

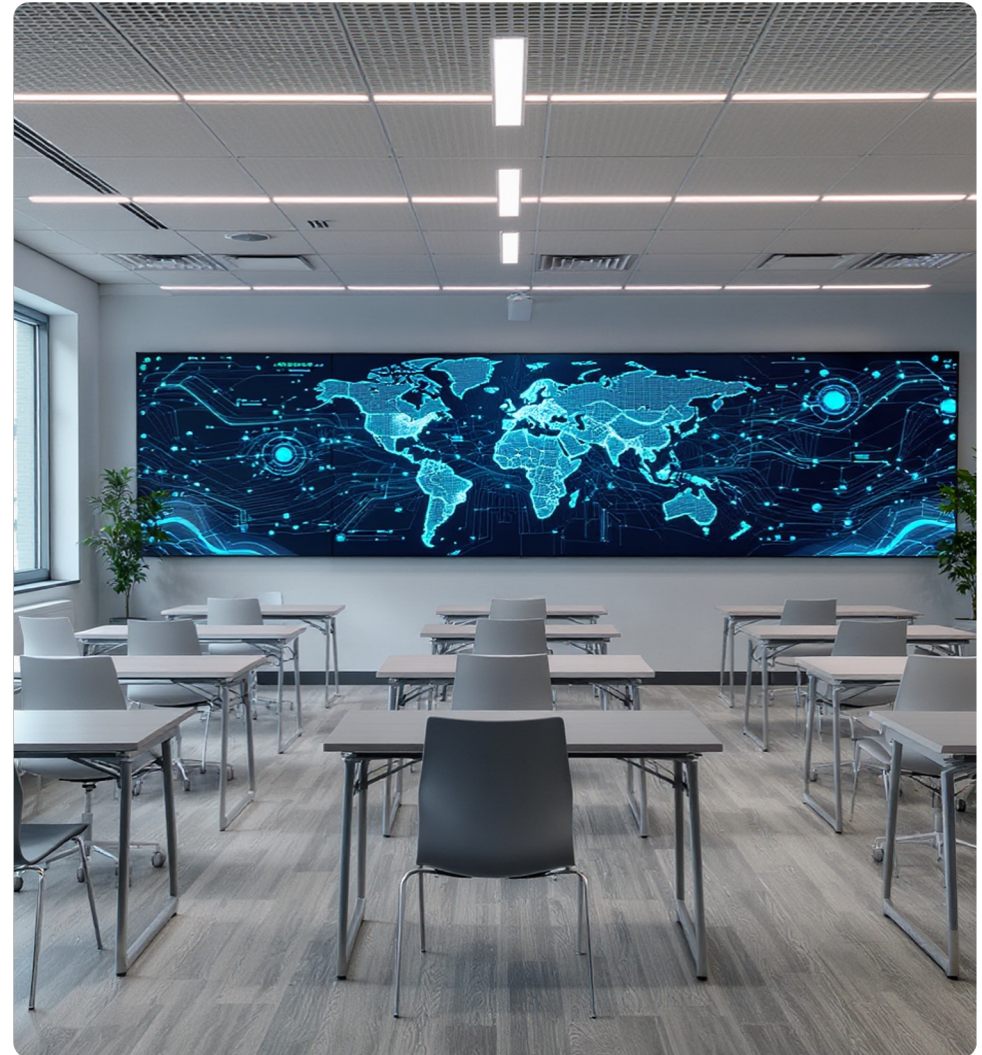


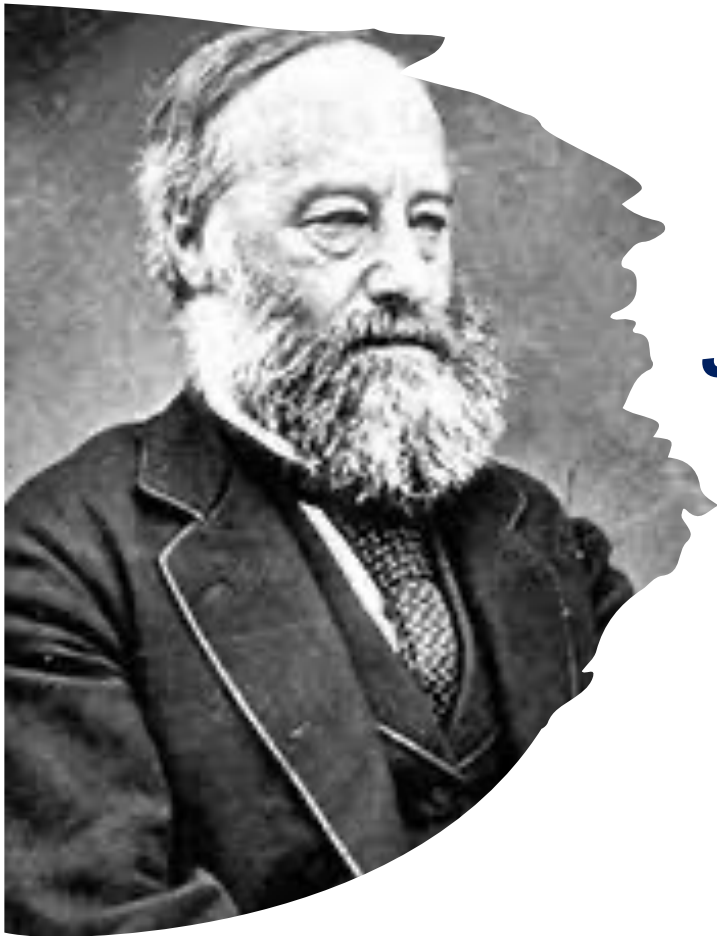
Dual-Use Education

Politiche Educative e Intelligenza Artificiale

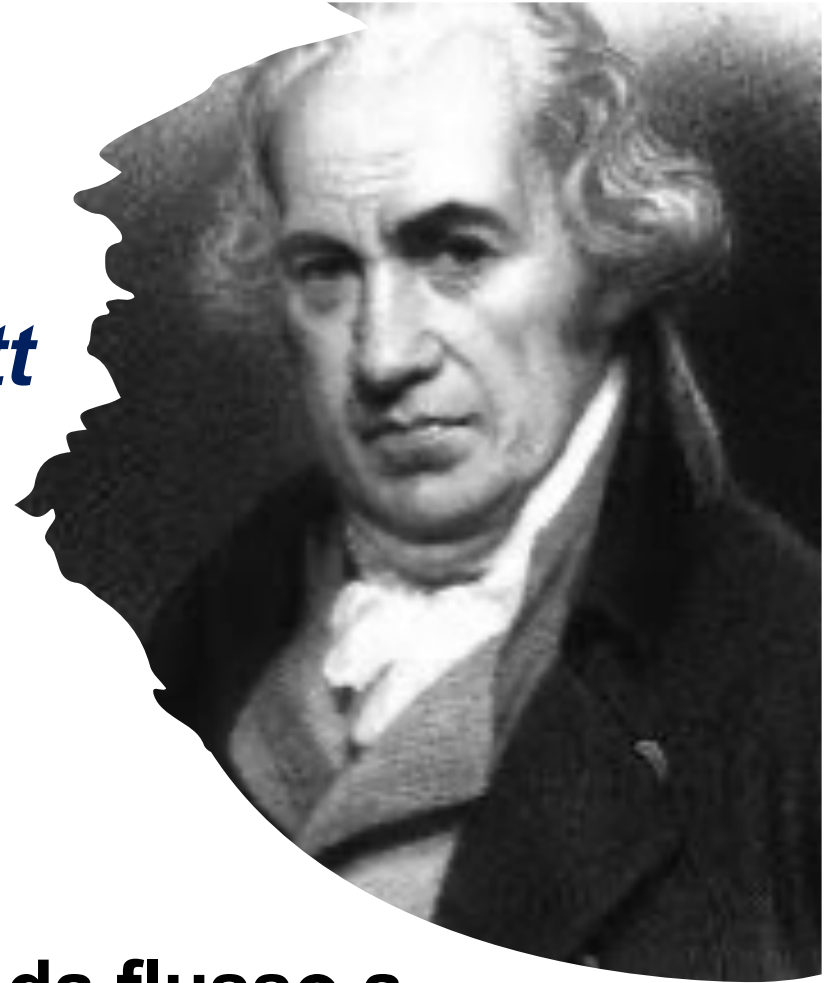
Verso un Paradigma di Cittadinanza Permanente in
Italia e in Europa

*C.A. Carnevale Maffè – SDA Bocconi School of Management
Roma, 14 gennaio 2026*





Joule vs Watt



Nell'era dell'AI, si passa da flusso a stock, da lavoro a potenza

Perchè servono nuove metriche per lo Human Capital

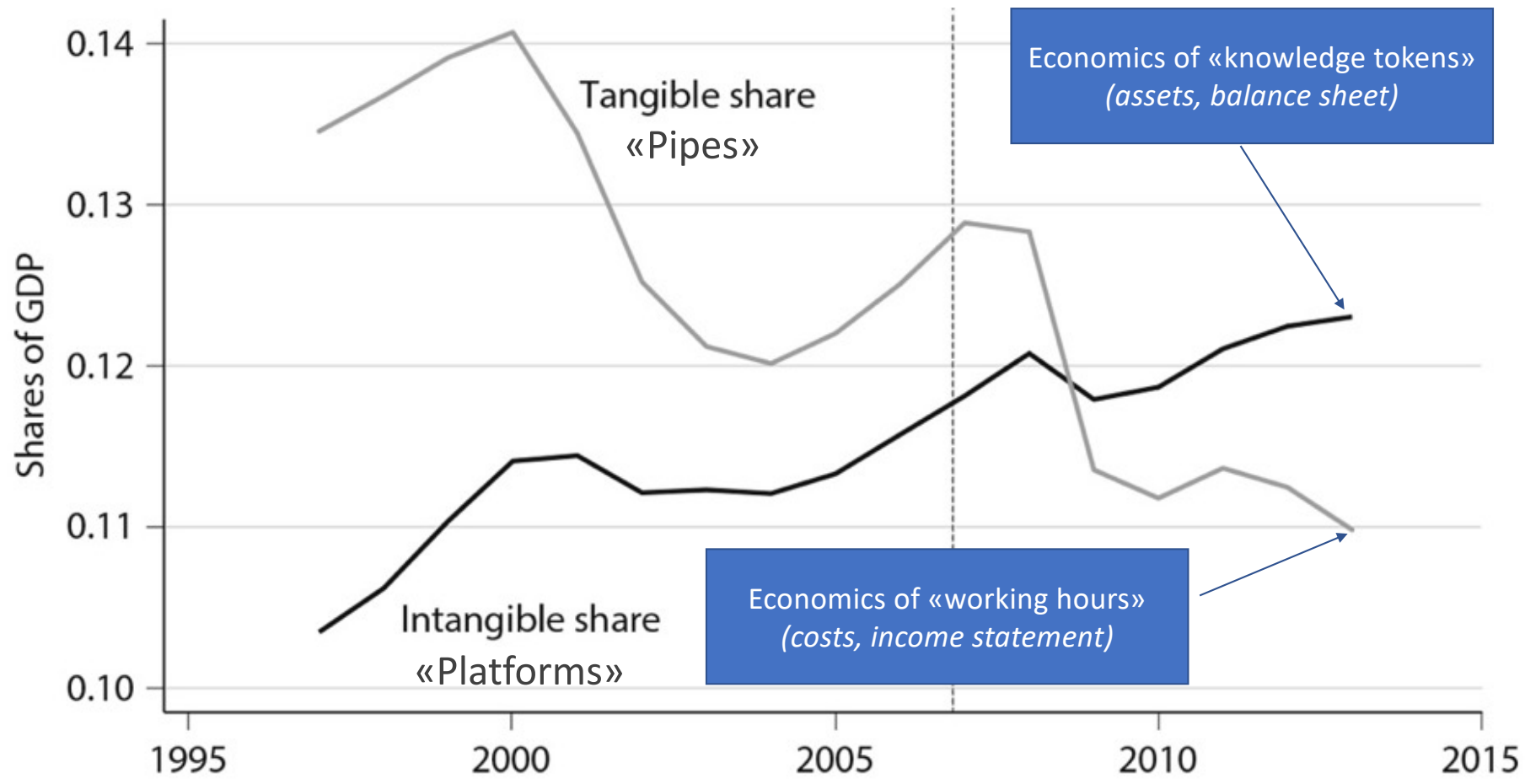


Figure 2.4. Intangible and tangible investment in Europe and the United States. Countries are Austria, Czech Republic, Denmark, Finland, France, Germany, Italy, Netherlands, Spain, Sweden, UK, USA. Source: authors' calculations based on INTAN-Invest database (www.intan-invest.net).

