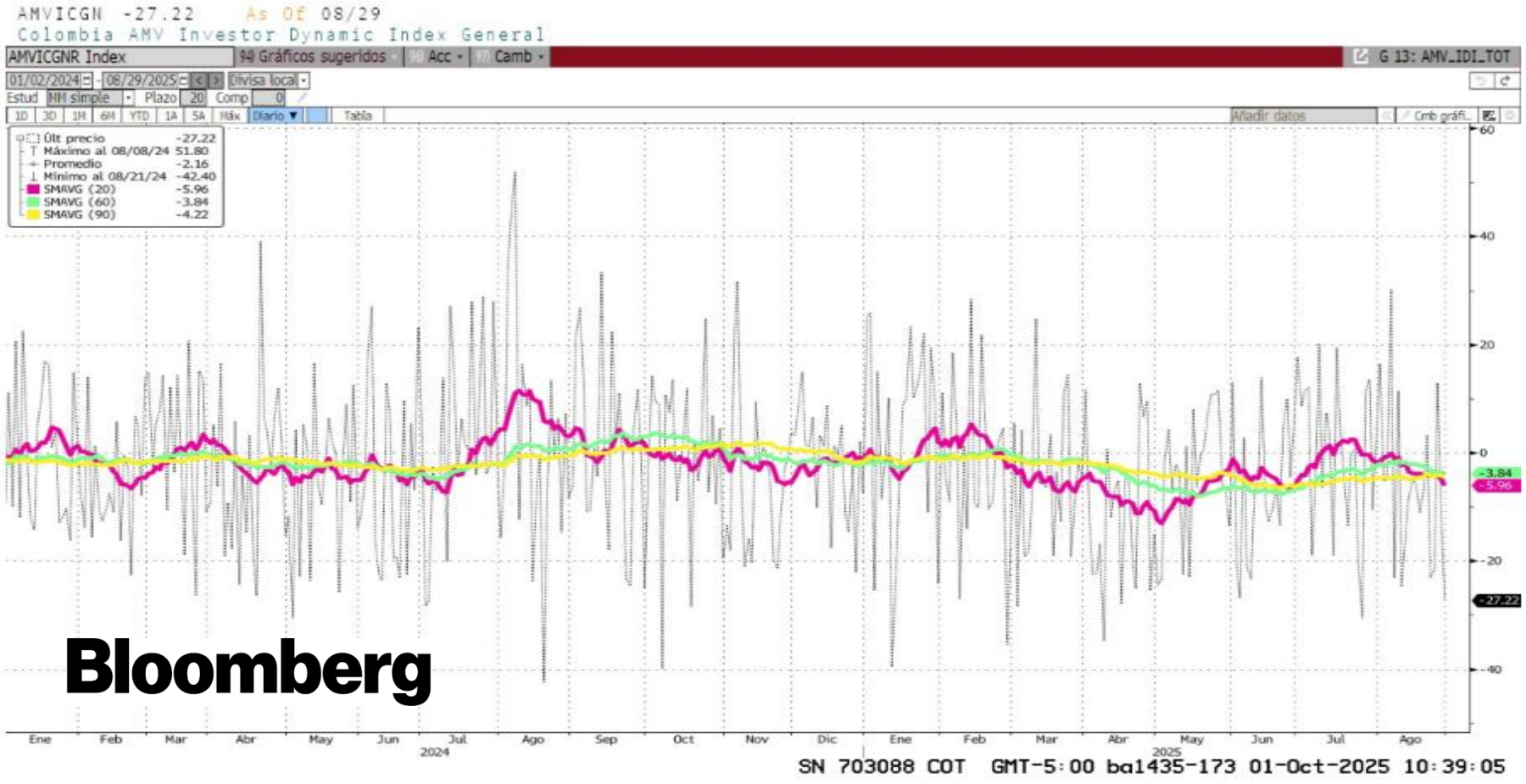
- ✓ **Mar 2024:** Invitación GFXC y designación de representantes del BanRep.
- ✓ **Mar 2025:** LFXC se incorpora como miembro asociado del GFXC.

- ✓ **Fortalecimiento institucional** a través de coordinación entre el AMV, Banrep y la industria.
- ✓ **Alineación con estándares internacionales** y acceso a información estratégica.

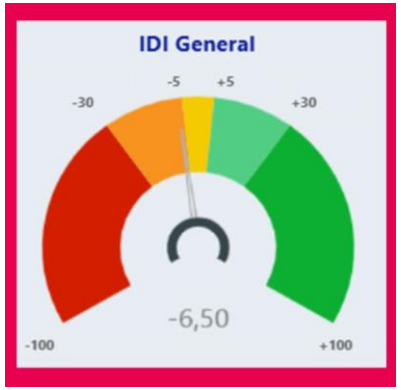
Estos avances fueron publicados en el **Recuadro 2 del Reporte de mercados financieros.**

# AMV como promotor del mercado de capitales

## Índice de Dinámica Inversionista → IDI




En **agosto** los inversionistas se situaron en zona de **intención moderada de venta de activos locales (-6,50),** con un valor del indicador inferior al observado en **julio (0,1)**




**Tickers IDI** → *AMVICUSD <Index>| AMVICSTM <Index> | AMVICPUB <Index>| AMVICGNR <Index>*

# ILM: Índice de Liquidez del Mercado

**¿Qué es?**

Es un **indicador compuesto** que integra **múltiples dimensiones de la liquidez** de los mercados de deuda pública, renta variable y cambiario en una sola métrica.

**Su objetivo**

Proporcionar una **medida más comprensiva** acerca de la dinámica de negociación de los mercados locales, incorporando **variables no convencionales.**

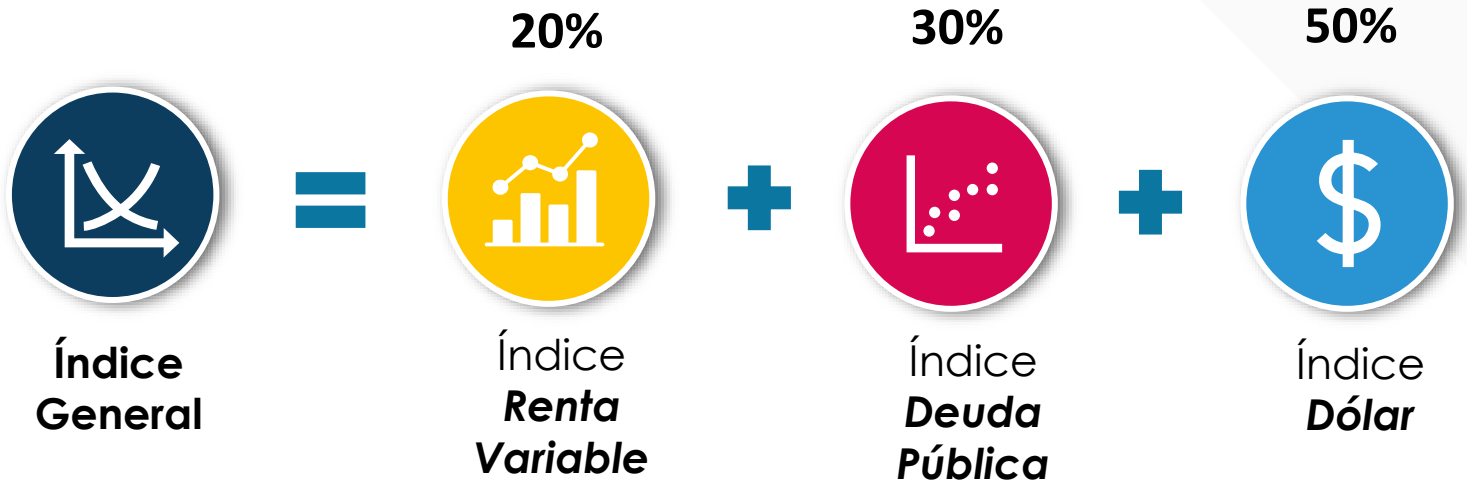
**¿Qué muestra?**

**Comportamiento de cinco variables asociadas con la liquidez:**

a) Volumen negociado.
b) Número de operaciones.
c) Nivel de interconexión entre participantes.
d) Profundidad de las pantallas de negociación.
e) Concentración de la negociación por activo.

# ILM: Índice de Liquidez del Mercado

El índice General es la suma ponderada de los índices de los 3 mercados

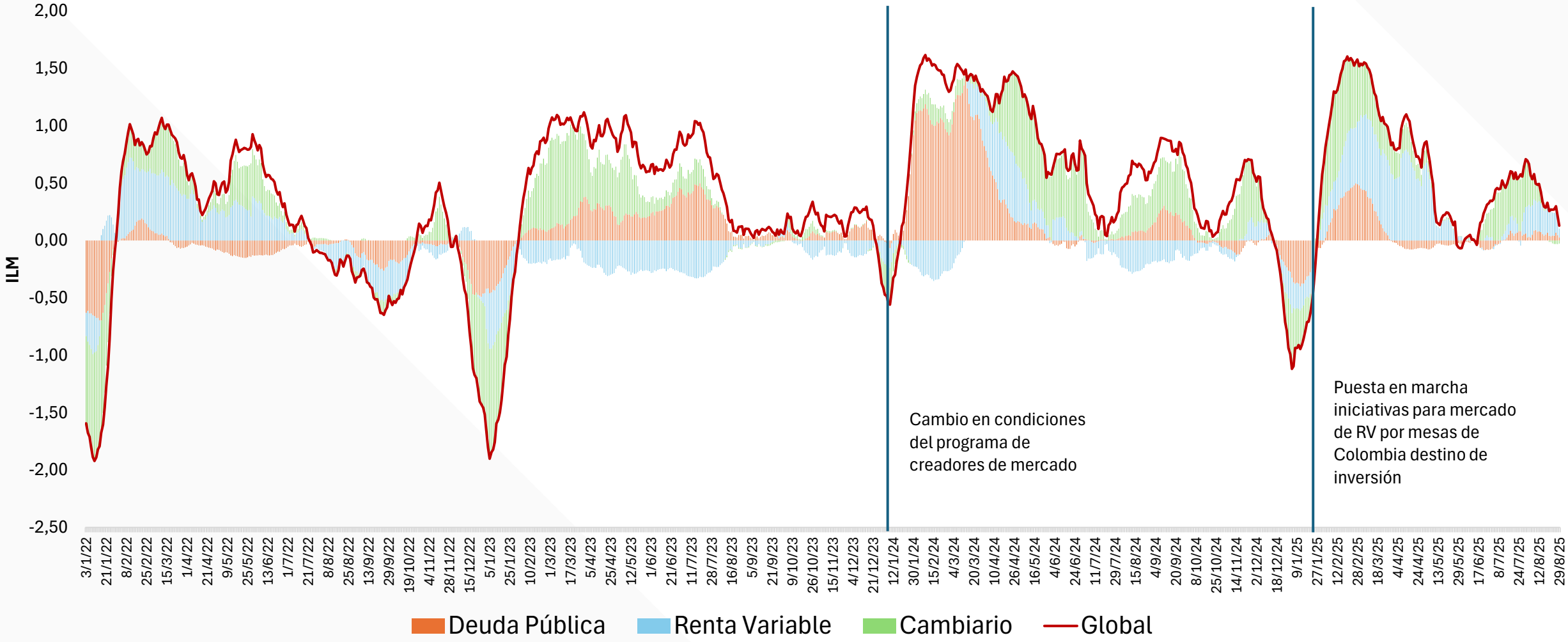



- Para cuantificar el ILM diario de cada mercado, se utiliza la metodología **PCA: Análisis de Componentes Principales**, que permite expresar las variables originales como una única nueva variable.
- Por su construcción **los ILM oscilan alrededor de cero**, así valores positivos se interpretan como un desempeño de la liquidez del mercado por encima de sus valores promedio, y viceversa.
- **Este indicador no posee cotas** superior o inferior, por lo que entre más positivo sea el valor observado, mejor será el comportamiento de la liquidez del mercado, y viceversa.

# ILM: Índice de Liquidez del Mercado

## ILM General

### Participación por mercados



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# Nuevos servicios Burcamp

**Cursos abiertos al público** para educación especializada a través de un campus virtual de AMV.

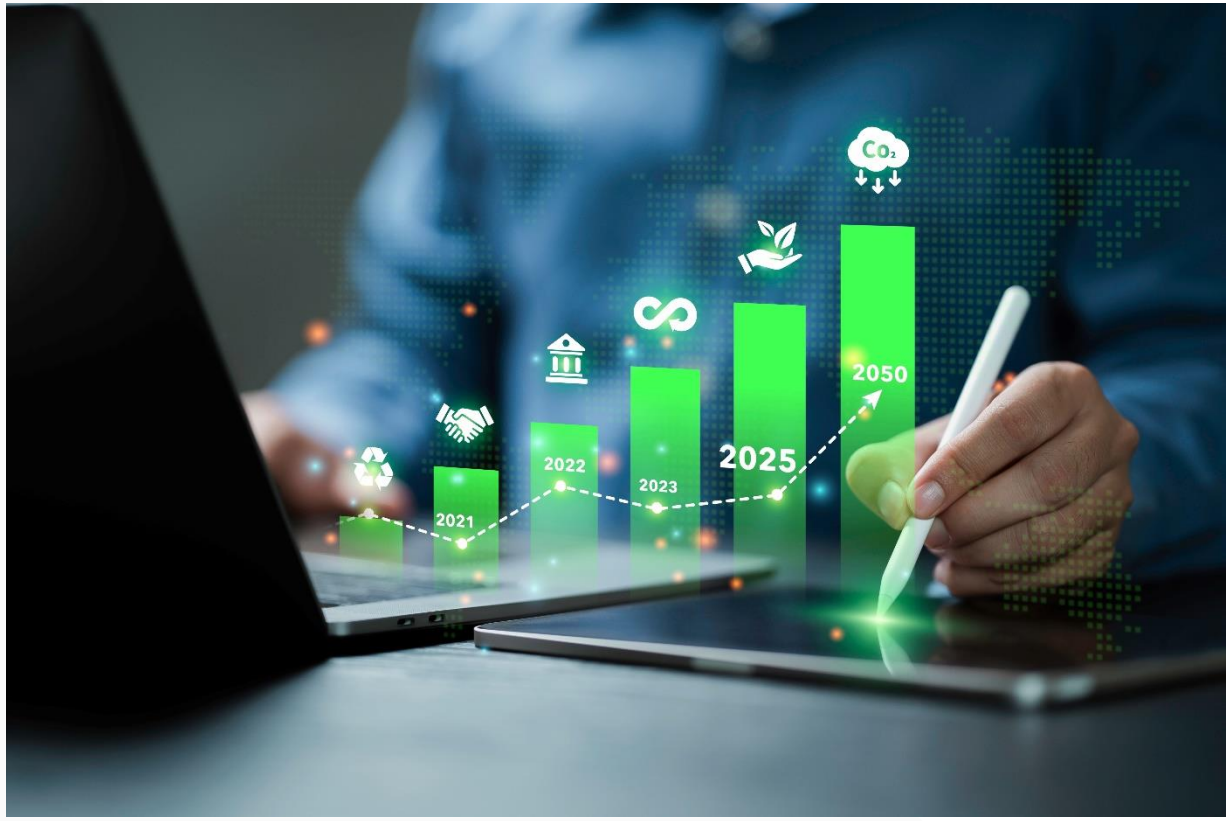
**Oferta de cursos:**

1. Administración de portafolios
2. Bases para la gestión de FIC
3. Blockchain
4. Primeros pasos en administración de riesgos
5. Negociación de activos
6. Regulación del mercado
7. Conductas y cumplimiento normativo
8. Innovación en la gestión de portafolios