Source: Haskie & Westlake, Capitalism without Capital: The Rise of the Intangible Economy, 2017

USA: con le «Superstar Firms», la quota di reddito da lavoro diminuisce rispetto a quella del profitto

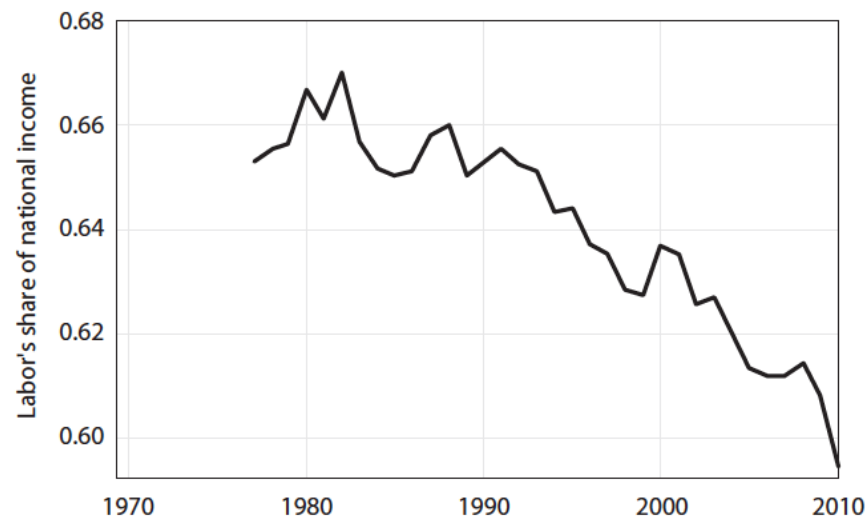
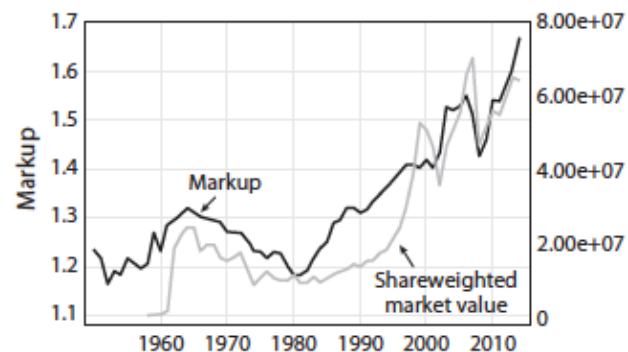
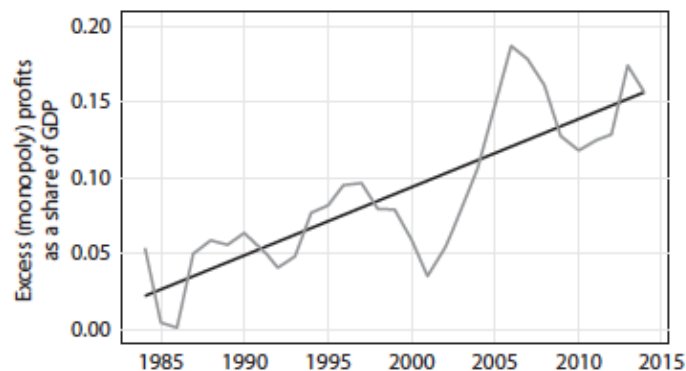


FIGURE 1.2: Labor's share of US National Income over time.

Source: David Autor, David Dorn, Lawrence F. Katz, Christina Patterson, & John Van Reenen, *The Fall of the Labor Share and the Rise of Superstar Firms* (MIT Working Paper, 2017), <https://economics.mit.edu/files/12979>.

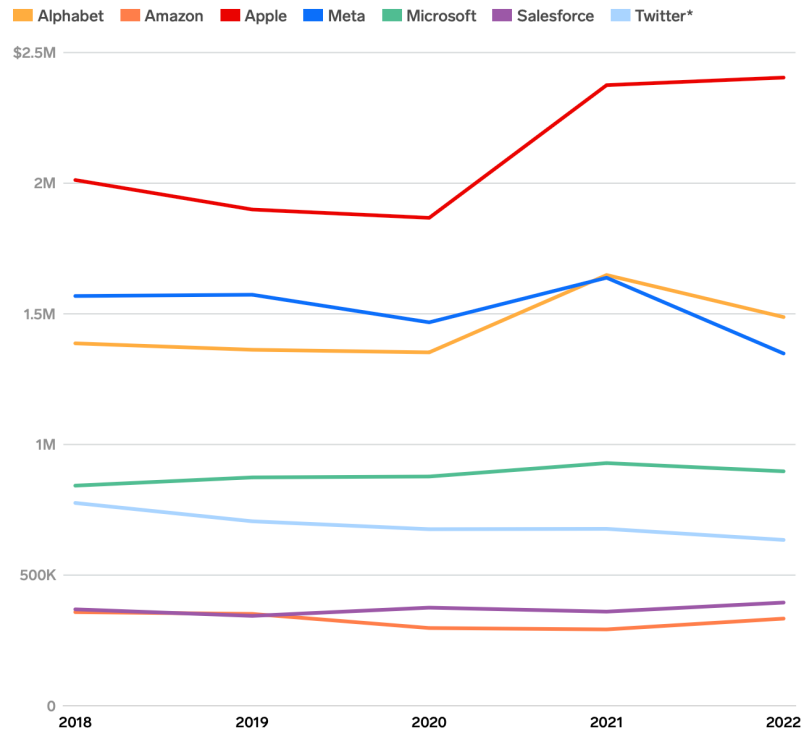
FIGURE 1.3: Above—competitive profits as a fraction of national income in the United States over time. Below—markups over cost (black) and average share-weighted stock market value (gray). Sources: Simcha Barkai, *Declining Labor and Capital Shares* (2017), <http://home.uchicago.edu/~barkai/doc/BarkaiDecliningLaborCapital>, pdf, and Jan de Loecker & Jan Eeckhout, *The Rise of Market Power and Macroeconomic Implications* (2017), <http://www.janeeckhout.com/wp-content/uploads/RMP.pdf>.



**USA:
minimo
storico di
quota salari
sul PIL**

La produttività del lavoro nelle «Big Platforms»

Revenue per employee, 2018–2022



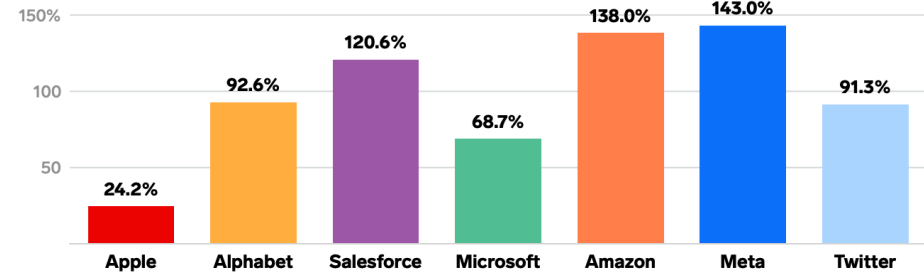
Note: *Twitter's 2022 figure is based on an annualized projection