**¡Nuevo!**

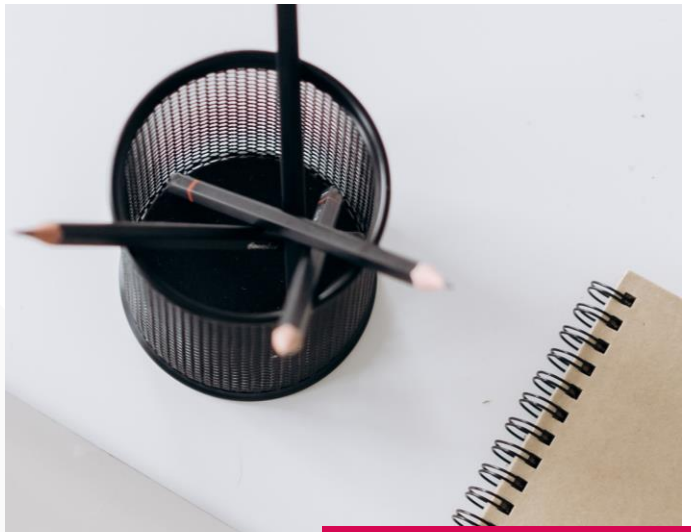
Cursos de preparación exámenes de certificación

# Nuevos servicios




## *Certificación Voluntaria* inversiones con criterios ASG

- Diseñada para profesionales que deseen integrar **criterios ambientales, sociales y de gobernanza.**
- Visión local, **ajustada a las necesidades y regulaciones del mercado.** Además, se basa en **mejores prácticas internacionales.**



# Nuevos servicios

## *Certificación Voluntaria* Riesgos Financieros

- **Normativa local e internacional:** énfasis en regulación colombiana y estándares internacionales.
- **Cobertura técnica completa**
- **Enfoque aplicado al contexto local:** análisis con instrumentos reales
- **Incorpora contenidos de certificación internacional → FRM (GARP)**
- **Temas emergentes y prospectivos:** ESG, IA

# Nuevos servicios
# Capacitaciones Premium

**18**
**Capacitaciones**

**329**
**Asistentes**

- **4** Bancos
- **2** SCB
- **1** AFP
- **1** CF-Ccial

## Temas:

**Control interno**
(solo para áreas de control)

**Abusos de mercado**

**Divisas y Derivados**

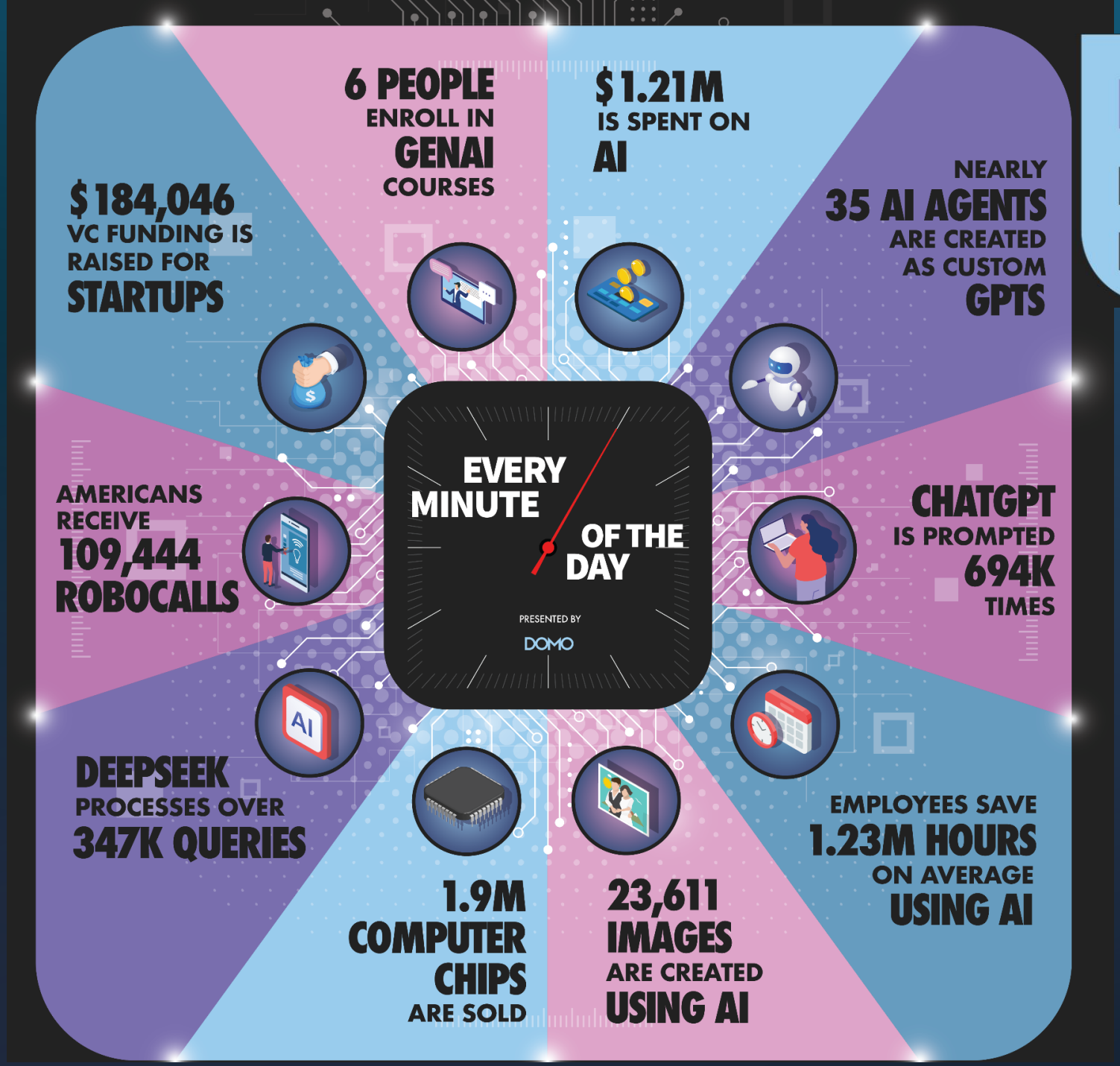
- Desarrollo **habilidades** equipos de control interno
- Elementos **líneas de defensa**
- Metodologías para **identificar y prevenir** conductas
- **Casos prácticos** sancionados AMV
- **Buenas prácticas** de industria

*A septiembre de 2025

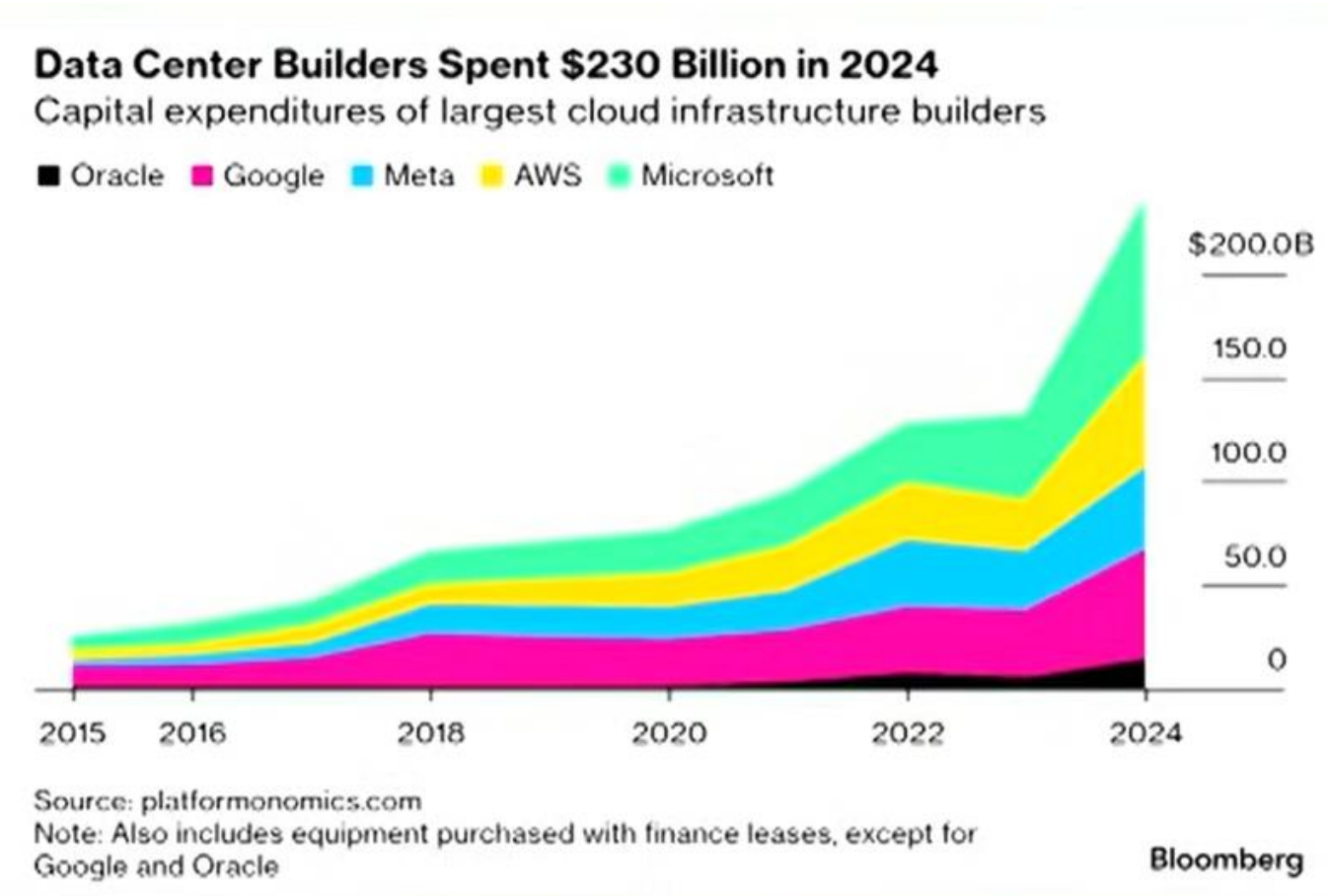
# 3. Su Majestad...
# ...‘*La Data*’

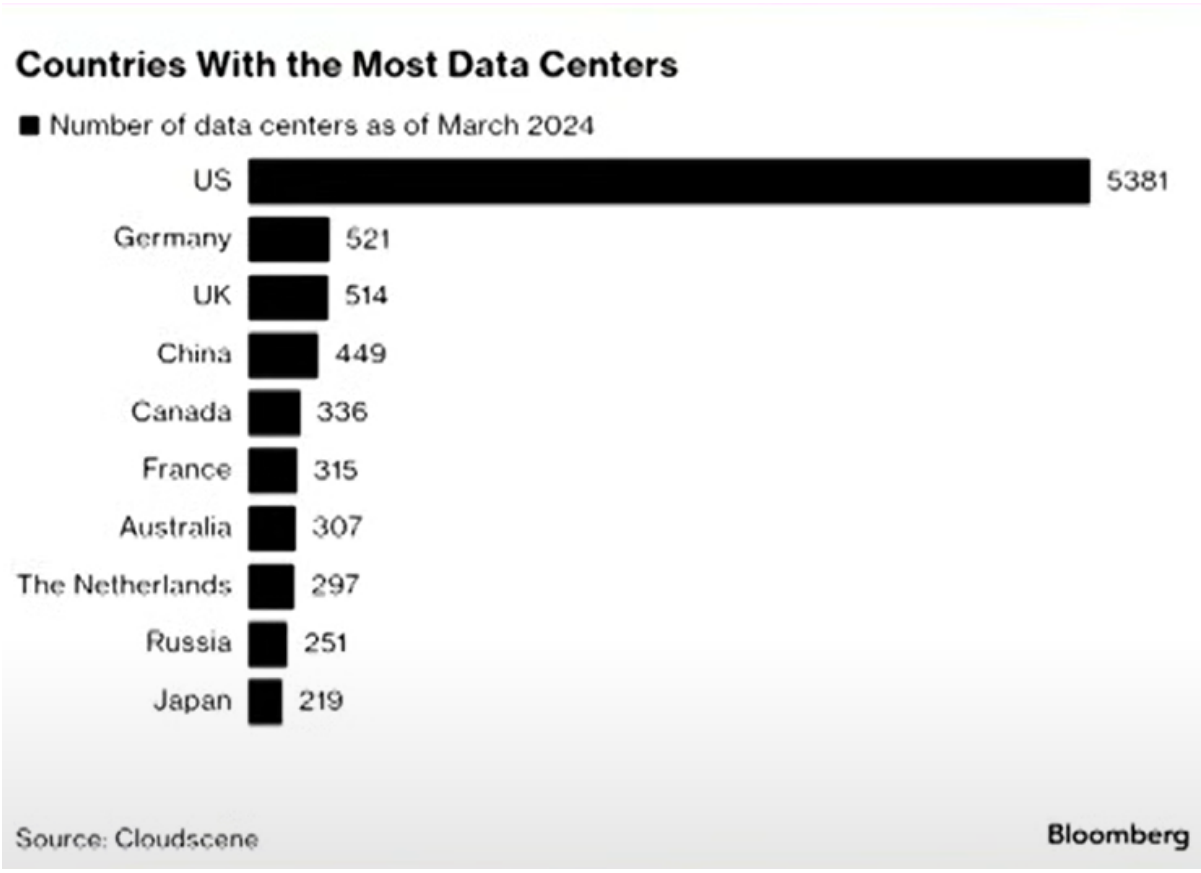
# DATA NEVER SLEEPS AI EDITION 2025

Domo has tracked minute-by-minute digital engagement for over a decade, and AI is moving from experimental to essential at unprecedented speed. Spending on artificial intelligence has more than tripled since 2024. From boardrooms to living rooms, this special second Data Never Sleeps AI edition reveals how AI is reshaping the global economy, 60 seconds at a time.

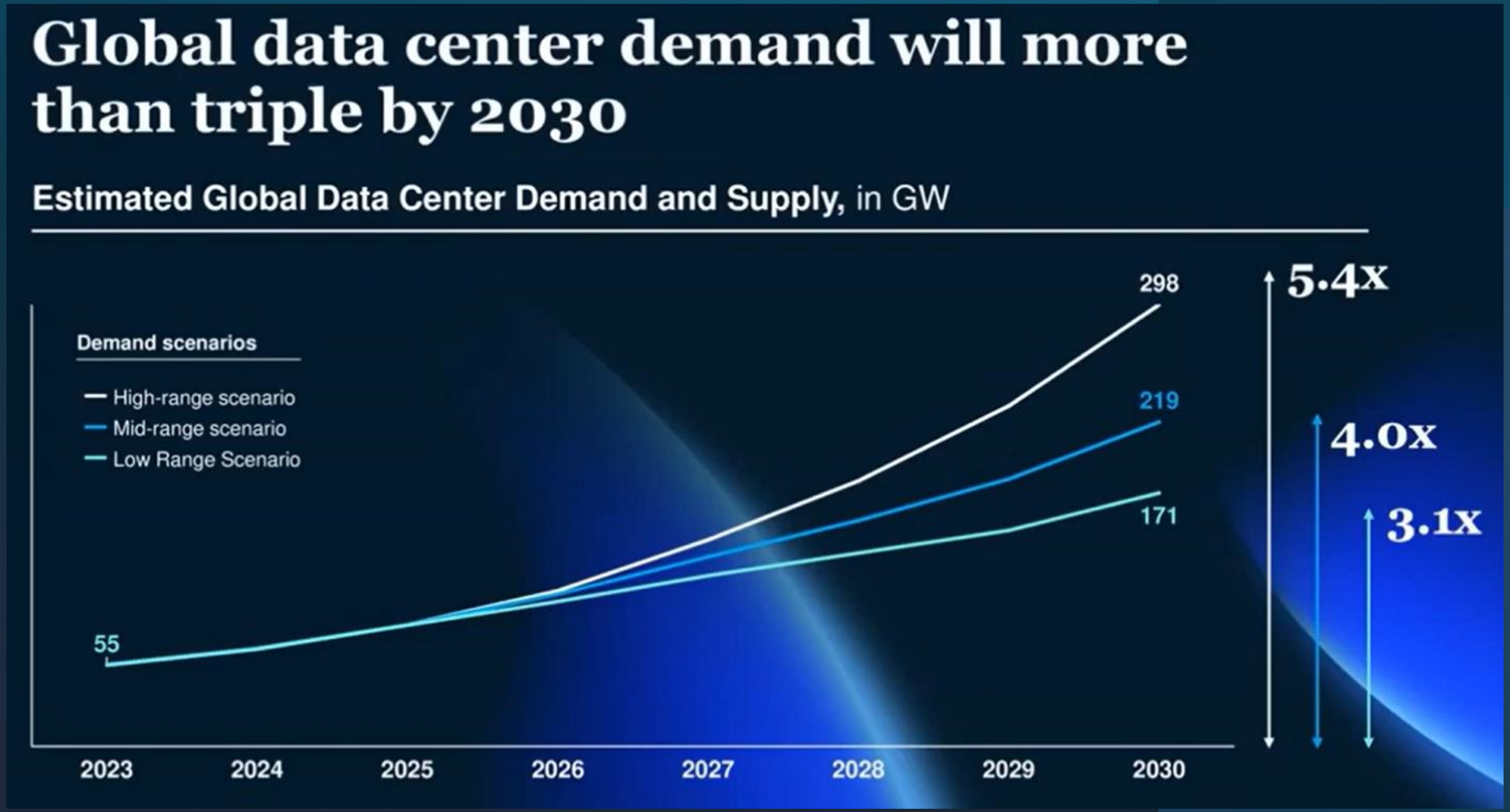


# Los '*Data Centers*' en su máxima expresión...



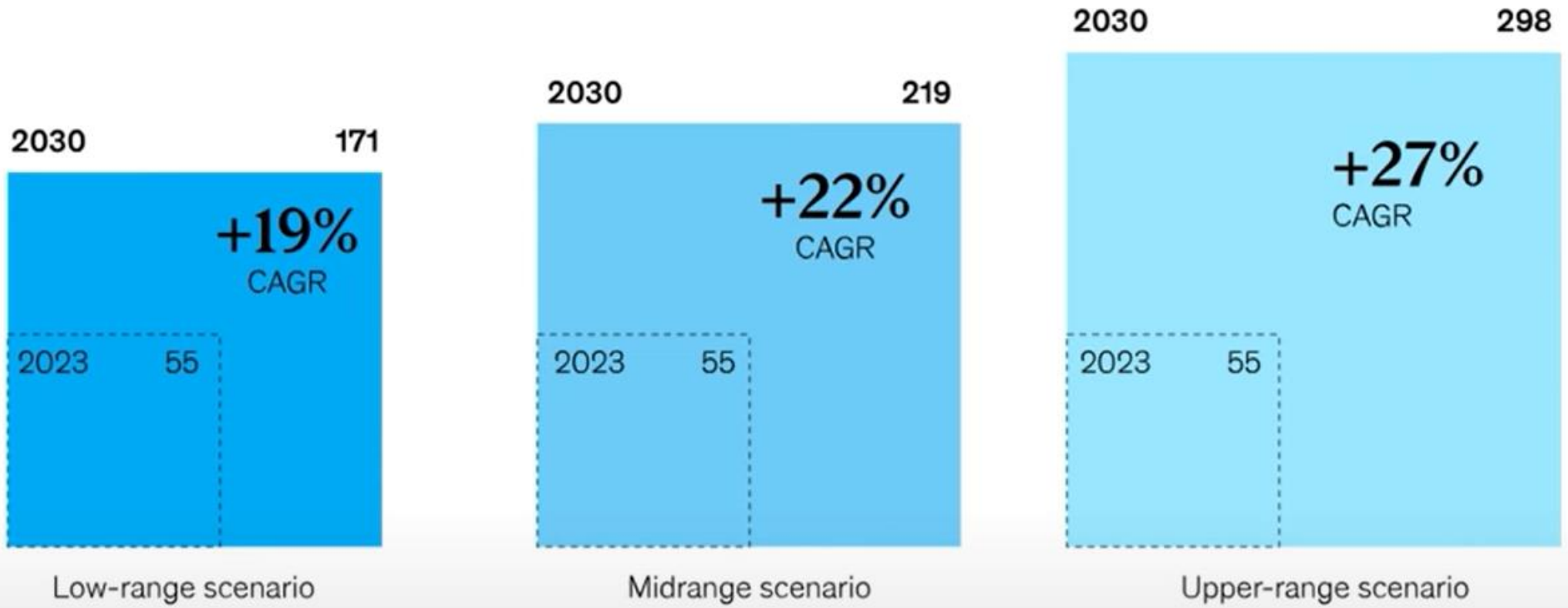



# Global data center demand will more than triple by 2030



# Global demand for data center capacity could more than triple by 2030.

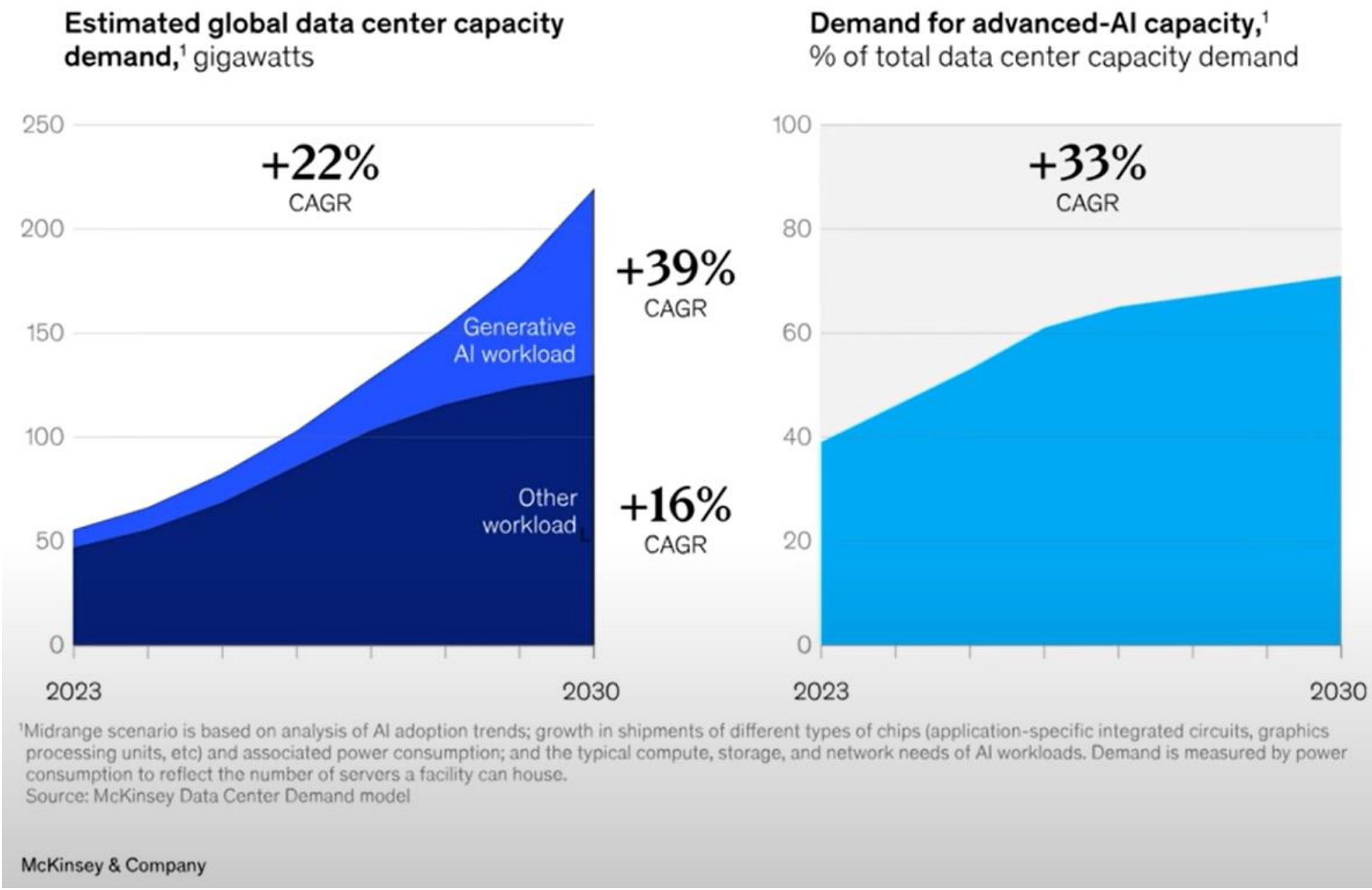
## Demand for data center capacity,[1] gigawatts

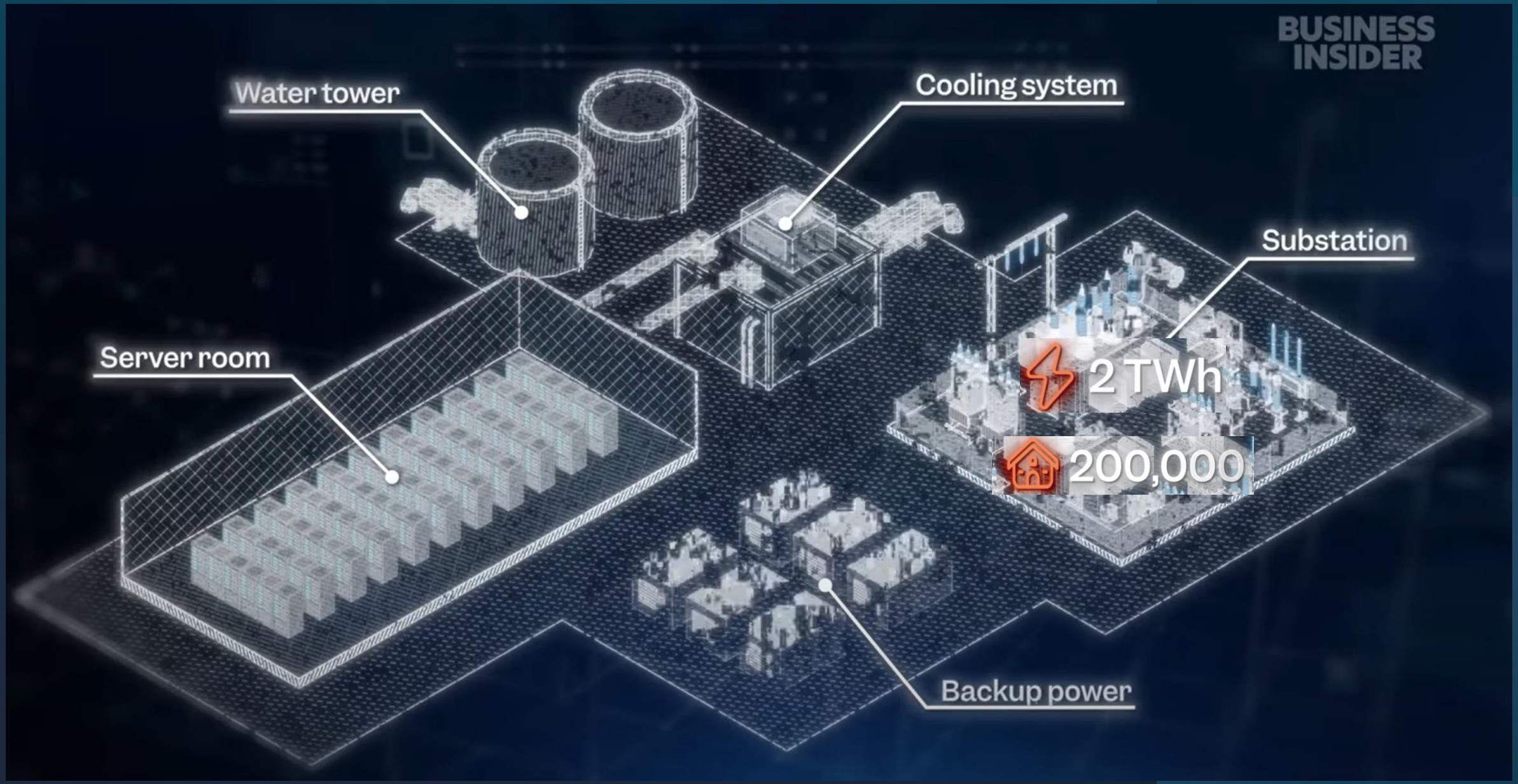



[1]Three scenarios showing the upper-, low-, and midrange estimates of demand, based on analysis of AI adoption trends; growth in shipments of different types of chips (application-specific integrated circuits, graphics processing units, etc) and associated power consumption; and the typical compute, storage, and network needs of AI workloads. Demand is measured by power consumption to reflect the number of servers a facility can house.
Source: McKinsey Data Center Demand model

McKinsey & Company

***IA es el principal 'driver' del crecimiento en la demanda por capacidad en Data Centers.***




BUSINESS INSIDER
Water tower
Cooling system
Substation
Server room
2 TWh
200,000
Backup power


THE WALL STREET JOURNAL.
Sam Altman Seeks Trillions of Dollars to Reshape Business of Chips and AI
Keach Hagey & Asa Fitch | Feb. 8, 2024


Bloomberg
Zuckerberg Says Meta to Spend Up to $65 Billion on AI in '25
Dana Wollman & Kurt Wagner | Jan. 24, 2025


Bloomberg
Microsoft to Spend $80 Billion on AI Data Centers This Year
Brody Ford | Jan. 3, 2025


Bloomberg
Meta Seeks New Nuclear Reactors to Run US Data Centers
Will Wade | Dec. 3, 2024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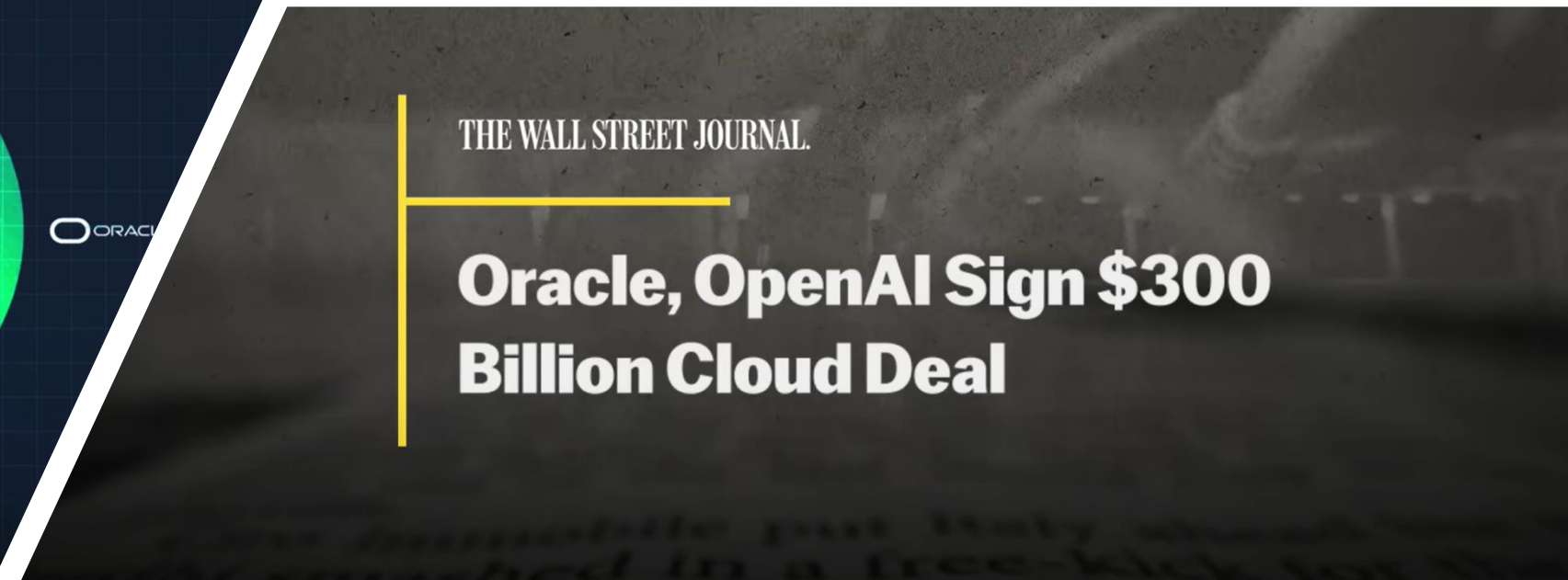
September 23, 2025 Company Global Affairs

# OpenAI, Oracle, and SoftBank expand Stargate with five new AI data center sites

New data centers put Stargate ahead of schedule to secure full $500 billion, 10-gigawatt commitment by end of 2025.