Chart: Ricki Lee/Insider • Source: Earnings reports

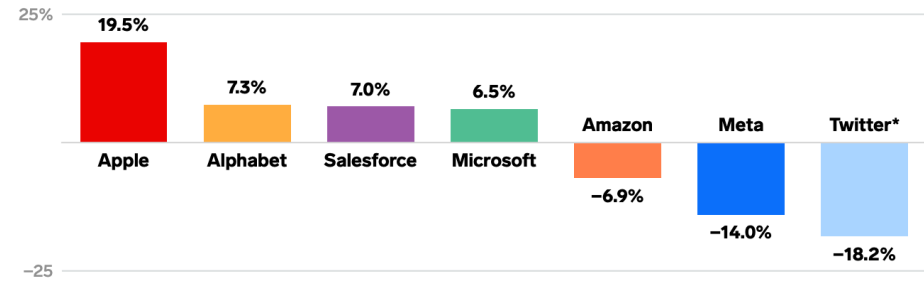
INSIDER

Number of employees vs. revenue per employee from 2018 to 2022

Percent change in number of employees from 2018 to 2022



Percent change in revenue per employee from 2018 to 2022



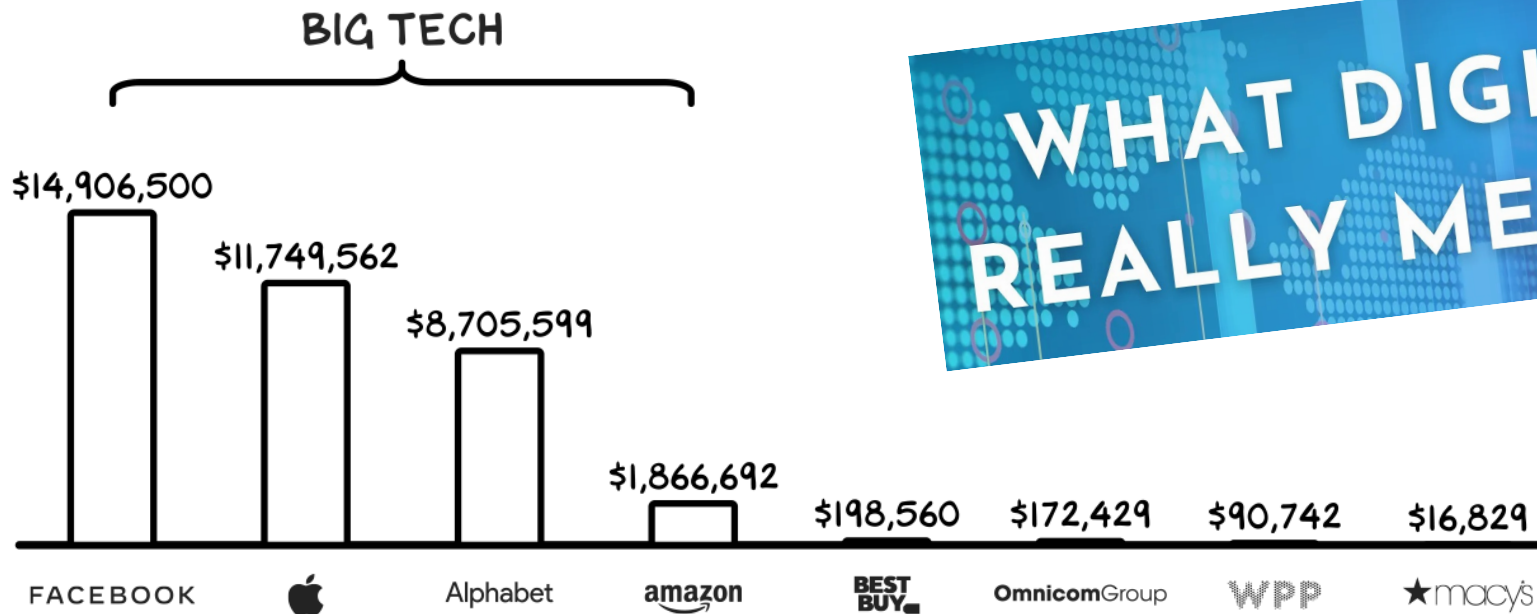
Note: *Twitter's 2022 figure is based on an annualized projection.

Chart: Ricki Lee/Insider • Source: Earning reports

INSIDER

High-tech significa high-value

MARKET CAP PER EMPLOYEE



SOURCE: PROF Q ANALYSIS OF SEEKING ALPHA AND MARCOTRENDS DATA.

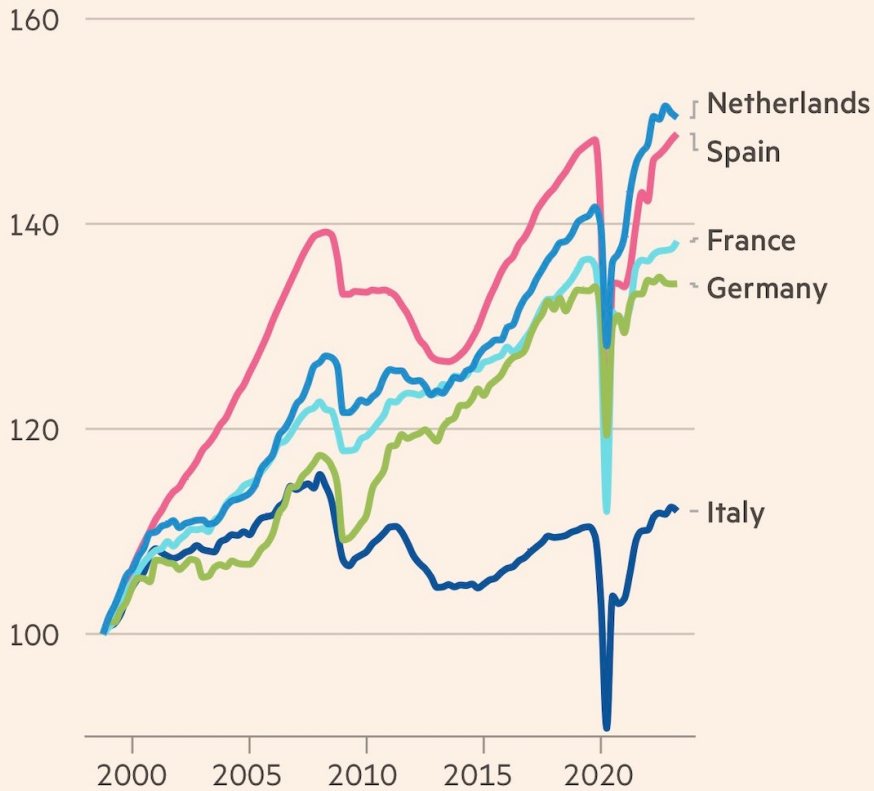
EU vs USA? Mid-tech vs High-tech

Top-three R&D spenders and their industries in the EU and the US

Top 3 R&D spenders and their industries in the EU and the US			
	2003	2012	2022
US	Ford (auto) Pfizer (pharma) GM (auto)	Microsoft (software) Intel (hardware) Merck (pharma)	Alphabet (software) Meta (software) Microsoft (software)
EU	Mercedes-Benz (auto) Siemens (electronics) VW (auto)	VW (auto) Mercedes-Benz (auto) Bosch (auto)	VW (auto) Mercedes-Benz (auto) Bosch (auto)

Source: Fuest et al. (2024). Based on the EU Industrial R&D Investment Scoreboard.

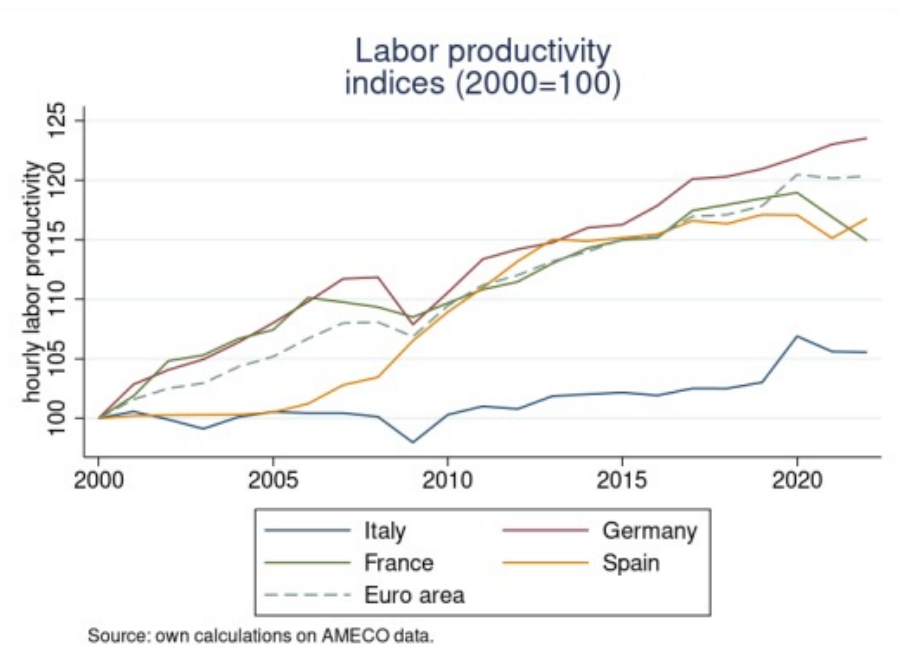
Real GDP, since the start of the euro (Q4 1998 = 100)



FINANCIAL TIMES

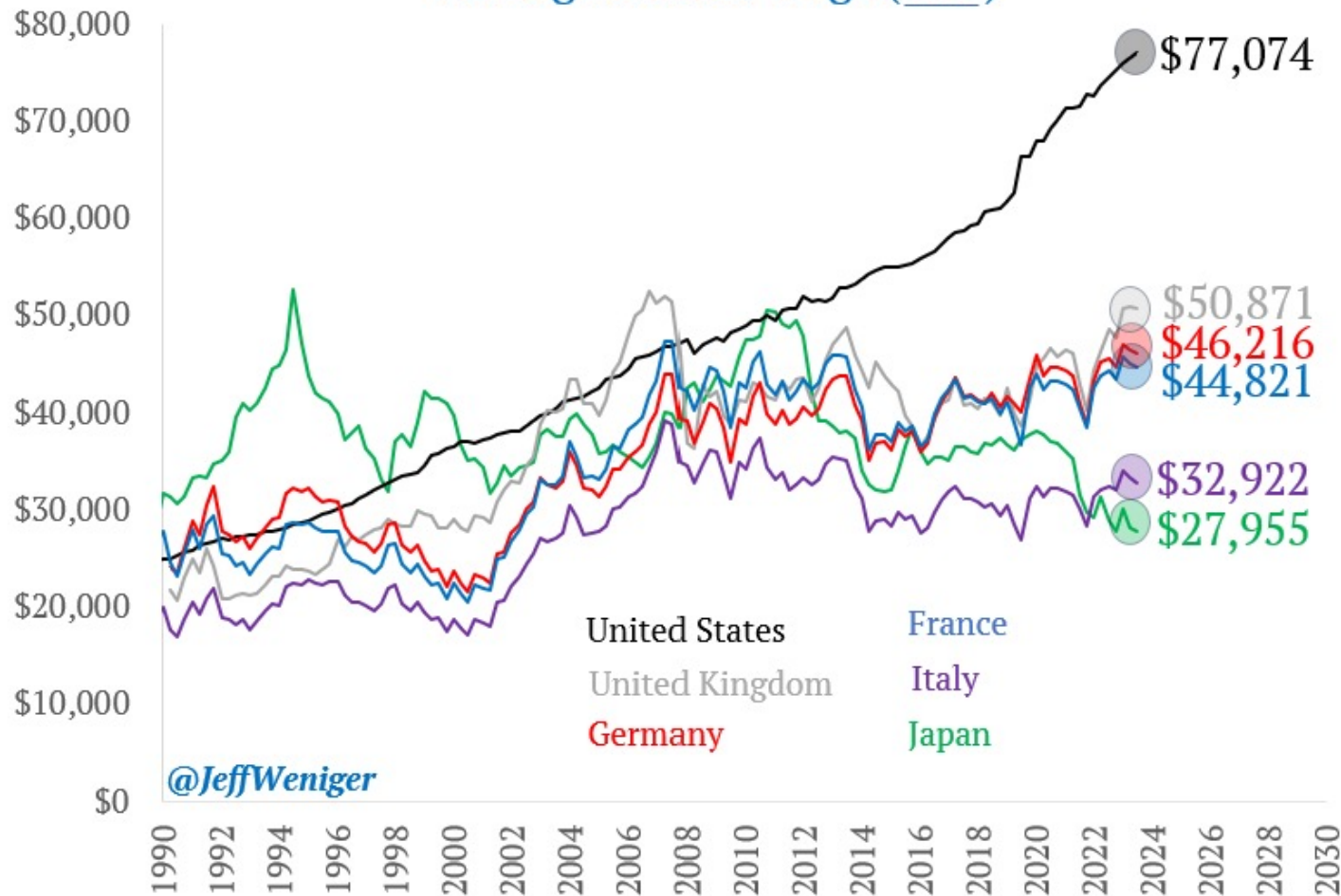
Source: Refinitiv

Dal 2000 a oggi, l'unico grande paese europeo a non saper crescere è l'Italia. La bassa produttività è alla radice della stagnazione



Source: own calculations on AMECO data.

Average Annual Wage (USD)



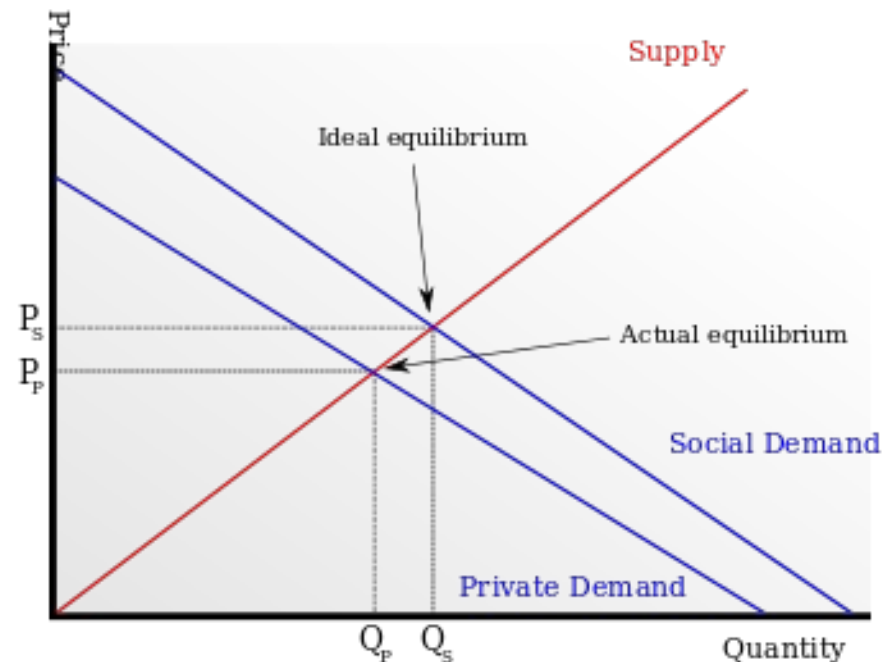
**Il divario
dei salari
medi tra
USA ed
Europa**

Source: Refinitiv, OECD, as of Q2/2024, with currency conversion as of 4/15/2024 exchange rate. File #0688

«Ore» in cambio di «salario»?

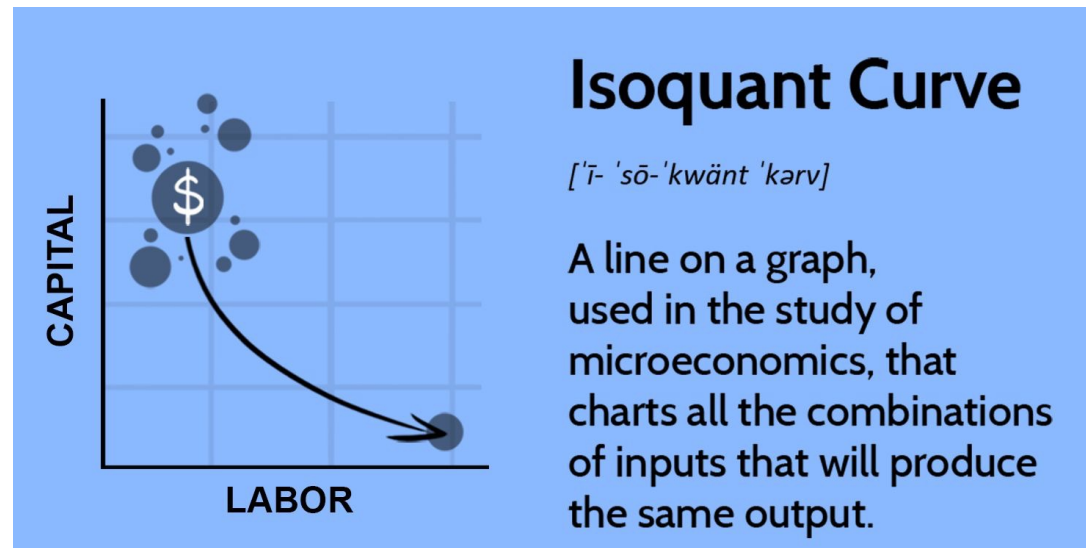
Nella knowledge economy, il lavoro non è più “un” mercato.

- ❑ il lavoro, nell’economia della conoscenza, è un sistema di mercati multilaterali
- ❑ Soggetto a forte **arbitraggio regolatorio** e a **discriminazioni di prezzo** per via normativa/fiscale, con fattori di **sussidio** e **premio**
- ❑ Esposto a fenomeni di “**bundling**” e rischi di “**envelopment**” per via tecnologica
- ❑ Caratterizzato da forti effetti di esternalità
- ❑ positive e negative,
- ❑ inframercato (same-side) & intermercato (cross-side)

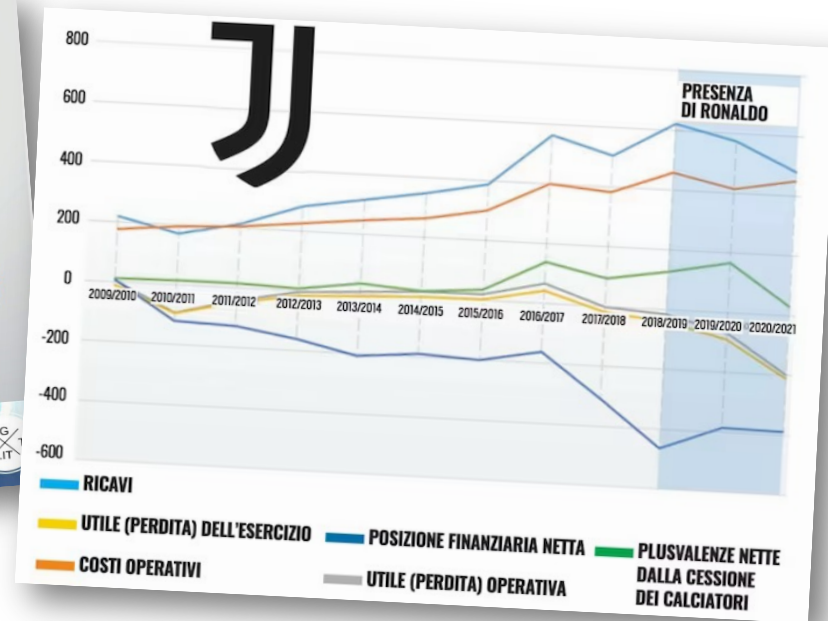


Lavoro e Capitale: Sostituire vs. Trasformare

- Finora il dibattito è stato su come **sostituire il lavoro con il capitale**
- Ora è necessario discutere su come **trasformare il lavoro in capitale**



Le competenze non sono una voce di costo, bensì una componente del patrimonio.



Misurare il «Capitale Organizzativo»: metriche finanziarie

Companies can use financial, operational, and experience-based metrics to assess their organizational capital.

Illustrative

█ Publicly declared █ Partly available/can be estimated from public sources █ Not publicly declared



Financial metrics

- █ R&D expenditure
- █ Revenue per employee
- █ Training spend per employee, by program (eg, functional training, leadership training)
- █ Gender pay gap by level and business unit
- █ Financial rewards as percentage of salary
- █ Investment efficacy: compensation per employee, revenue growth per \$ increase in capital investment (spending on organizational systems and processes¹ and compensation)
- █ Human capital value added $((\text{revenue} - \text{expenses} + \text{pay and benefits}) / \text{full-time employees})$
- █ Human capital ROI $((\text{revenue} - \text{expenses} + \text{pay and benefits}) / \text{pay and benefits})$
- █ Organizational capital: capitalized value of expenditure on organizational systems and processes¹

Source: McKinsey Global Institute, 2023

Chi emette “CO2 organizzativo” avvelena anche te. Digli di smettere (o meglio, fagli pagare il credit certificate) *Verso una tassonomia europea per il Bilancio ESG dello Human Capital*

Il bilancio del capitale umano: una Nota Integrativa con “Stress Test” dello Stock di Competenze

- Certificazione periodica da board di auditor indipendente, con uno «IAS» dedicato all’impairment test del capitale umano

Razionale di fondo: Chi “sfrutta” i lavoratori, senza formarli al nuovo contesto, genera esternalità negative

- Le organizzazioni che tengono un comportamento opportunistico verso il pool di competenze professionali e sociali di un contesto sociale, producono esternalità negative economiche e sociali: distruggono capitale umano, generano «passività organizzative» e di conseguenza devono sopportarne i costi sociali e formativi.



I criteri ESG includono i rischi organizzativi, come la qualità del lavoro, della formazione, dell'inclusione

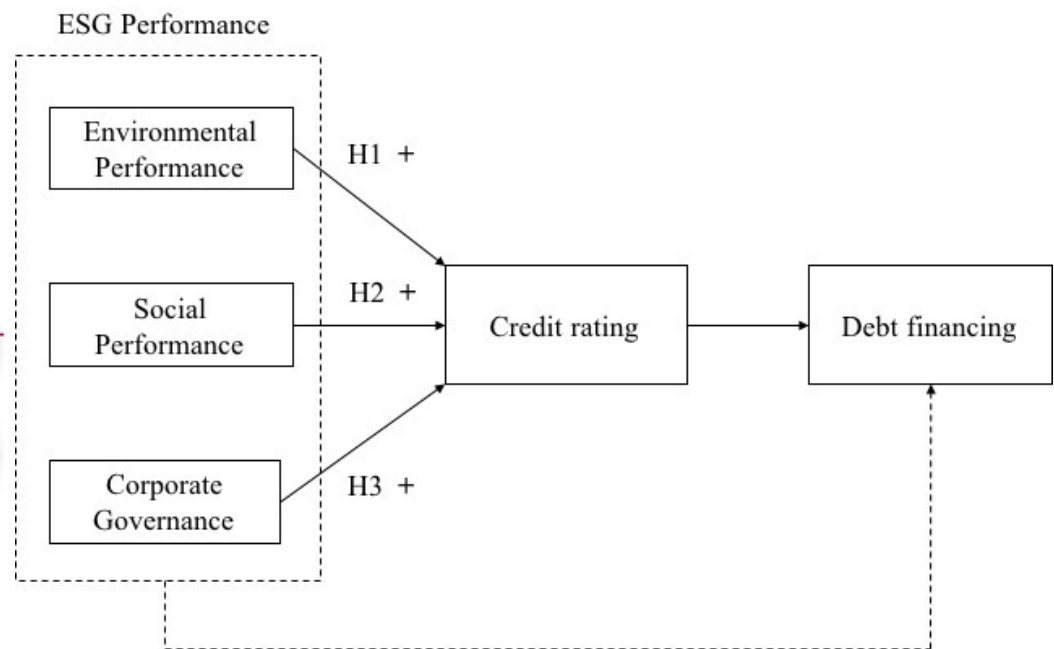


EU Social Taxonomy: What Does It Mean for Your Business?
Celsia, February 9, 2023 | 9 min read