# President Trump Signs Technology Prosperity Deal with United Kingdom

The White House | September 18, 2025


## Trump, Starmer sign $350B tech deal to spur AI, nuclear energy and quantum computing

THE WALL STREET JOURNAL.



TECHNOLOGY | ARTIFICIAL INTELLIGENCE Follow

# Nvidia to Invest $5 Billion in Intel, Furthering Trump's Turnaround Plan

Joint announcement sends Intel shares soaring 23%

By *Robbie Whelan* Follow, *Amrith Ramkumar* Follow, *Lauren Thomas* Follow and *Joseph De Avila* Follow

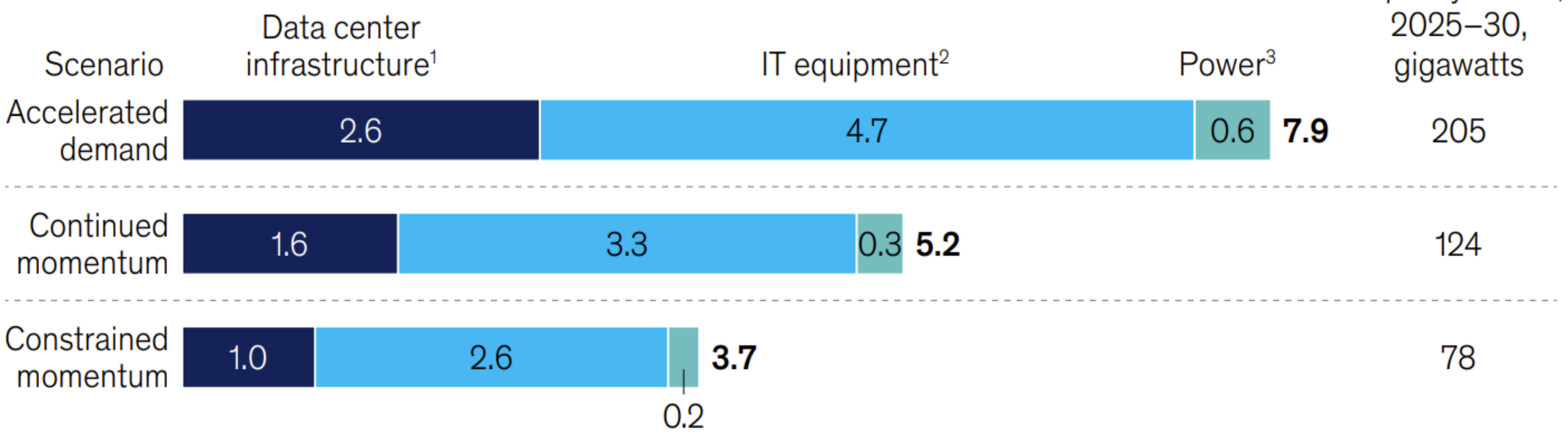
*Updated Sept. 18, 2025 4:30 pm ET*

Share Resize 410 Listen (2 min)


In August, President Trump said Intel agreed to give the U.S. government the stake a week after he spoke with CEO Lip-Bu Tan. Photo: Annabelle Gordon/Bloomberg News

# El ***Capex*** requerido al ***2030*** para respaldar la demanda de capacidad de '***Data Centers***' asociada a IA oscila entre **$3-$8 trillones**

**Global data center total capital expenditures driven by AI, by category and scenario, 2025–30 projection,** $ trillion




Note: Figures may not sum to totals, because of rounding.
[1]Excludes IT services and software (eg, operating system, data center infrastructure management), since they require relatively low capex compared with other components.
[2]Includes server, storage, and network infrastructure. IT capex also accounts for replacing AI accelerators every 4 years.
[3]Assumes $2.2 billion–$3.2 billion/gigawatt (including power generation and transmission cost) to account for a range of power generation scenarios (eg, fully powered by gas, a combination of gas power and storage, and solar) and regional cost differences. Distribution cost is neglected, as most AI centers are expected to be >50 megawatt scale and connected to a transmission grid.
Source: McKinsey Data Center Capex TAM Model; McKinsey Data Center Demand Model

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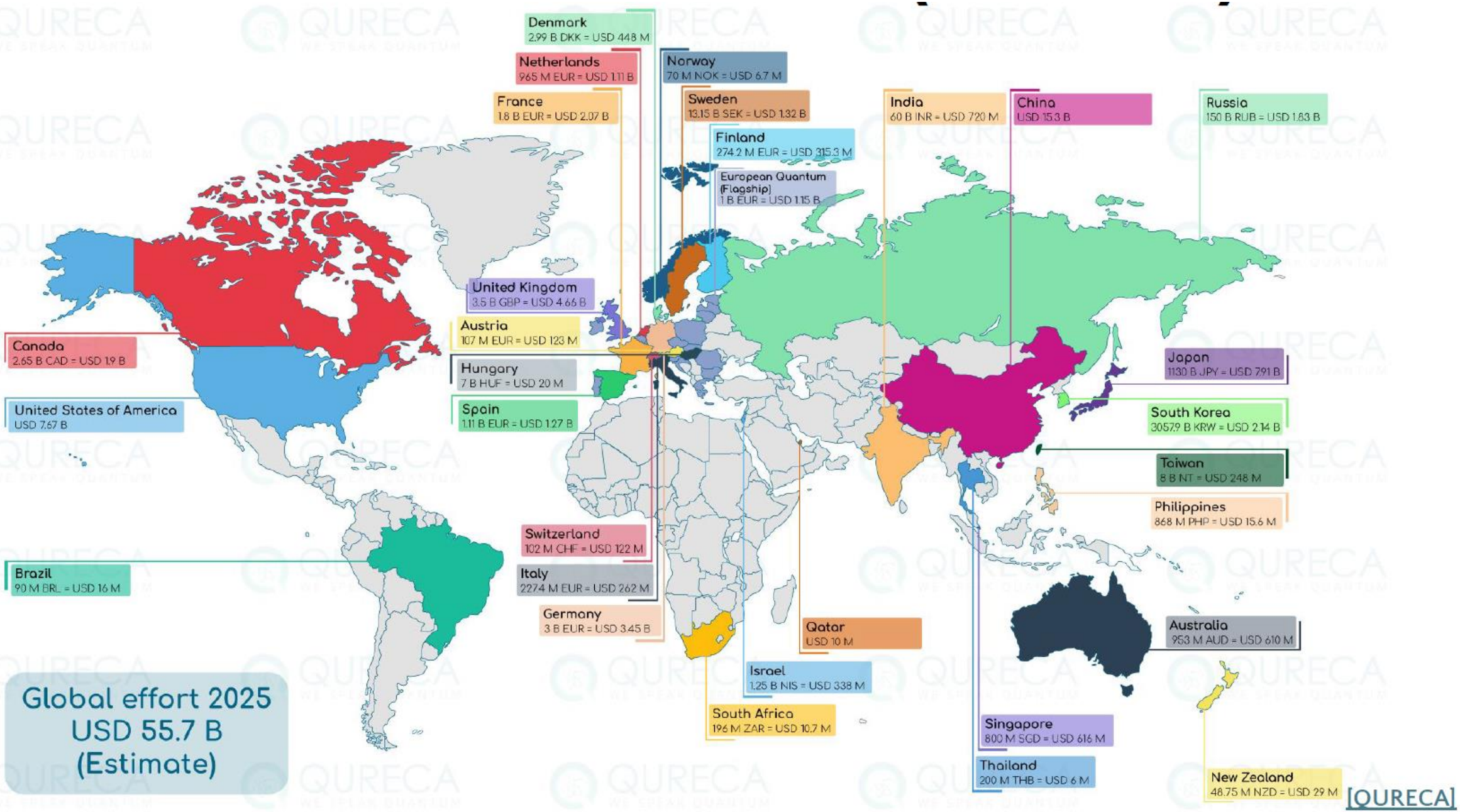
# 4. La *Computación Cuántica* y los mercados financieros...

# I+D en Computación Cuántica a nivel global




[QURECA]

# I+D en Computación Cuántica → Empresas

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| | Electron spins | | | Atoms | | |
|---|---|---|---|---|---|---|
| | Superconducting | Silicon | NV Centers | Trapped Ion | Neutral Atoms | Photonics |
| Americas | rigetti, Google AI Quantum, IBM Q, qci, (intel), EeroQ, Electrons on Helium, D-Wave, (Quantum Annealing), seeqc | (intel), QUANTUM MOTION | QDTI, TURING | IONQ, Honeywell, QUANTUM FACTORY | ATOM COMPUTING, QuEra, Cold atom, ColdQuanta | PsiQuantum, XANADU, BardeenQ |
| EMEA | OQC, IQM, ALICE & BOB, Cat Qubits | equal1.labs, imec | | Universal Quantum, OXFORD IONICS, AQT | PASQAL | ORCA Computing, QUANDELA, LightOn, QuiX |
| APAC | Alibaba.com, 本源量子 | Silicon Quantum Computing, NTT | QUANTUM BRILLIANCE | QUDOOR 启科量子 | | |


PyTorch FRONTEND

QuantumBlack AI by McKinsey

Source: THE QUANTUM INSIDER

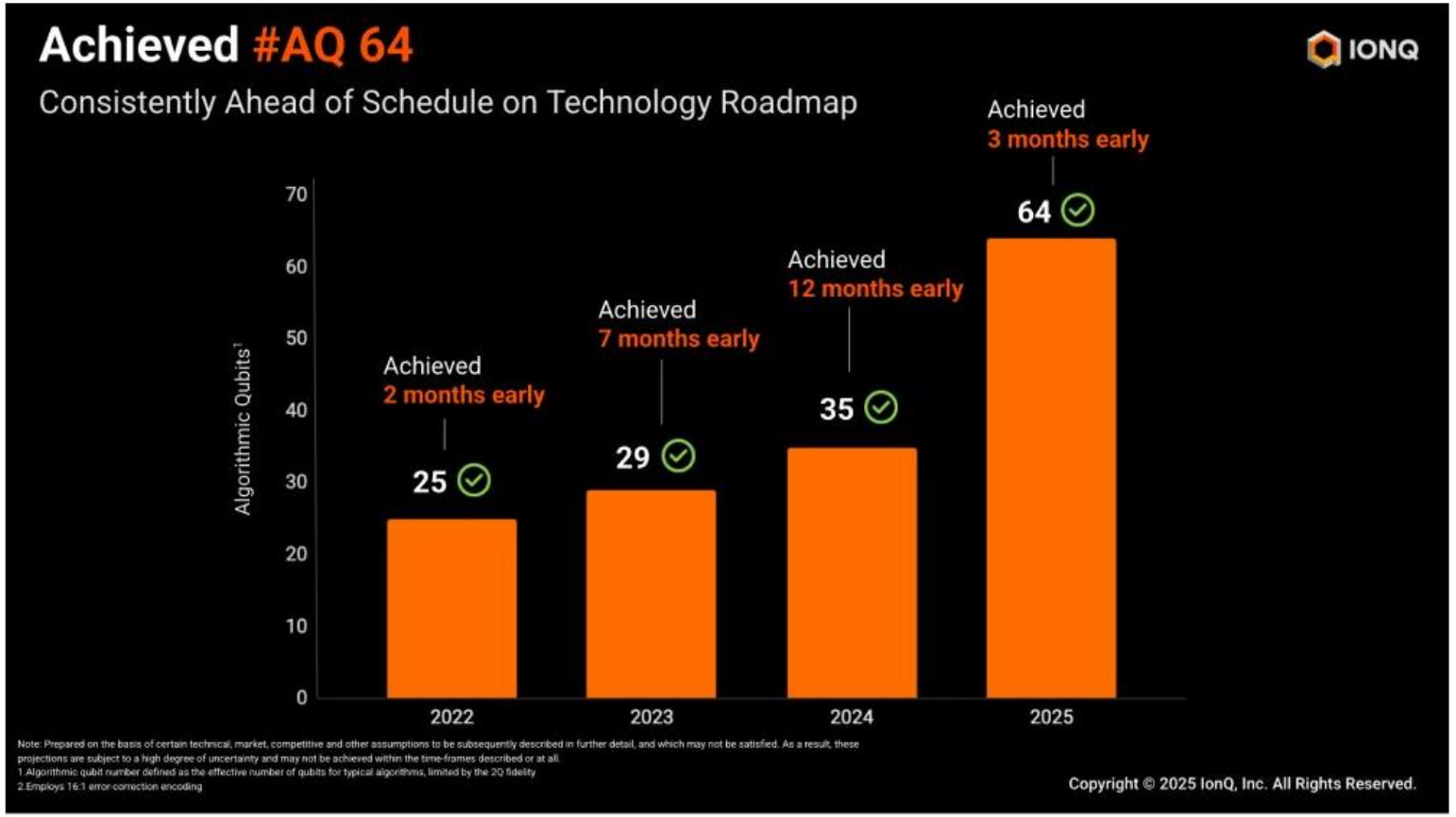
**IonQ (NYSE: IONQ)** anuncia que su sistema ***IonQ Tempo***, un computador cuántico de iones atrapados de 100 qubits, alcanzó un ***algorithmic qubit score de #AQ 64***.

***Cada incremento en #AQ duplica el espacio computacional útil para ejecutar algoritmos cuánticos*****.** Un sistema con ***#AQ 64*** es capaz de considerar más de ***2^64*** posibilidades y se afirma que tiene un espacio computacional que es ***36 cuatrillones*** de veces más grande que los actuales sistemas cuánticos disponibles de IBM.

Con ***#AQ 64***, se espera que el sistema ***IonQ Tempo*** sea capaz de obtener mejoras en: *(i) distribución de redes de energía, (ii) descubrimiento computacional de fármacos, y (iii) optimización de cadenas de suministro*.