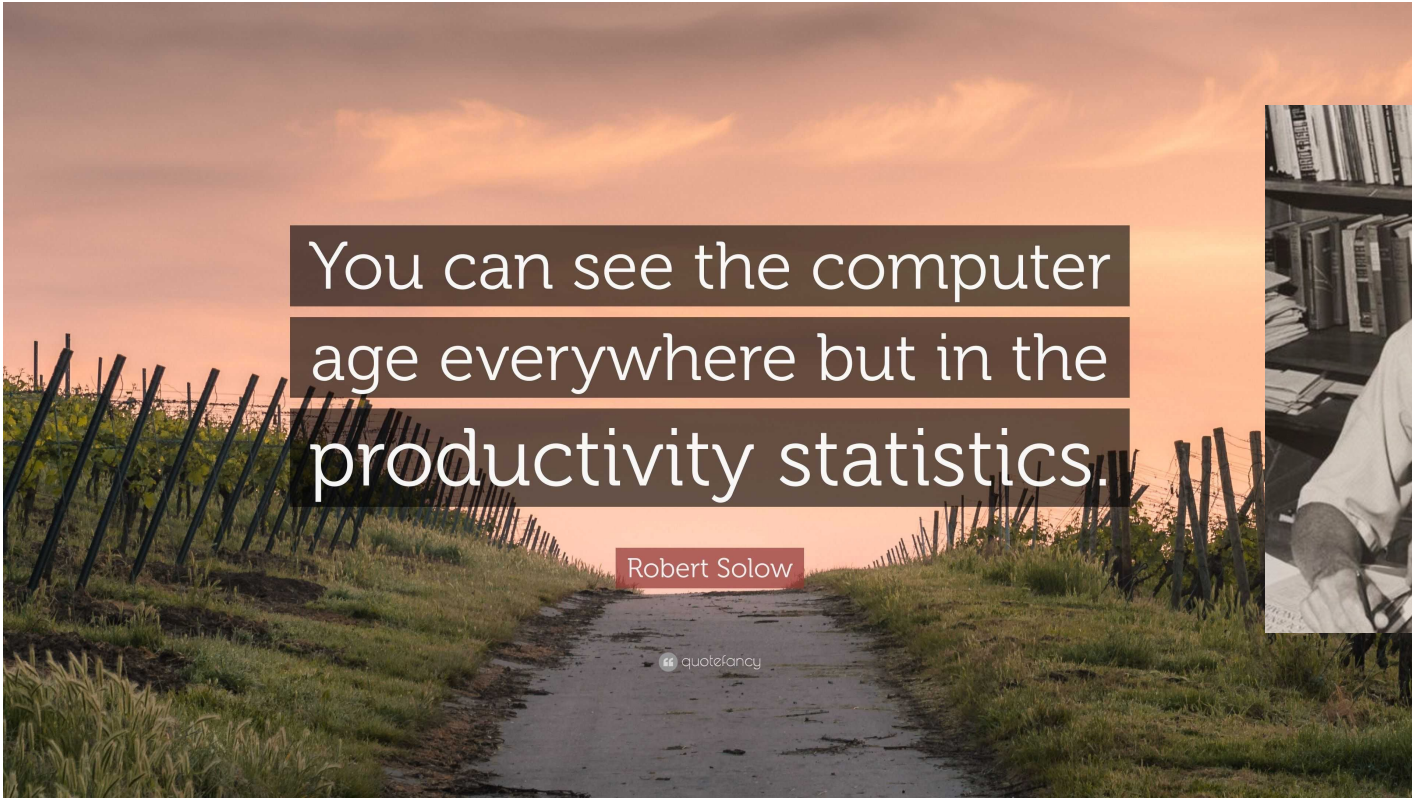
EU ESG – developing the social taxonomy

The Platform on Sustainable Finance has submitted a final report to the European Commission setting out proposals for the structure of a social taxonomy.

I «rischi organizzativi» definiti dalle tassonomie ESG sono critici per l'accesso al capitale, specie con tassi in rialzo



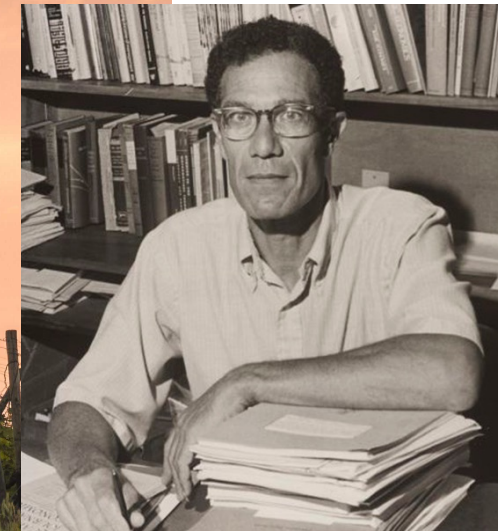
A.I. E IL «PRODUCTIVITY PARADOX» DI SOLOW



You can see the computer age everywhere but in the productivity statistics.

Robert Solow

quote fancy



25,000 out of 60,000 employees are AI agents in McKinsey, CEO reveals

McKinsey says around 25,000 of its 60,000 workers are now AI agents, marking a major shift in how the consulting firm operates. CEO Bob Sternfels explains how AI is reshaping the company's workforce, hiring strategy, and business model.



McKinsey is quietly turning into a very different kind of company. According to a recent report by Business Insider, the global consulting giant now uses around 25,000 AI agents, alongside about 40,000 human employees. That means more than a third of its total workforce is no longer human.

The numbers were shared by McKinsey & Company CEO Bob Sternfels, who has been speaking openly about how deeply artificial intelligence is changing the firm.



THE STEEP DECLINE OF CONSULTING COMPANIES' VALUATIONS

Accenture Plc	\$250.37	↓ 30.71%	
Booz Allen Hamilton Holdin...	\$89.04	↓ 52.13%	×
Capgemini SE	€129.60	↓ 26.68%	×
FTI Consulting Inc	\$163.75	↓ 17.42%	×
Gartner Inc	\$253.45	↓ 50.75%	×

AI: «LOW FIRING, LOW HIRING»

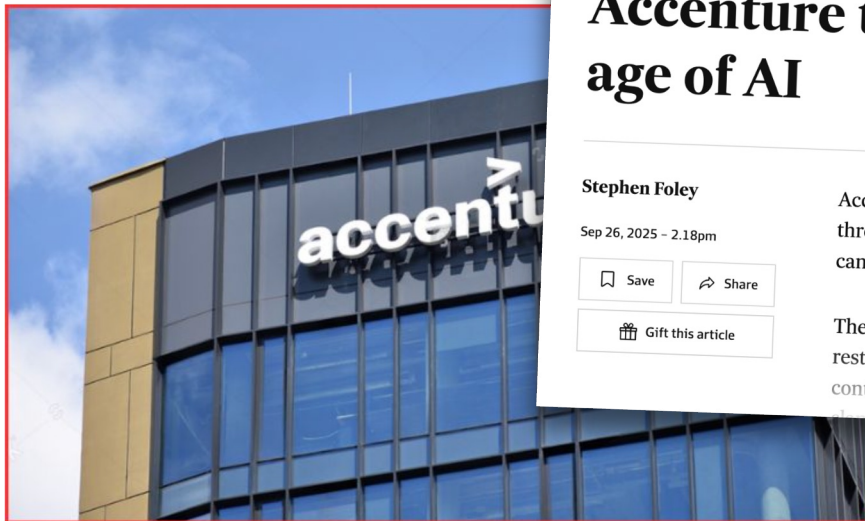


AI & CONSULTING, PROFESSIONAL SERVICES...

Accenture Layoffs: 11,000 Jobs Lost to AI, More Cuts Likely

By Syed Afsha Ali | Friday September 26, 2025

f in t w e m



New Delhi, September 26 – Accenture, an IT consulting behemoth, has

Accenture to 'exit' staff who cannot be retrained for age of AI

Stephen Foley

Sep 26, 2025 - 2:18pm

Save

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Gift this article

Accenture has reduced its global workforce by more than 11,000 in the past three months and warned staff that more will be asked to leave if they cannot be retrained [for the age of artificial intelligence](#).

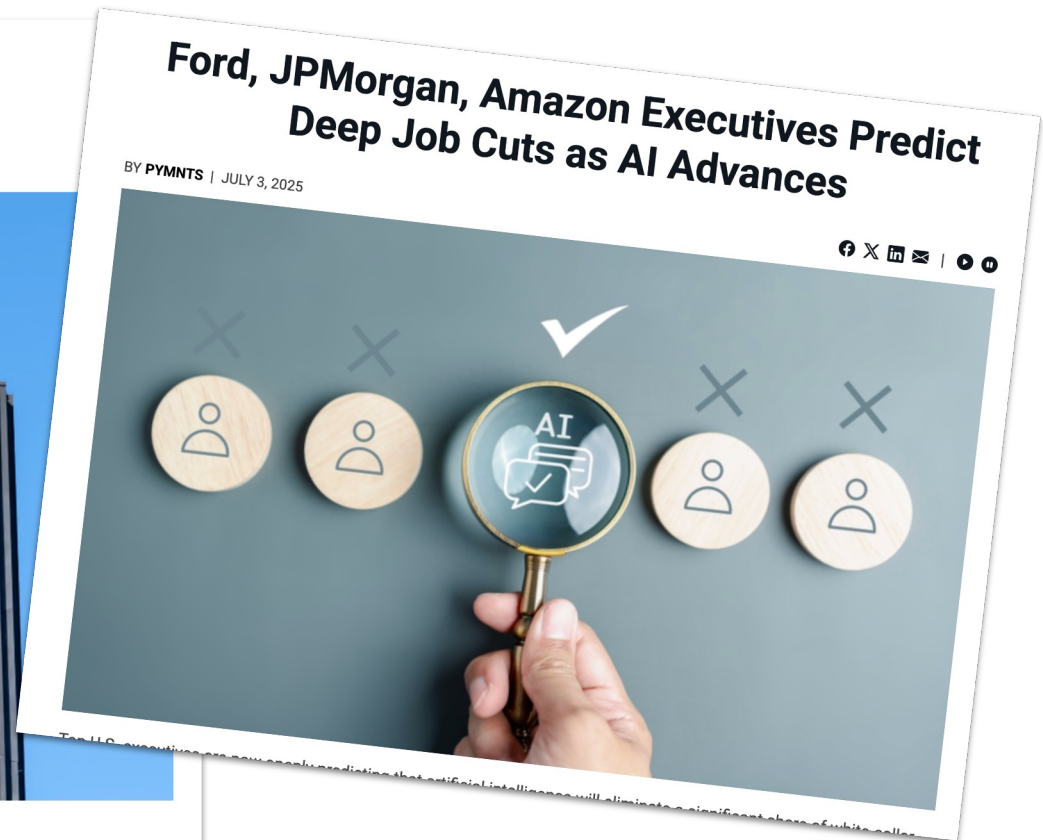
The IT consulting group detailed an \$US865 million (\$1.3 billion) restructuring program and an outlook for the year ahead that reflects continuing [sluggish corporate demand for consulting projects](#) and a

AI & BANKS, MANUFACTURING, LOGISTICS...

Morgan Stanley to cut 2,000 jobs as AI reshapes Wall Street



Investment giant has introduced multiple AI tools aimed at improving efficiency.





TECH

AI adoption linked to 13% decline in jobs for young U.S. workers, Stanford study reveals

PUBLISHED THU, AUG 28 2025 7:16 AM EDT

Shreya Ghosal | Dylan Butts
@IN/DYLAN-B-7A451A107

WATCH LIVE

KEY POINTS

- The study revealed that workers between the ages of 22 and 25 have experienced a 13% relative decline in employment since 2022, in occupations most exposed to AI.
- Some examples of these highly exposed jobs include customer service representatives, accountants and software developers.

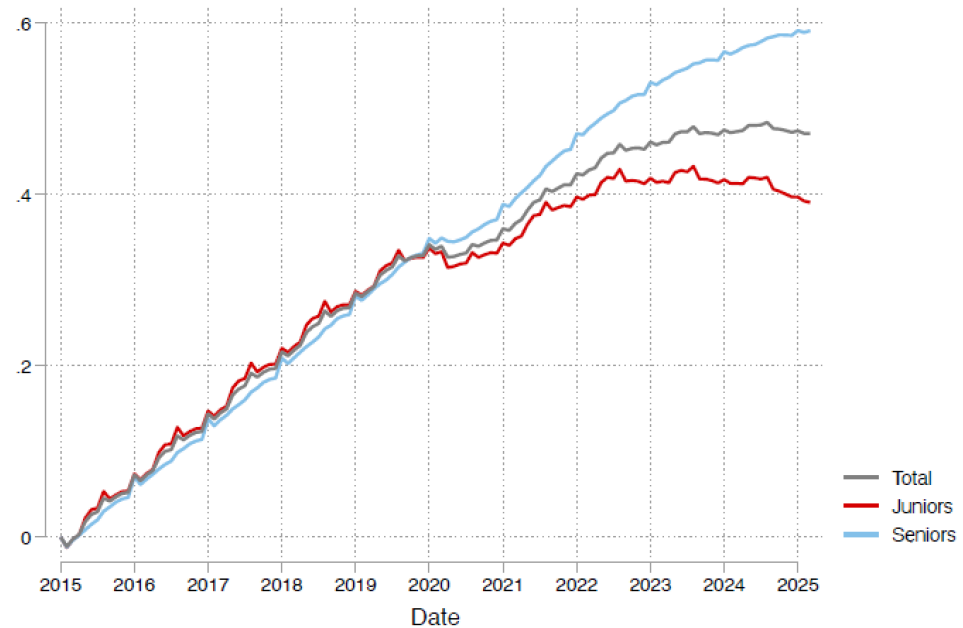


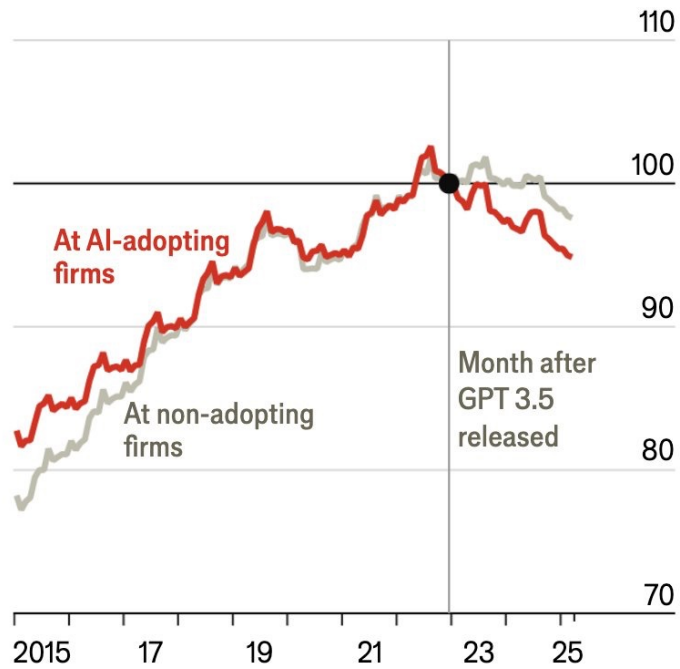
Figure 2: Time Series of Junior and Senior Employment in Sample Firms

Notes: This figure plots the average number of junior-level workers and senior-level workers in our sample of firms over time, normalized to 1 in January 2015. We define “junior” workers as those in Entry- or Junior-level positions, and “senior” workers as Associate level and above (see Section 3.1 for details).

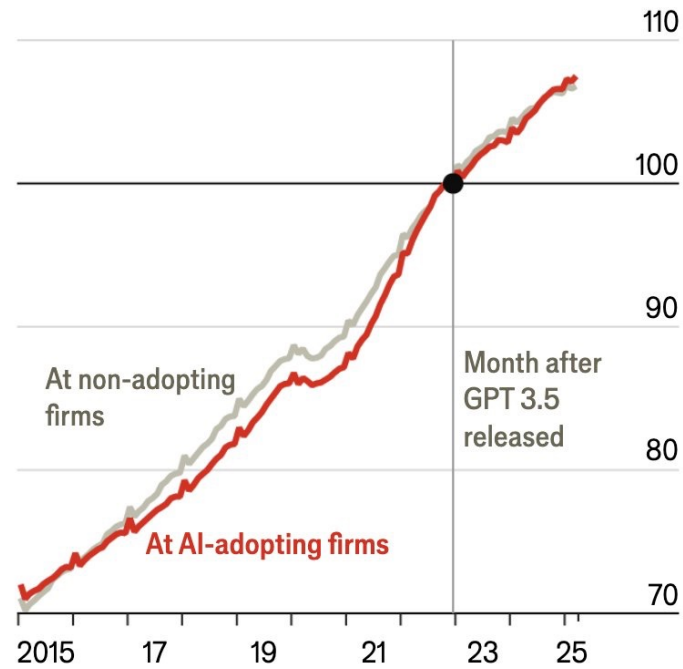
Rage against the machine

United States, change in employment, December 2022=100

Junior employees



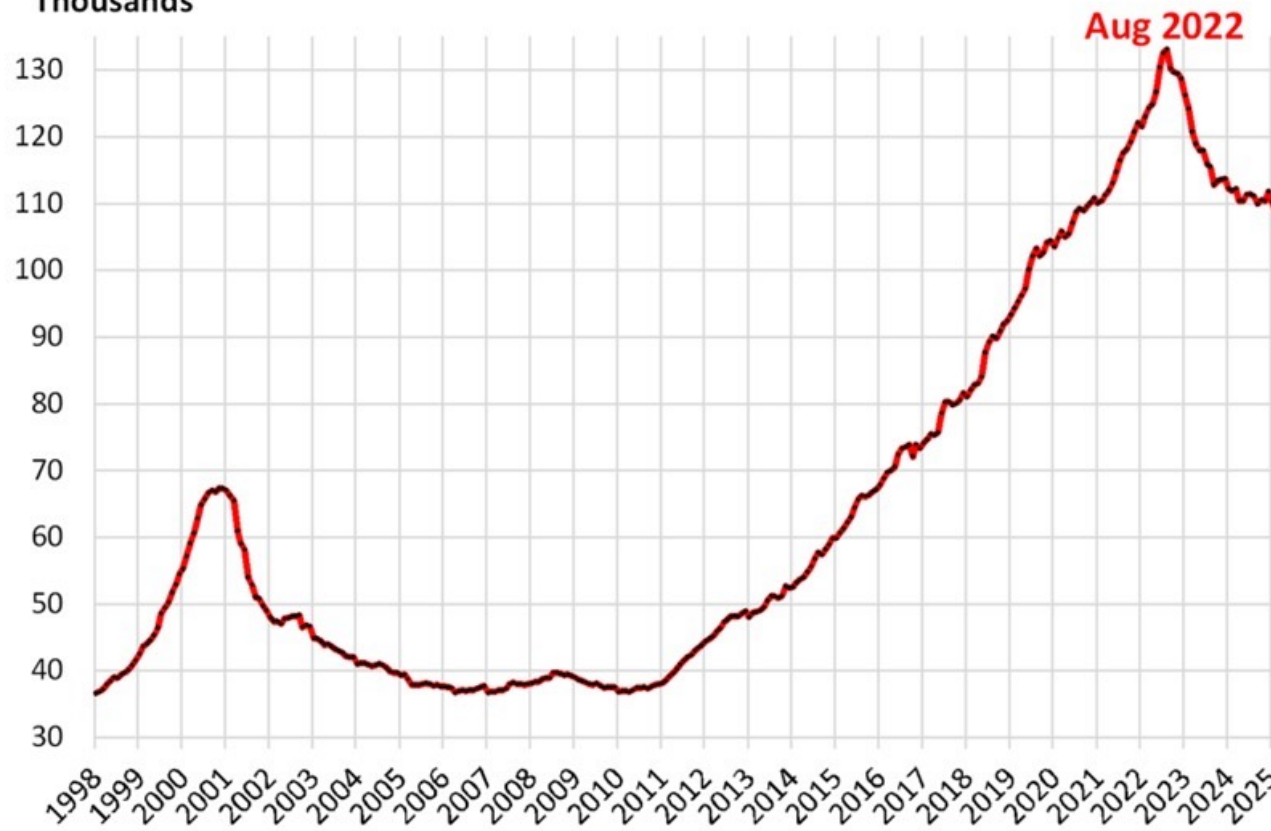
Senior employees



Source: "Generative AI as seniority-biased technological change",
by S.M. Hosseini & G. Lichtinger, SSRN working paper, 2025

Jobs in Information, San Francisco & Northern Silicon Valley

Thousands



Source: BLS

POSTED BY @KOBESSILETTER WOLFSTREET.com

THE WALL STREET JOURNAL

LIFESTYLE | WORKPLACE

Why AI Will Widen the Gap Between Superstars and Everybody Else

Workplace tensions and resentment will rise if top performers benefit more than everyone else from artificial-intelligence tools. But there are things companies can do to level the playing field.