## IonQ Achieves Record Breaking Quantum Performance Milestone of #AQ 64

September 25, 2025



# Capex en *Computación Cuántica* → Industria Servicios Financieros

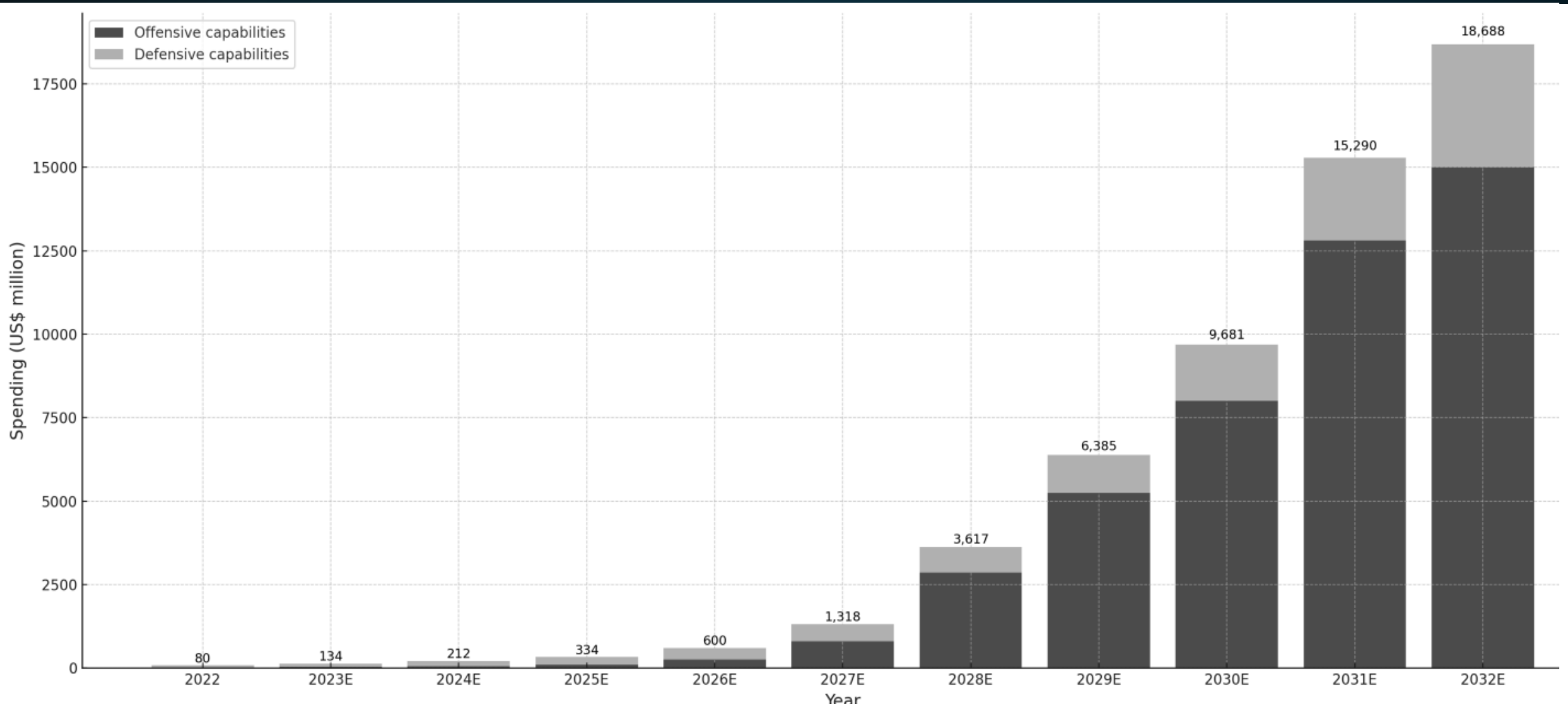



Figure 1: Financial Services Industry's Spending on Quantum Computing Capabilities (2022-2032) [1]

# Alianzas I+D en *Computación Cuántica*

| | Lead investor / institution | Partner / investee | Year (latest milestone) | Activity type | Quantum focus / use-case | Deal size / commitment | Ref. |
|---|---|---|---|---|---|---|---|
| 1 | JPMorgan Chase | Quantinuum (Honeywell) | 2025 | R&D partnership | Certified-randomness generator for crypto and risk-modeling algorithms | N/A (internal research) | [25] |
| 2 | Goldman Sachs | QC Ware & IonQ | 2021-ongoing | Joint research & PoC | Quantum Monte-Carlo for derivatives pricing | Undisclosed | [26] |
| 3 | Bank of Canada | Multiverse Computing | 2023 | Research collaboration | Central-bank risk analytics & quantum-safe encryption | Undisclosed | [27] |
| 4 | Monetary Authority of Singapore (MAS) | Multiple FIs (FSTI 3.0) | 2024 | Grant programme | Building quantum & AI capabilities across Singapore's finance sector | S$100 million | [28] |
| 5 | Global VC market | Sector start-ups | *H1 2025* | Venture funding | Hardware & software across the quantum stack | US$2.2 billion YTD | [29] |
| 6 | PSG Equity, Intel Capital | Quantum Machines | 2025 | Series C equity | Quantum-control systems & orchestration software | US$170 million | [30] |
| 7 | Entrée Capital & co-investors | Classiq | 2025 | Series C equity | High-level quantum compiler / OS layer | US$110 million | [31] |
| 8 | Commonwealth & Queensland Govt's | PsiQuantum | 2024 | Equity + loans (public=private) | Fault-tolerant photonic QC plant (Brisbane) | AU$940 million | [32] |
| 9 | Carlyle Group (PE) | Rigetti Computing | 2023 | Minority PE investment | Scaling superconducting quantum processors | Undisclosed | [33] |
| 10 | SoftBank Vision Fund 2 | IonQ | 2021 | Strategic equity + GTM alliance | Global expansion of trapped-ion hardware | Undisclosed | [34] |

*Note:* Table summarises representative deals and research alliances that signal both near-term pilots and longer-horizon bets on quantum advantage in finance. Sources are press releases, filings, and reputable news outlets.


# 5. IA y su Aporte al Mercado de Capitales

# Premios Nobel 2024 - Física & Química → *ML, ANN & AI*

## NOBEL PRIZE IN PHYSICS

'FOR FOUNDATIONAL DISCOVERIES AND INVENTIONS THAT ENABLE MACHINE LEARNING WITH ARTIFICIAL NEURAL NETWORKS'

**JOHN HOPFIELD, 91**
Professor at Princeton University, USA; PhD from Cornell University

**GEOFFREY HINTON, 76**
Professor at the University of Toronto, Canada; PhD from The University of Edinburgh, UK

**IN 2023:** Awarded to Pierre Agostini, Ferenc Krausz and Anne L'Huillier for developing methods to produce attosecond pulses, allowing exploration of scientific processes at subatomic levels.

## NOBEL PRIZE IN CHEMISTRY

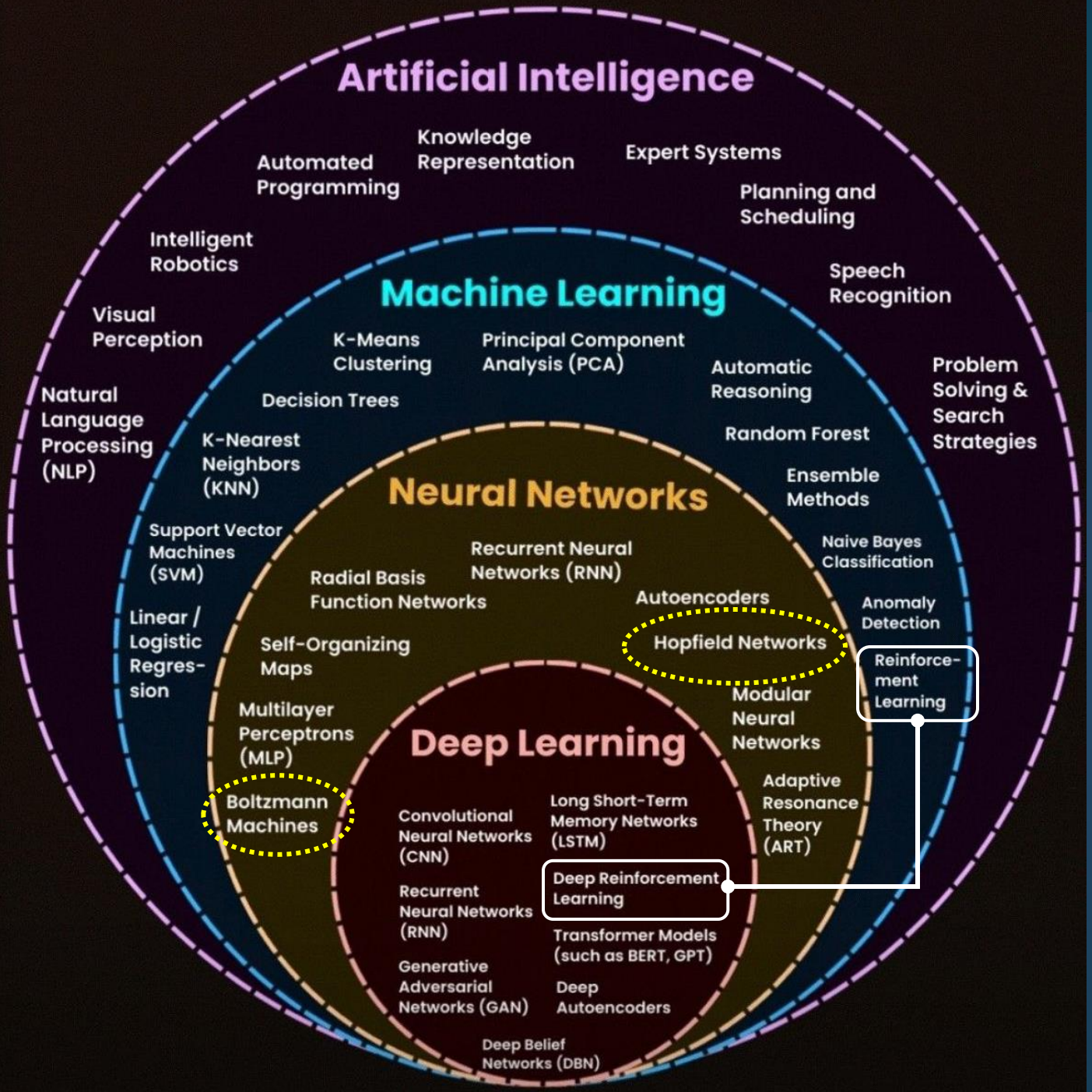
'FOR COMPUTATIONAL PROTEIN DESIGN' & 'FOR PROTEIN STRUCTURE PREDICTION'

**DAVID BAKER, 62**
Professor at University of Washington; PhD from University of California

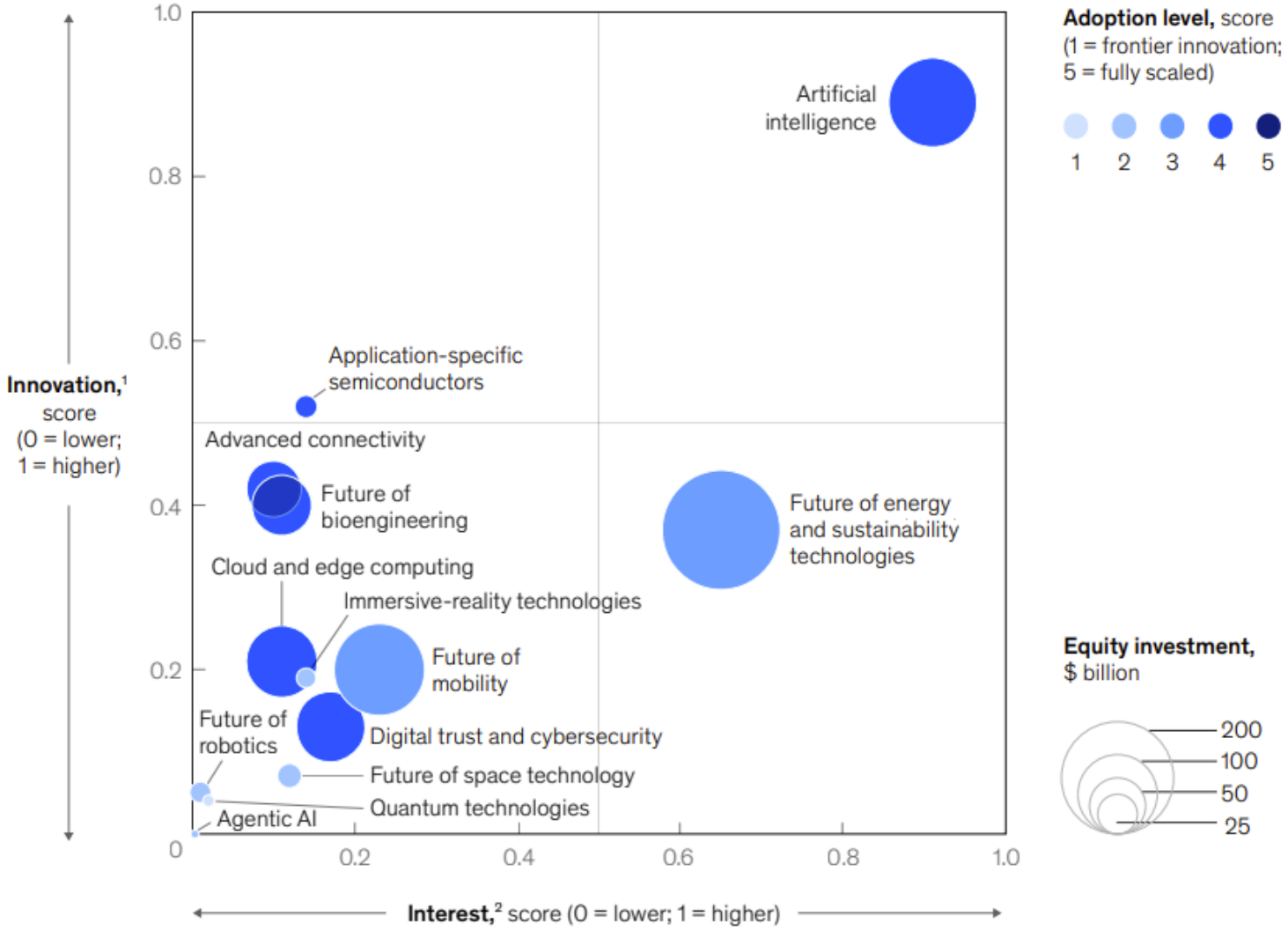
**DEMIS HASSABIS, 48**
CEO of Google DeepMind; PhD from University College London

**JOHN M JUMPER, 39**
Senior Research Scientist at Google DeepMind; PhD from University of Chicago

**IN 2023:** Awarded to Moungi G Bawendi, Louis E Brus, and Aleksey Yekimov for the discovery and synthesis of quantum dots.


Artificial Intelligence
Automated Programming
Knowledge Representation
Expert Systems
Planning and Scheduling
Intelligent Robotics
Speech Recognition
Visual Perception
Machine Learning
K-Means Clustering
Principal Component Analysis (PCA)
Automatic Reasoning
Problem Solving & Search Strategies
Natural Language Processing (NLP)
Decision Trees
Random Forest
K-Nearest Neighbors (KNN)
Ensemble Methods
Neural Networks
Support Vector Machines (SVM)
Recurrent Neural Networks (RNN)
Naive Bayes Classification
Radial Basis Function Networks
Autoencoders
Anomaly Detection
Linear / Logistic Regres-sion
Hopfield Networks
Reinforce-ment Learning
Self-Organizing Maps
Modular Neural Networks
Multilayer Perceptrons (MLP)
Deep Learning
Adaptive Resonance Theory (ART)
Boltzmann Machines
Convolutional Neural Networks (CNN)
Long Short-Term Memory Networks (LSTM)
Deep Reinforcement Learning
Recurrent Neural Networks (RNN)
Transformer Models (such as BERT, GPT)
Generative Adversarial Networks (GAN)
Deep Autoencoders
Deep Belief Networks (DBN)

## Innovation, interest, investment, and adoption, by technology trend, 2024




Note: Innovation and interest scores for the 13 trends are relative to one another. All 13 trends exhibit high levels of innovation and interest compared with other topics and are also attracting significant investment.

[1]The innovation score combines the 0–1 scores for patents and research, which are relative to the trends studied. The patents score is based on a measure of patent filings, and the research score is based on a measure of research publications.

[2]The interest score combines the 0–1 scores for news and searches, which are relative to the trends studied. The news score is based on a measure of news publications, and the searches score is based on a measure of search engine queries.

McKinsey & Company

# *Casos de Uso 'Recientes y Potenciales' de IA & ML en actividades relativas a Mercado de Capitales.*

**GLOBAL FINANCIAL STABILITY REPORT**

Steadying the Course: Uncertainty, Artificial Intelligence, and Financial Stability

2024 OCT

Potential benefits include enhanced accuracy, efficiency, and market insights through multidimensional analysis from unstructured data sources, delivering customized, and actionable outputs.

| Key Processes | Client/Institution Profiling | Asset Allocation | | | Trading | Risk Management | |
|---|---|---|---|---|---|---|---|
| | Identification of Needs and Constraints | Asset Class Allocation | Sectoral Allocation | Security Selection | Orders Placement and Execution | Risk Monitoring | Reporting |
| Potential Benefits from Adopting AI | **Enhance client's profile assessment**<br>• Analyze unstructured or alternative clients' data to understand unique objectives, idiosyncratic needs, and risk preference<br>• Generate simulated scenarios and visualization of potential outcomes of different asset mix | **Enhance optimization and forecast techniques for strategic allocation**<br>• High dimensional forecasting and predictor selections<br>• Deep learning methodologies for dynamic multiperiod portfolio optimization<br>• Clustering/network analysis to analyze multidimensional interactions/ correlations | | **Improve analysis precision**<br>• Feature extraction (beta, momentum, and so on)<br>• Network/ multidimension analysis for relative value analysis and identify price dislocation | **Minimize market impact**<br>• Structured trade execution algorithms to minimize market impact<br>• Analyzing unstructured data and cross-market indicators to identify prevailing liquidity conditions<br>**Assist price discovery**<br>• Modelling executable prices for illiquid securities through multiple market indicators<br>**Improve liquidity management efficiency**<br>• Forecast liquidity needs (margin management, collateral, etc.) through clustering/network analysis | **Dynamic risk sensing**<br>• Generate risk hypothesis<br>• To identify performance drivers and anomalies through multidimensional analysis<br>**Generate risk scenario**<br>• Value-at-risk estimation through generative adversarial networks to capture temporal dynamics in time-series data | **Customize insights**<br>• Customized content generation, reports, and dashboards<br>• Chatbot<br>**Ease compliance monitoring**<br>• Screening, flagging, and reporting of anomalies |
| | | **Derive signals from unstructured and alternative data**<br>• Natural language processing models for sentiment analysis to identify thematic opportunities<br>• Polarity detection, microtext analysis, aspect extraction, or sarcasm detection to improve signal quality | | | | | |

Sources: Academic studies; IMF outreach discussions (see Box 3.1); prospectus from third-party services; and IMF staff compilations.