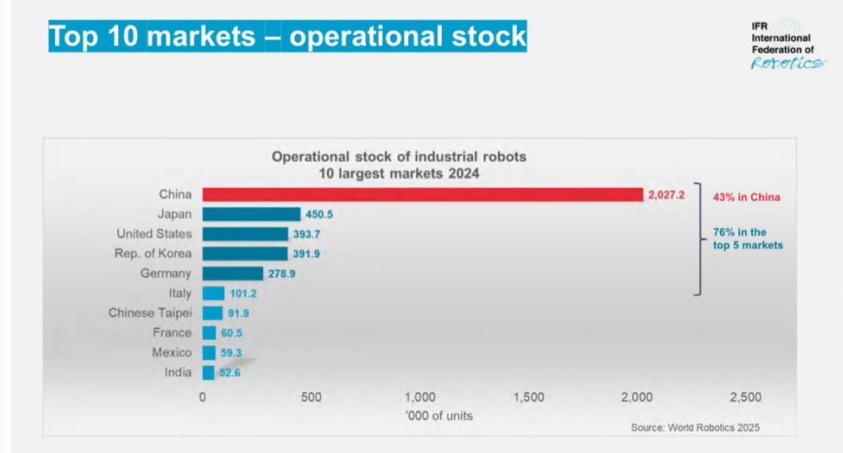
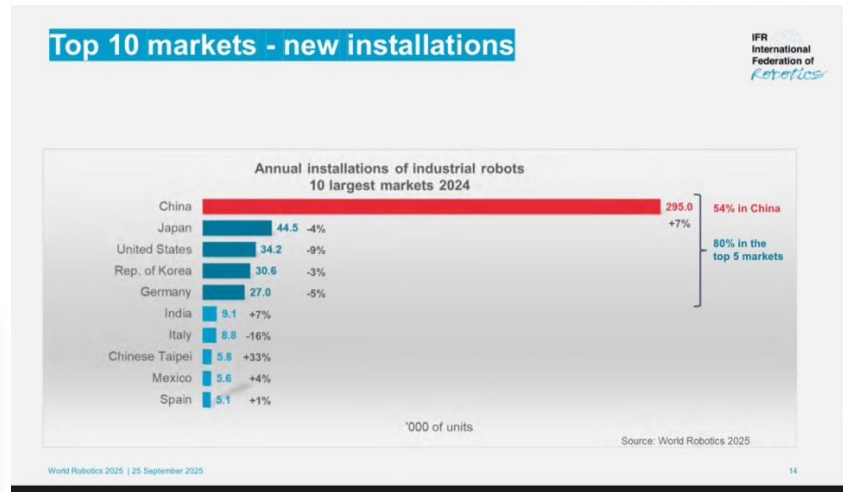
Listen (2 min)

Save AA 30

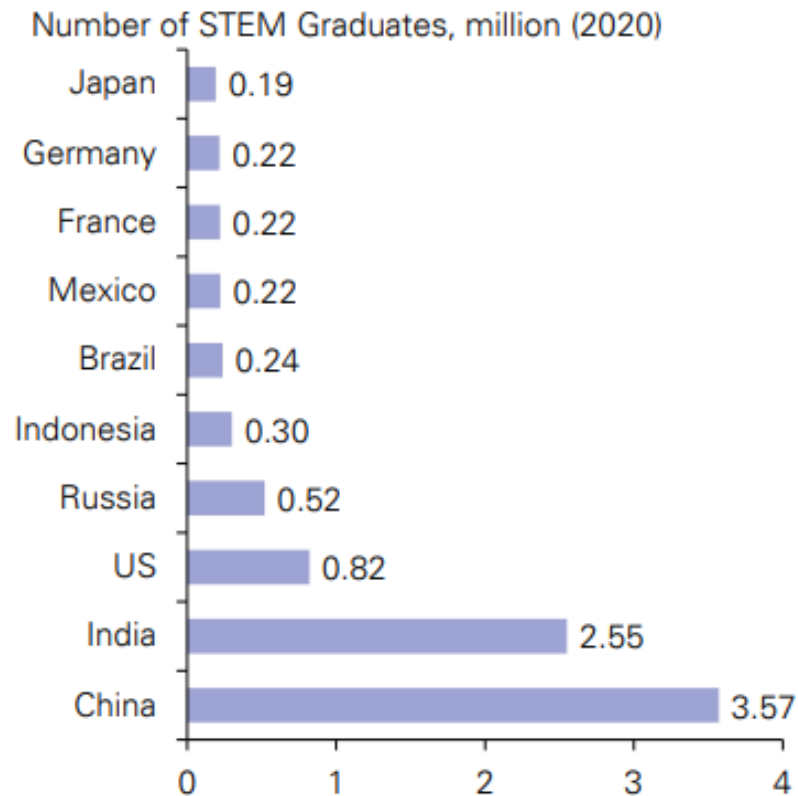
Western executives who visit China are coming back terrified

Robotics has catapulted Beijing into a dominant position in many industries

2602 Gift this article free

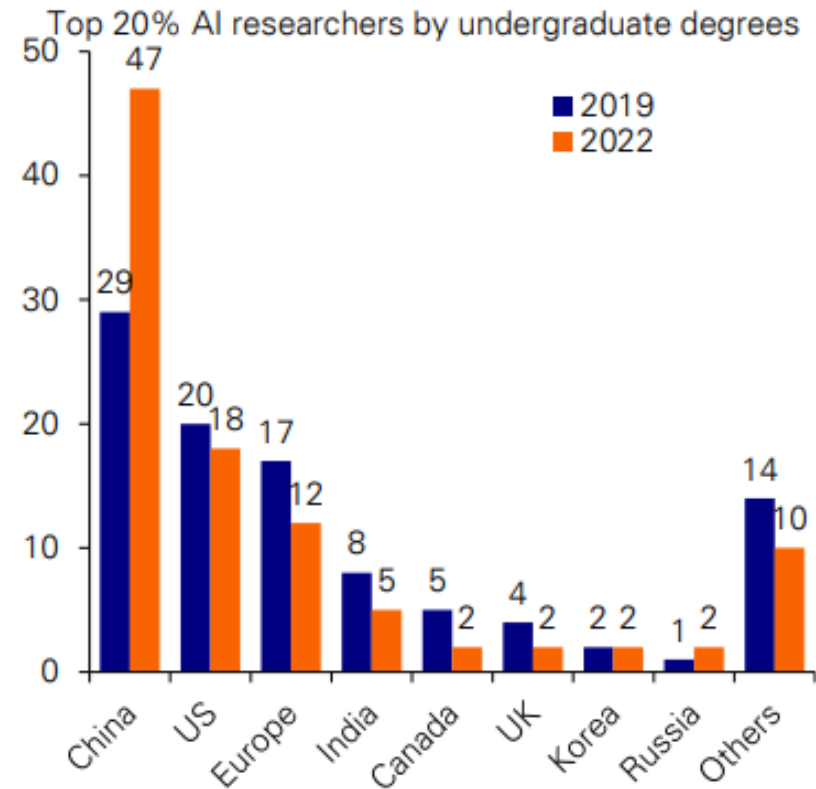


China leads the world in the supply of engineers



Source: Deutsche Bank Research, [Paulson Institute](#)

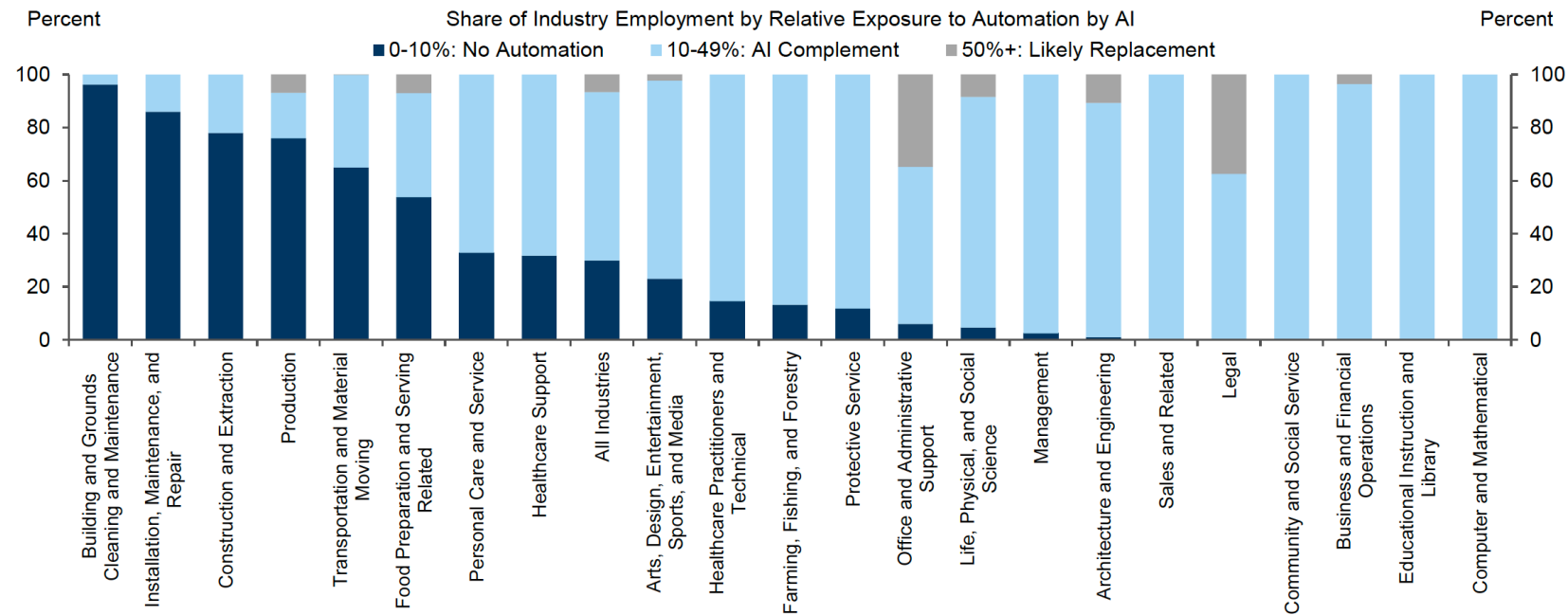
Almost half of AI top talents graduated from Chinese universities



Source: Deutsche Bank Research, [Oliss and others \(2023\)](#)

GEN AI: SOSTITUZIONE IN AMBITO LEGALE E AMMINISTRATIVO, EFFETTI LIMITATI SU LAVORI MANUALI E OUTDOOR, INCREMENTO DI PRODUTTIVITÀ PER LE ALTRE ATTIVITÀ

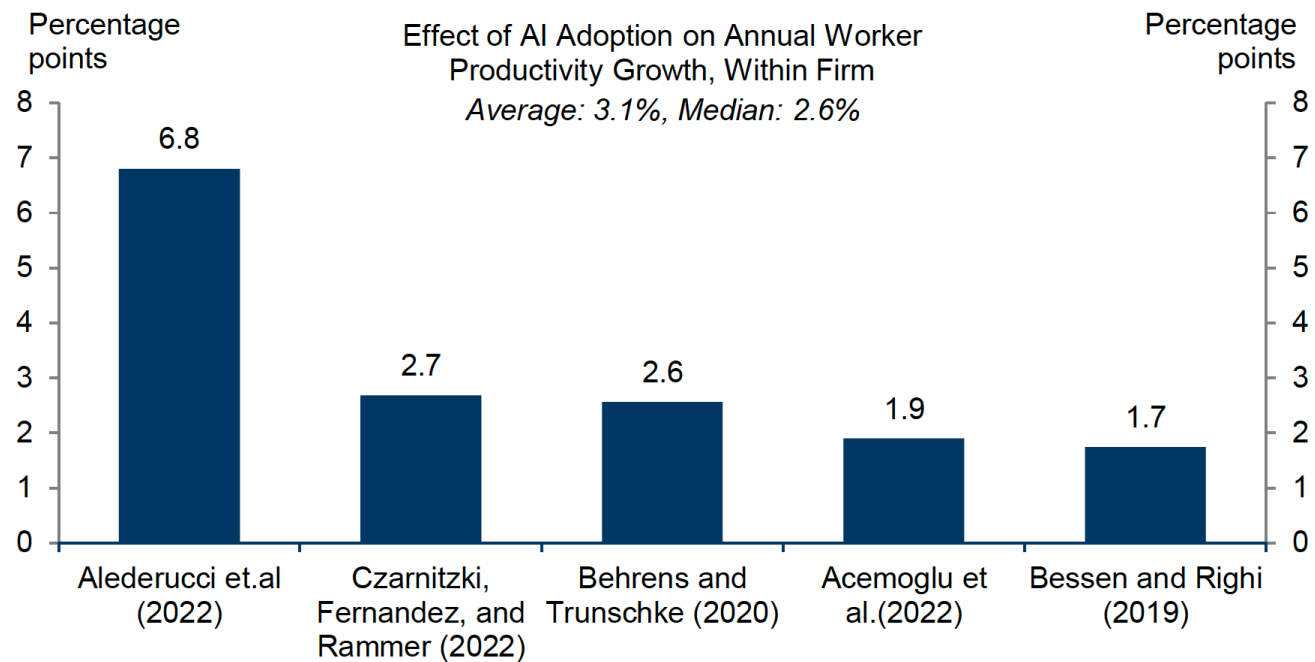
Exhibit 8: Replacement in Legal and Administrative Fields, Little Effect in Manual and Outdoor Jobs, and Productivity-Enhancement Everywhere Else