Note: The figure presents recent and potential artificial intelligence (AI) and machine learning (ML) use cases across investment decision, execution, and monitoring processes. The information may not be exhaustive of all possible AI/ML use cases, as adoption continues to evolve.

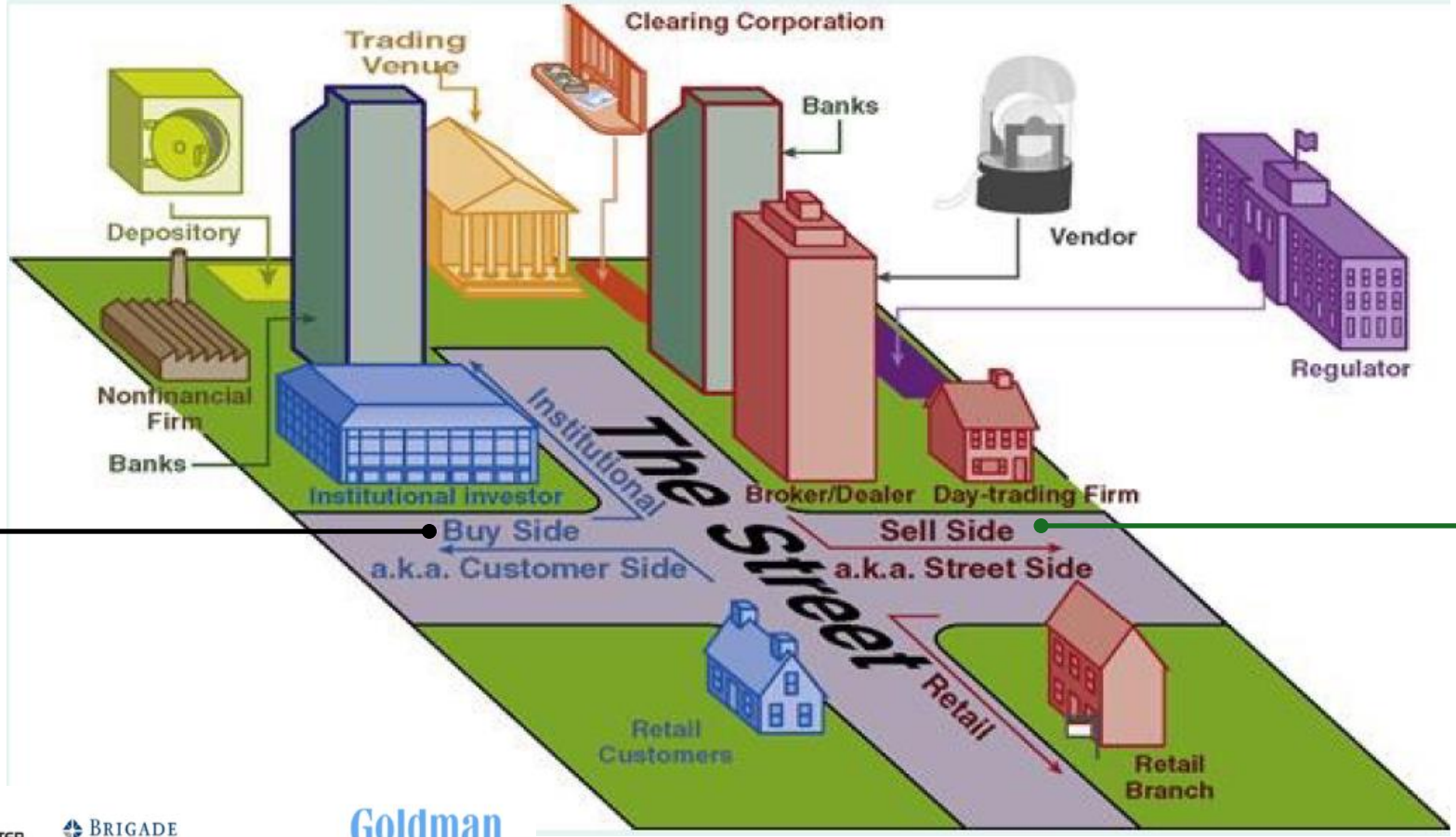

La IA es algo mucho más grande que la Revolución Industrial, la electricidad y todo lo que ha venido antes.
LARRY ELLISON,
Cofundador y CTO de Oracle
El entrenamiento de modelos de IA es un gigantesco mercado multimillonario. Es difícil concebir un mercado tecnológico tan grande como ese. Pero si miras de cerca, puedes encontrar uno que sea aún más grande. Y es el mercado para la inferencia de IA.
LARRY ELLISON,
Cofundador y CTO de Oracle
the largest contract in history and shocks the markets @elinformek
Eventualmente, la IA lo cambiará todo... aunque no todo el mundo entiende completamente el alcance del tsunami que se avecina...
LARRY ELLISON,
Cofundador y CTO de Oracle

# 6. Trading Algorítmico

# *Trading Cuantitativo vs Algorítmico*

## Quantitative vs Algorithmic Trading

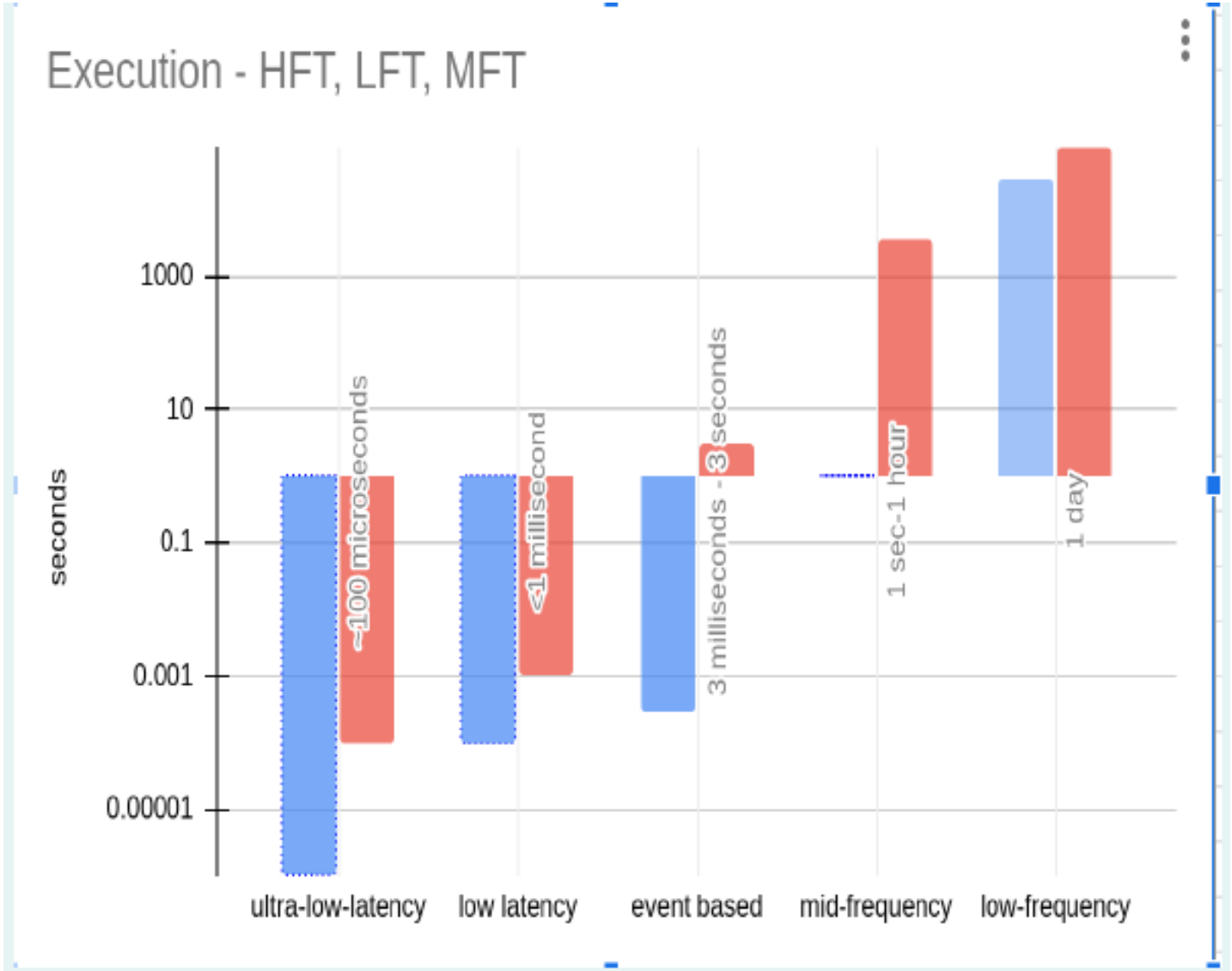
1. **Quantitative Trading (Quant)**
   - Complex Models & Statistics
   - Analyze data to find opportunities
   - Manual or Automatic Execution
   - **Strategies:** Mean Reversion, Statistical Arbitrage
2. **Algorithmic Trading (Algo)**
   - Pre-set Rules & Automation
   - Execute trades based on rules
   - Simpler Models (Price Trends)
   - **Strategies:** VWAP, TWAP, POV, Implementation Shortfall
3. **Choosing Between Them:**
   - **Complexity:** Quant (complex), Algo (simpler)
   - **Automation:** Quant (variable), Algo (full automation)
   - **Goals:** Quant (long-term returns), Algo (short-term gains)
   - **Resources:** Quant (higher initial cost), Algo (lower cost)
4. **Data Analysis:**
   - **Quant:** Scrutinize large datasets, historical testing
   - **Algo: Big data, machine learning (sentiment analysis)**
5. **Risk Management:**
   - **Quant:** Mathematical models (Monte Carlo simulations)
   - **Algo:** Algorithmic oversight, technical methods
6. **Tools:**
   - **Quant:** EOD Historical Data, StrategyQuant, Python, C++
   - **Algo:** Low latency software, Portfolio123 (backtesting), Quiver Quantitative




**Buy side**

**Sell side**

# Clasificación según Velocidad de Ejecución y Tiempo de tenencia



# Hedge Weekly N°52

Investment Funds Performance Review

**HSBC** Alternative Investment Group

Week of Monday 23 Dec to Friday 27 Dec 2024

HSBC

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# Estrategias de Trading Cuantitativo (muestra)

| Key Approaches | Description | Some key Players |
|---|---|---|
| Equities Factor Trading | Factor creation and trading, portfolio formation and trading – usually economically justified, done in large volume, lower alpha | Blackrock, AQR etc |
| CTA/QIS/Risk-Premia | Creation and trading of single premia-based strategies: Momentum or Trend-Following, Carry, Mean-reversion, Macro, etc. | Man AHL, Aspect, Graham Cap, Inv Bank QIS teams etc. |
| Statistical Arbitrage | Tightly Risk Controlled investment in large (e.g, 3000+) portfolios of equities, rebalanced at medium to low frequency. | Qube, Two Sigma, DE Shaw, RenTech etc. |
| Mid-Frequency Trading | Fast processing, forecasting and execution for implementing trades, mostly in single tickers. Vol Trading, Fixed income RV trading, event trading. | Most quant hedge funds, many HFTs + other prop shops |
| Automated Execution | Algorithms for systematic execution meant to reduce slippage, for clients, internal PMs, etc. | Many larger Investment banks, all larger HFs, most mid-frequency shops |
| Systematic Market-Making (E-trading) | Market-making for external clients (capturing the spread), internal desks (capturing spread but reducing externally paid transaction costs), etc. | Most investment banks |
| HFT | Low latency, interaction with order book, both market-making and taking, using highly engineered platforms. Sometimes arbitrage trading. | Optiver, HRT, Jump Trading, Jane Street, etc |

# '*Trading Roles*' en *Sell* & *Buy-side*

**Sell-Side Roles:**

- Quant Research (Pricing)
- Quant Strategist
- E-Trading Quants (Market-making)
- E-Trading Quants (Execution)
- Quant Structurer
- Quant Investment Strategies (QIS)
- Risk Management Quant

**Buy-Side/Trading Roles:**

- Quantitative Researcher/Strategist
- Systematic Trader
- Quantitative Developer/Engineer
- Data Scientist/ML Engineer
- Risk Manager
- Infra/Systems Engineer

# 7. Algorithmic Trading

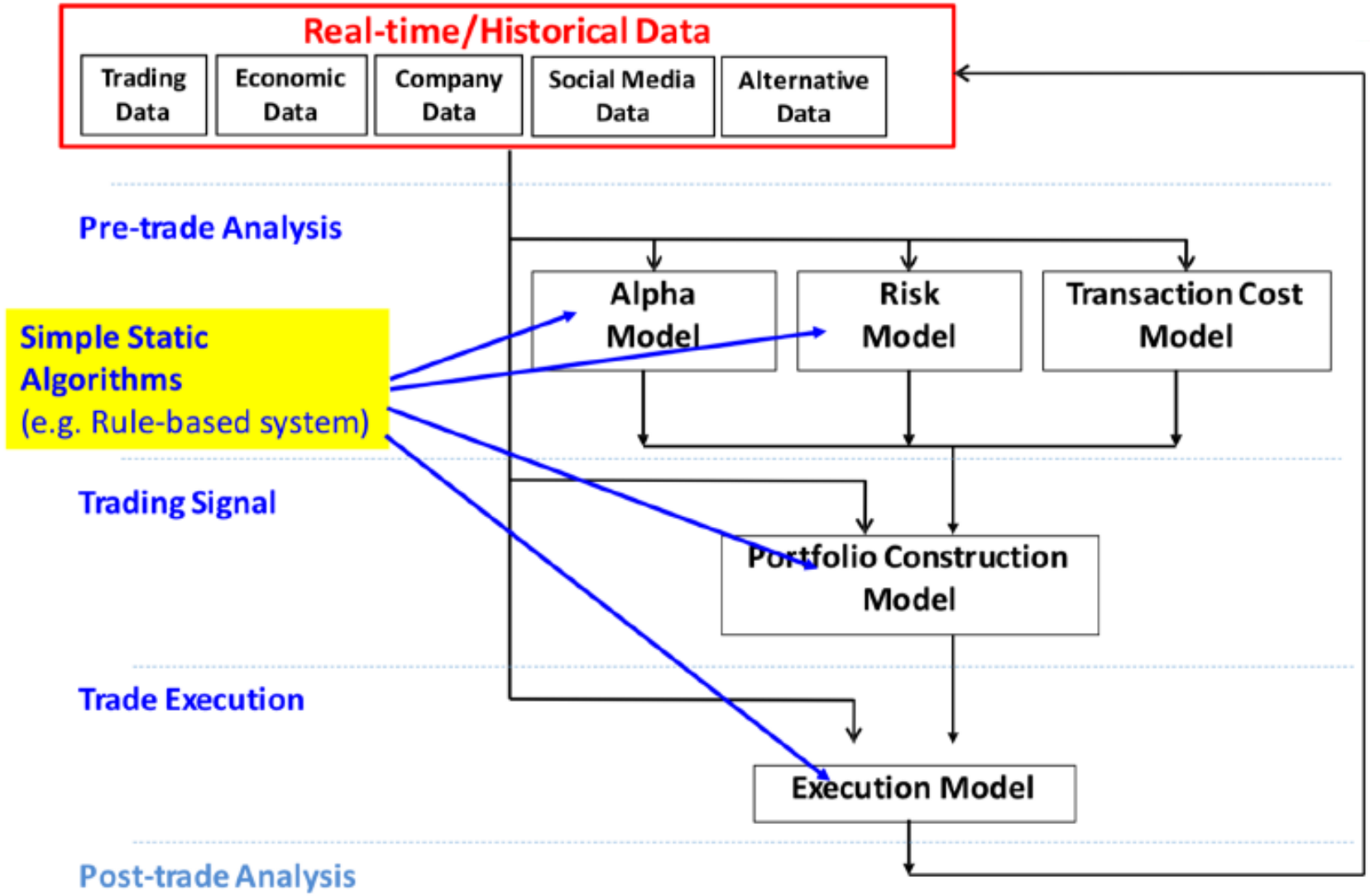
## *Estructura*

**Fuente:** Koshiyama, Adriano and Firoozye, Nick and Treleaven, Philip, *Algorithms in Future Capital Markets* (January 29, 2020).

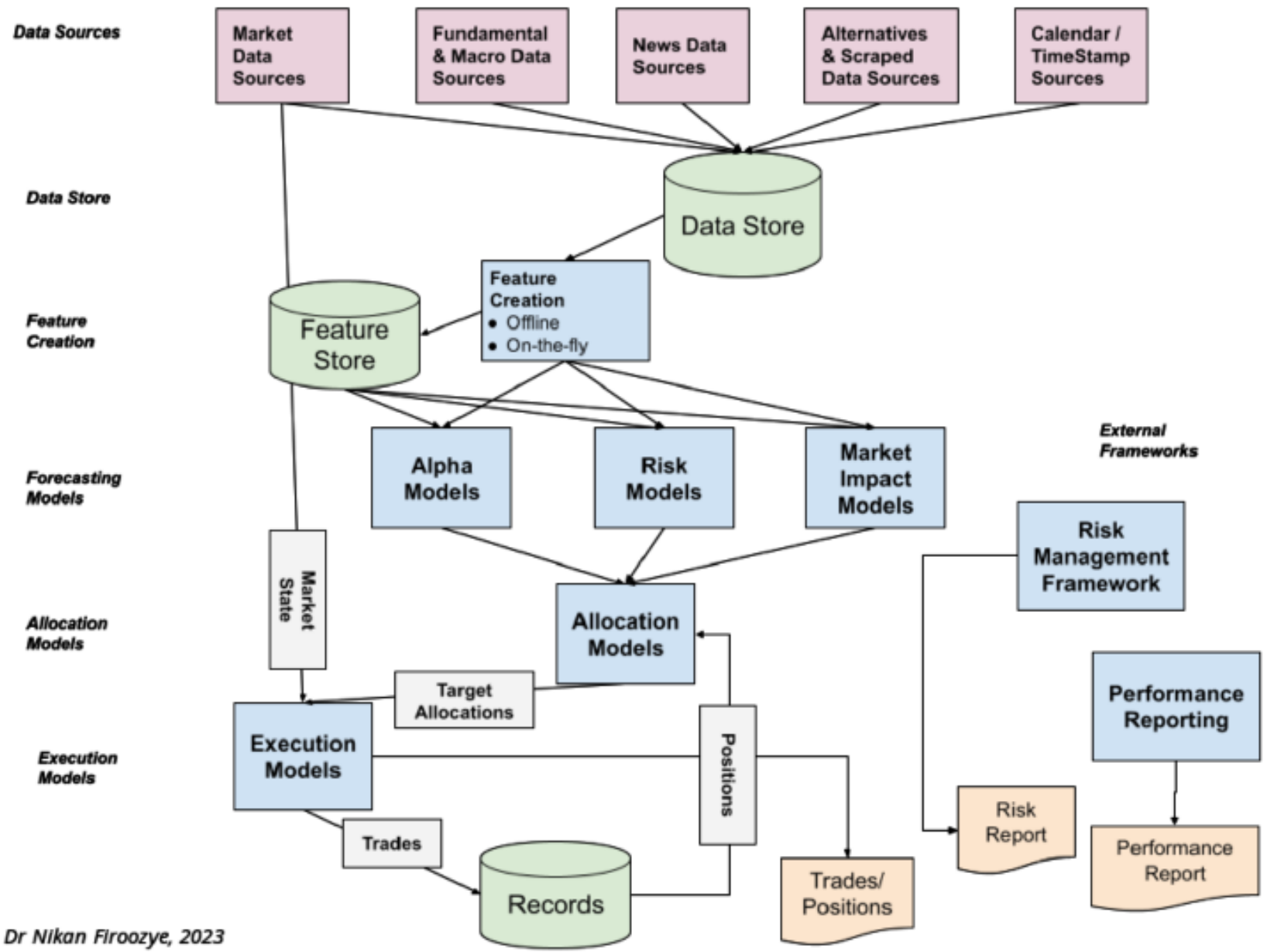
SSRN: https://ssrn.com/abstract=3527511

**UCL:** University College London

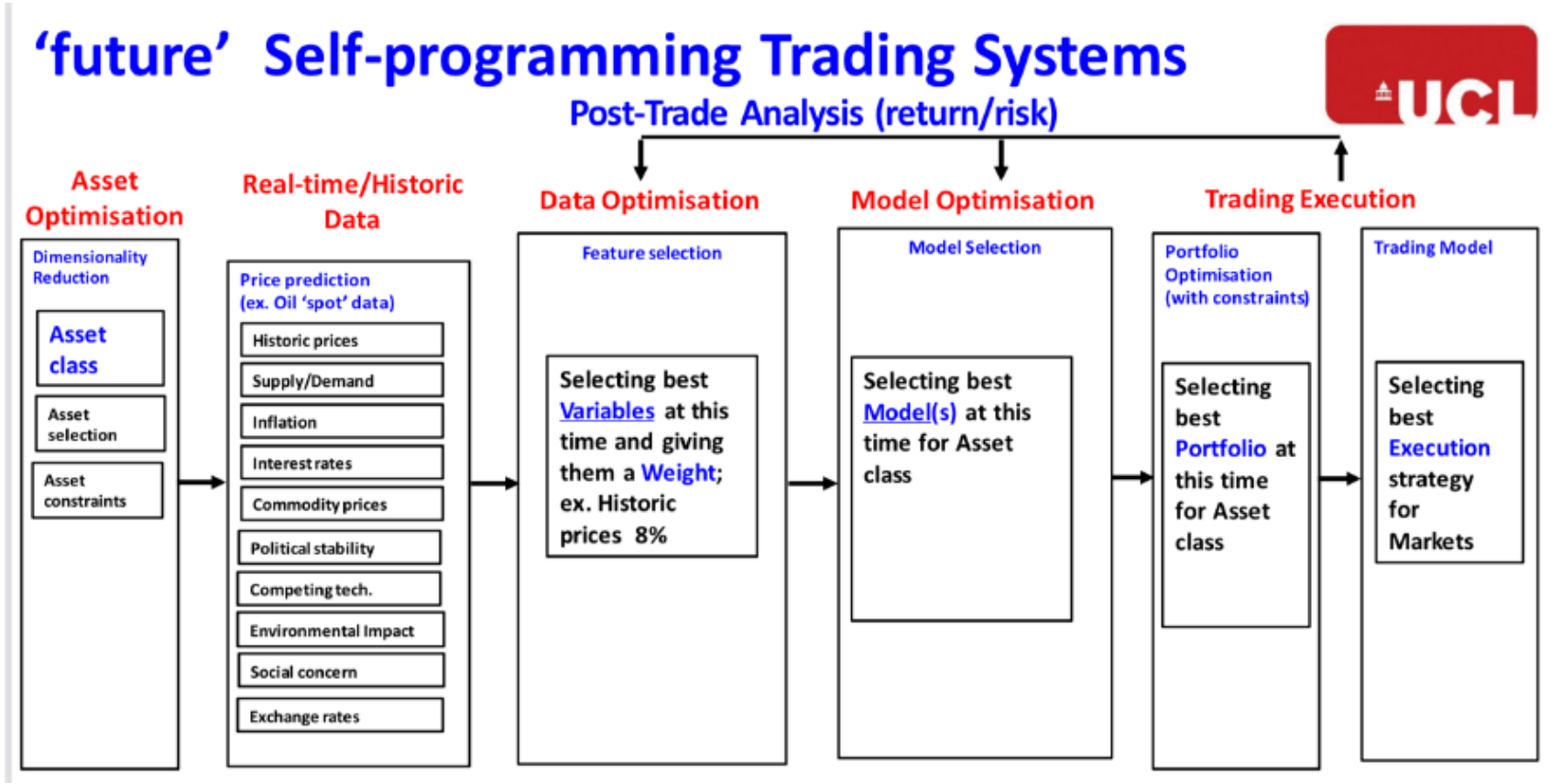
# Sistema o *Estructura ‘Tradicional’* de Trading Automatizado



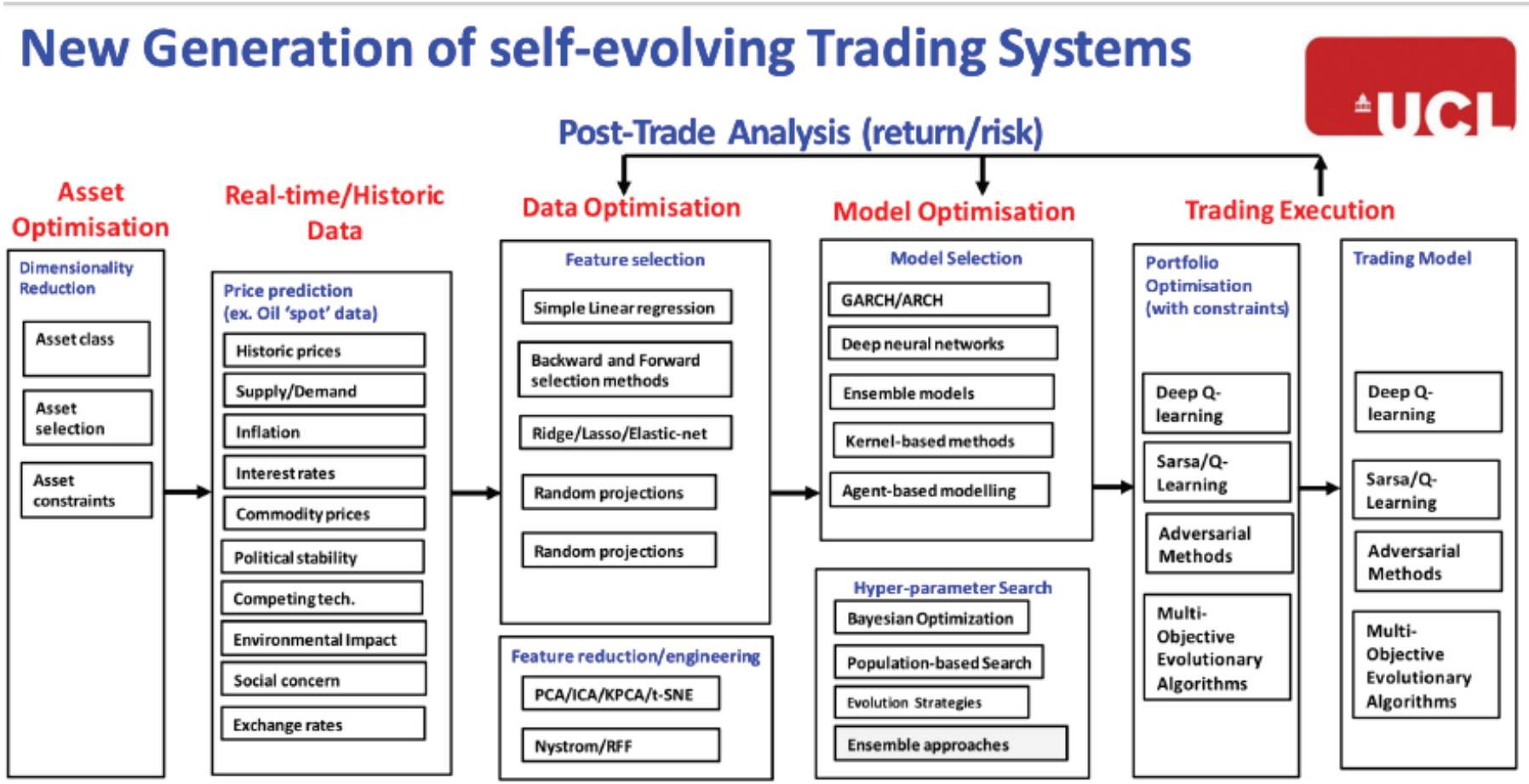
Estructura de Trading Algorítmico, *versión mejorada → parcial/te on/off-line*



# View Futurista (I)



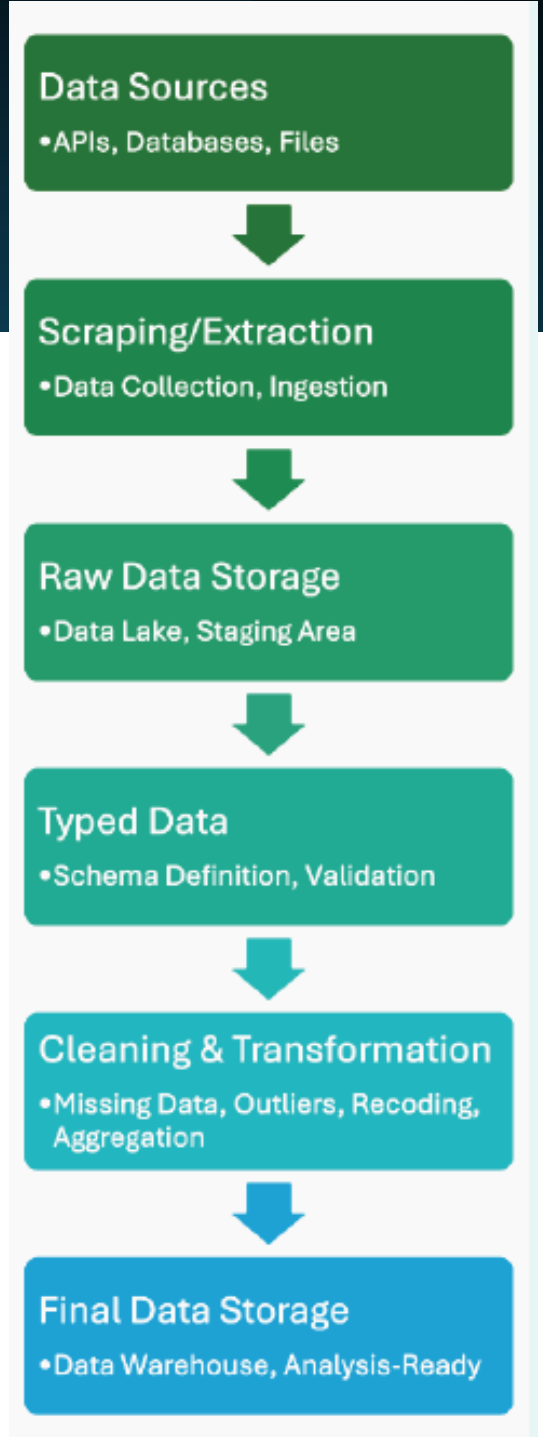
Versión Futurista (II): ***Self-evolving***



# Procesamiento de la Data →

## Data Processing Pipeline

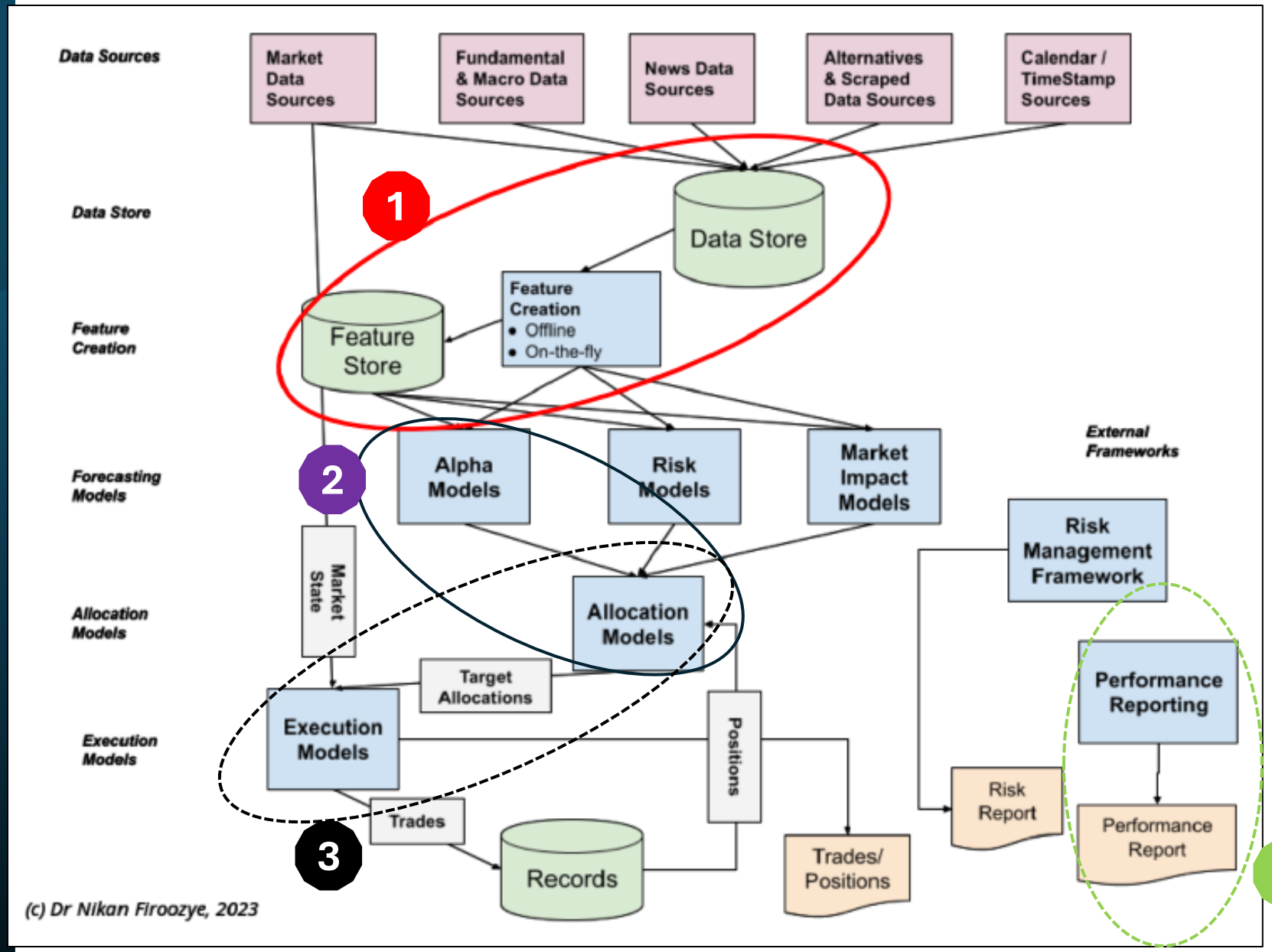
- ELT - Extract, Load, Transform
- Extract & Store Raw files
- Transform: Type, clean, verify
- Save in accessible format
- Data Processing:
  - Missing data fixes
  - Outlier handling
  - Data correction
  - Encoding/Categorization
  - Discretisation
  - Transformation




Ref: Kaggle Feature Engineering Methods

amv
Autorregulador del Mercado de Valores de Colombia

# Estructura con énfasis en *Data & Alphas/Features*



TECHNOLOGY

# Quantum Computing Could Reinvent Finance. IBM and HSBC Take First Step With Bond Trading.

By Mackenzie Tatananni Follow

Sept 25, 2025 8:03 am EDT



**IBM Quantum**
80.574 seguidores
22 horas •

Today, HSBC announced the world's first-known empirical evidence of quantum computers solving real-world problems in algorithmic bond trading: https://ibm.co/6042BJMMM

Working with IBM, HSBC adopted a hybrid approach that combines classical and quantum computing, delivering up to a 34% improvement over classical-only techniques in predicting the likelihood of a trade being filled at a quoted price in the European corporate bond market.

In this trial, an IBM Quantum Heron — our latest and highest-performing quantum processor — augmented classical computing workflows to better detect hidden pricing signals in noisy market data.

This achievement not only celebrates the combination of deep domain expertise integrated with cutting-edge algorithms research, but also demonstrates the emerging potential of quantum computing as a tool in quantitative finance.

AMERICAN BANKER



HSBC

# HSBC claims quantum edge in bond market

By Carter Pape September 25, 2025, 1:47 p.m. EDT 5 Min Read

Jay Gambetta, vice president of IBM Quantum, observes the chandelier-like part of a quantum computer that cools the microchip. IBM provided the quantum computer that HSBC used in its experiment on bond market pricing predictions. *HSBC*

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3 EU may change CBDC to counter U.S. stablecoins

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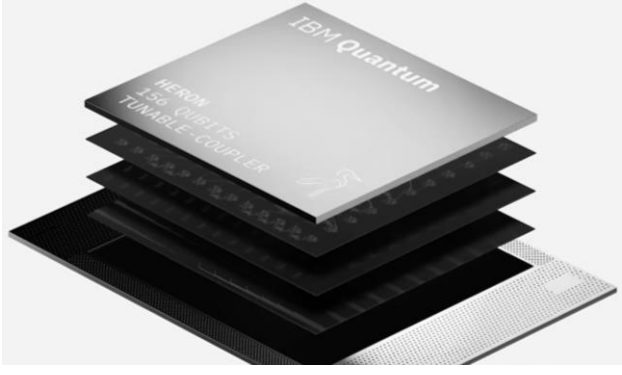
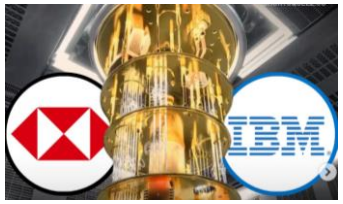
5 U.S. Bank begins testing a blockchain for trade finance






# *Enhanced fill probability estimates in institutional algorithmic bond trading using statistical learning algorithms with quantum computers*

Dealer 1

wait

*estimator inputs*

$\widetilde{\Lambda}_1$

$\mathcal{P}_1$

trading strategy

bid

*optimization*

Time-Dependent Estimation of Trade Fill Probabilities

Bond Market

Dealer 2

*optimization* bid

wait

$\mathcal{P}_2$

$\widetilde{\Lambda}_2$

Dealer *j*

*optimization* bid

wait

$\mathcal{P}_j$

$\widetilde{\Lambda}_j$

Dealer *M*

*optimization* bid

wait

$\mathcal{P}_M$

$\widetilde{\Lambda}_M$

Calibration Process

**Fill Probability Estimator** (ML/AI)

or paththrough

Event Matching

Online Process

**RFQ** + market state observables at given request time

Pull

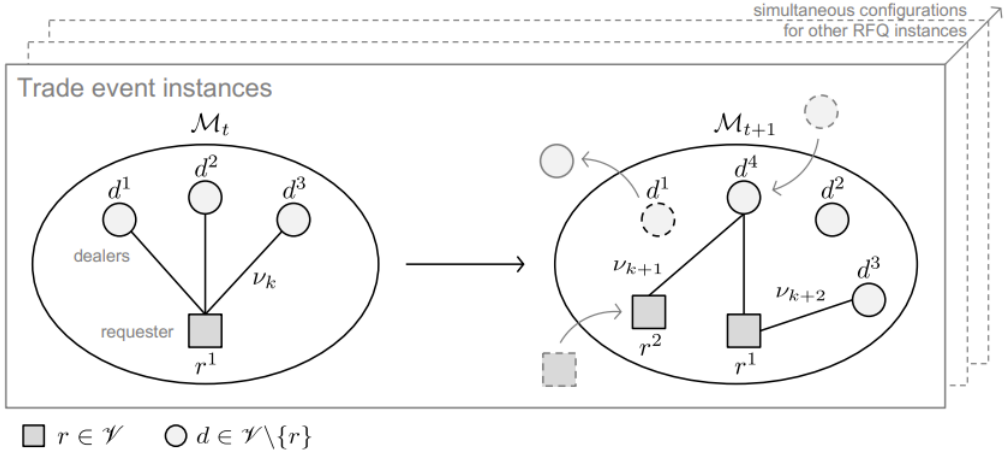
Feature Store

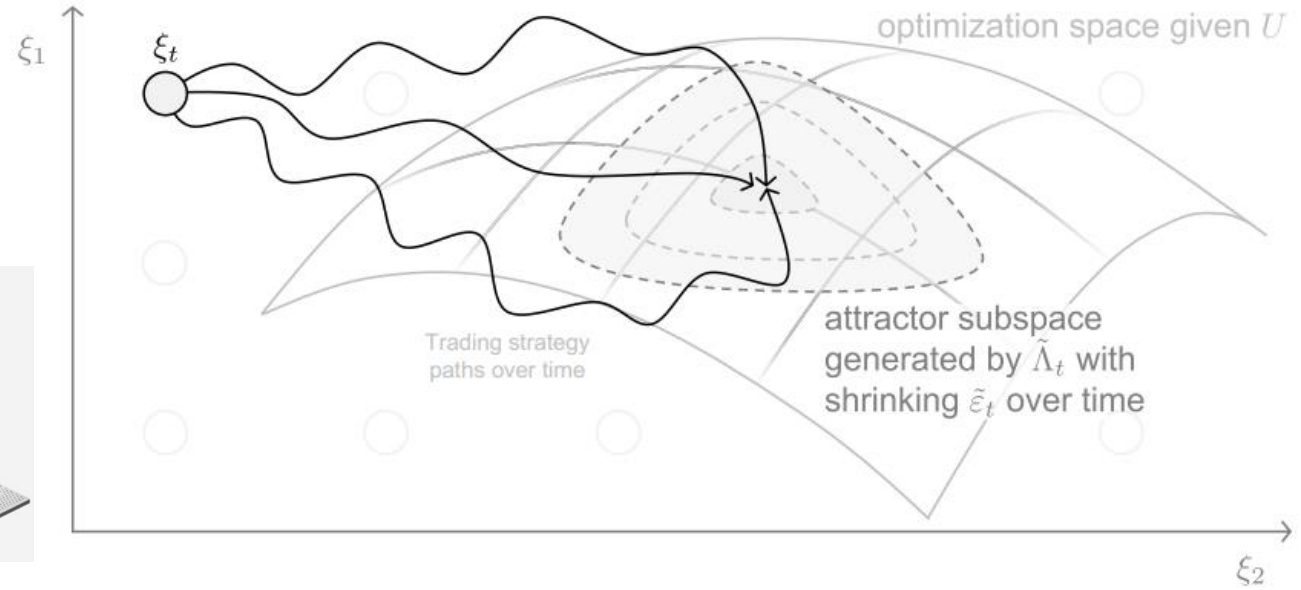
**Projected Quantum Measurements**

IBM Quantum System Two

**Quantum Computer**

Offline Process

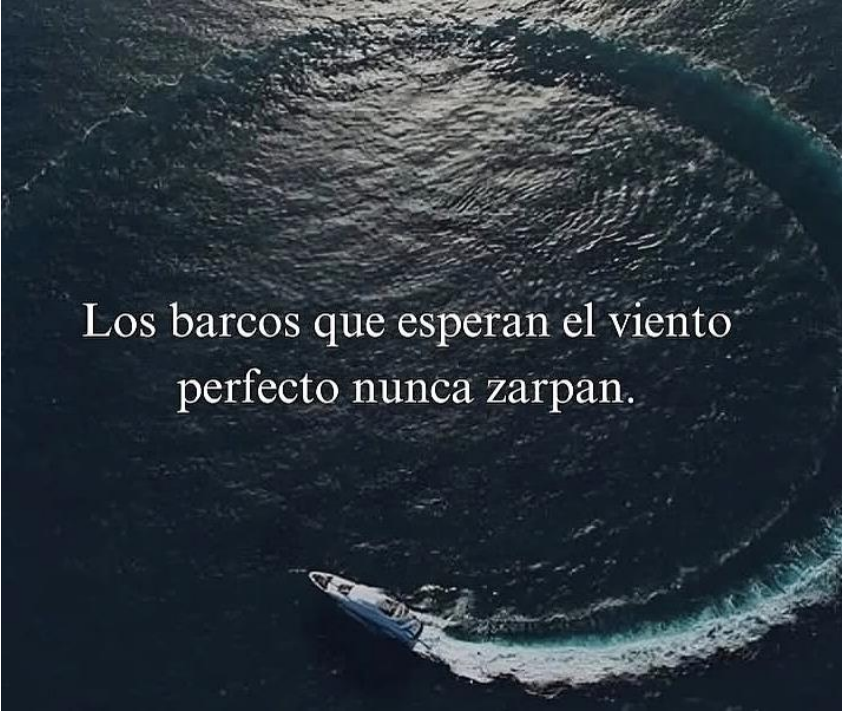

📷: Ciceri et. al., Figure 1, arXiv, 2025

# Conclusiones

El desarrollo y evolución de ***nuestro mercado de capitales*** es responsabilidad de todos y cada uno de los Actores.

Los avances recientes a nivel global, en términos de: *IA, Data Centers, Computación Cuántica*, entre otros; nos impone ***grandes retos y enormes desafíos que debemos asumir***.

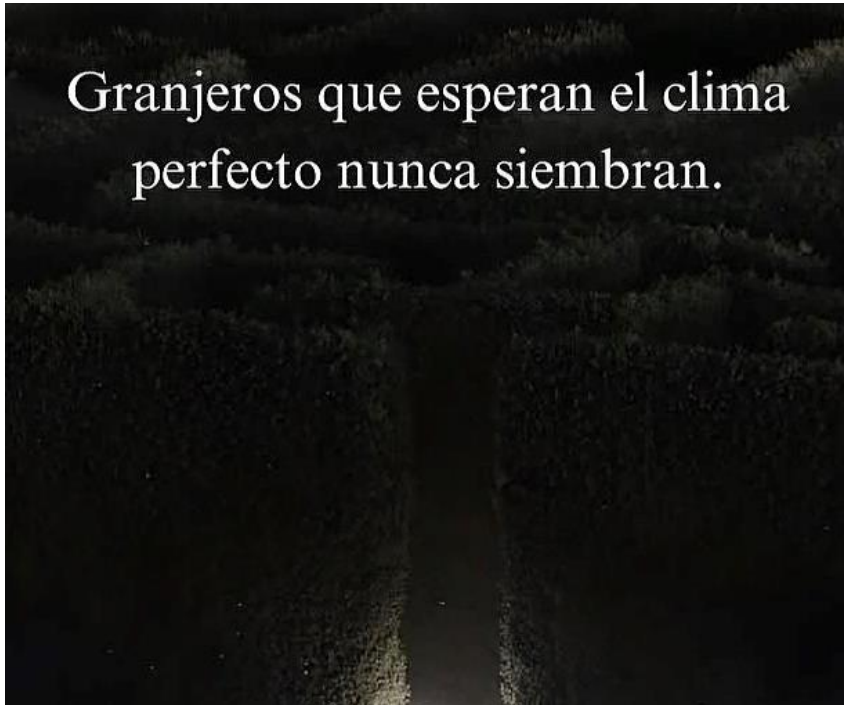
La SFC, URF, BanRep, Nuamx, las Infraestructuras, los Gremios, y AMV, ***estamos al servicio de la industria financiera*** para promover la generación de valor, y contribuir a la profundización de nuestro mercado de capitales.


Los barcos que esperan el viento
perfecto nunca zarpan.


Atletas que esperan la condición
perfecta nunca entrenan.


Emprendedores que esperan el plan
perfecto nunca hacen negocios.


Escritores que esperan las palabras
perfectas nunca escriben.


Granjeros que esperan el clima
perfecto nunca siembran.


La perfección es el enemigo del progreso.
Irónicamente, esperar el **"momento perfecto"** solo
garantiza que perderás todos los momentos.


Comienza desordenado.
Comienza con miedo.
Comienza cansado.
Comienza roto.


Pero, sobre todo, comienza ahora.
Tu yo futuro te lo agradecerá.

# ¡Gracias!