Source: Goldman Sachs Global Investment Research

EFFETTI DELL'AI SULLA PRODUTTIVITÀ DEI LAVORATORI

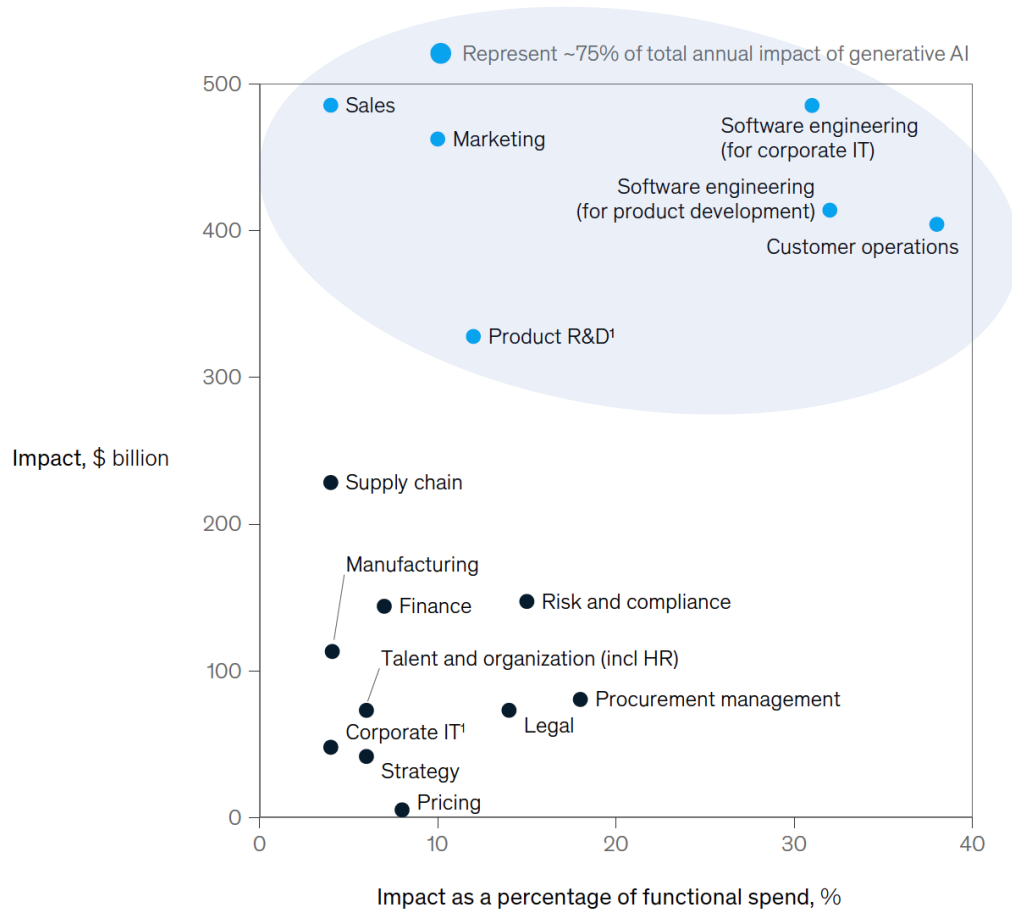
Exhibit 9: Academic Studies Generally Find That AI Adoption Increases Within-Firm Annual Worker Productivity Growth by 2-3pp



Source: Goldman Sachs Global Investment Research

L'AI avrà un impatto molto elevato su specifici processi di business

Using generative AI in just a few functions could drive most of the technology's impact across potential corporate use cases.



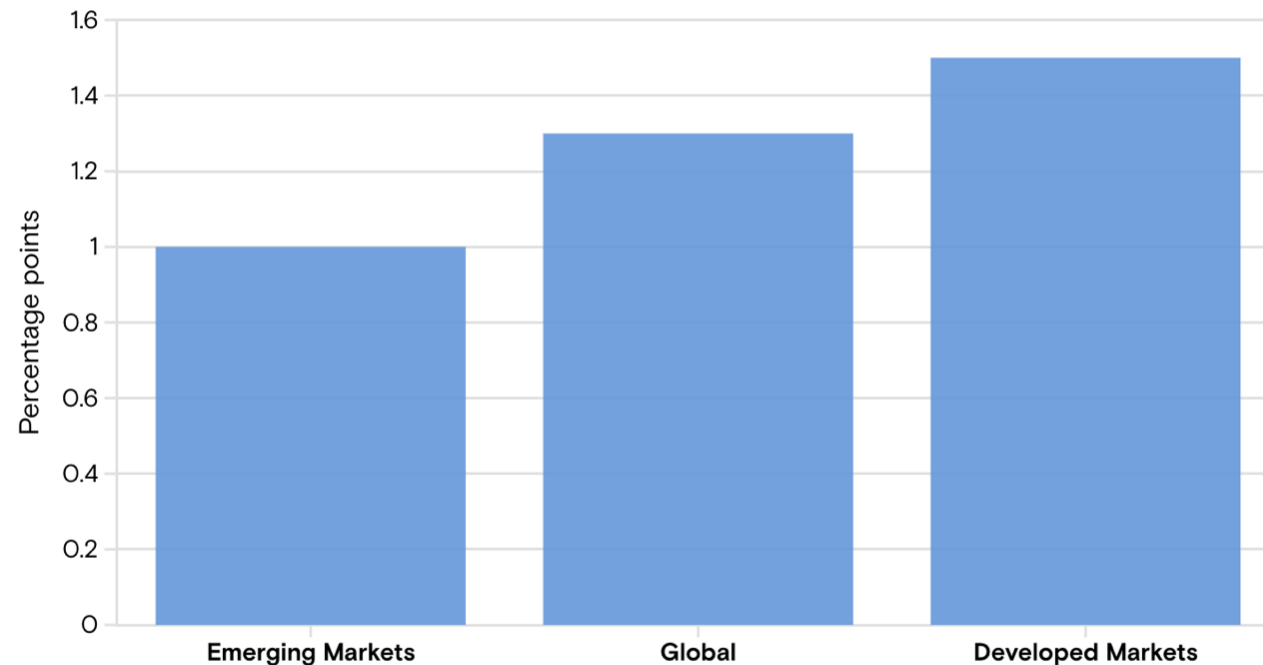
Note: Impact is averaged.

¹Excluding software engineering.

Source: Comparative Industry Service (CIS), IHS Markit; Oxford Economics; McKinsey Corporate and Business Functions database; McKinsey Manufacturing and Supply Chain 360; McKinsey Sales Navigator; Ignite, a McKinsey database; McKinsey analysis

AI has the potential to be a major driver of labor productivity growth

Estimated effect of widespread AI adoption on annual productivity growth



La GenAI avrà un impatto asimmetrico sulla produttività globale, beneficiando maggiormente le economie data-rich

Source: Goldman Sachs Research
Composites based on market FX GDP country weights. Estimates are not forecasts and represent stylized scenarios in which AI productivity gains are realized over a 10-year period following widespread adoption.

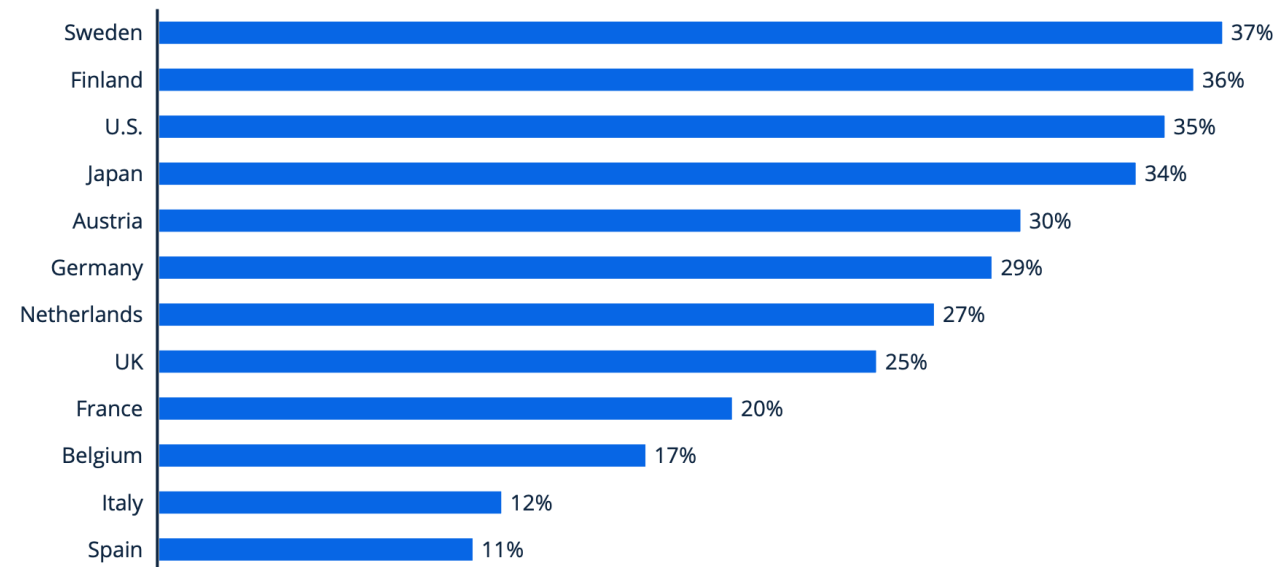
**Goldman
Sachs**

IMPATTI DELL'A.I. SULLA PRODUTTIVITA' DEL LAVORO: ITALIA ANCORA IN FONDO ALLA CLASSIFICA

AI has the potential to increase labor productivity

Impact of AI (2/7)

Impact of AI on labor productivity in developed countries in 2035

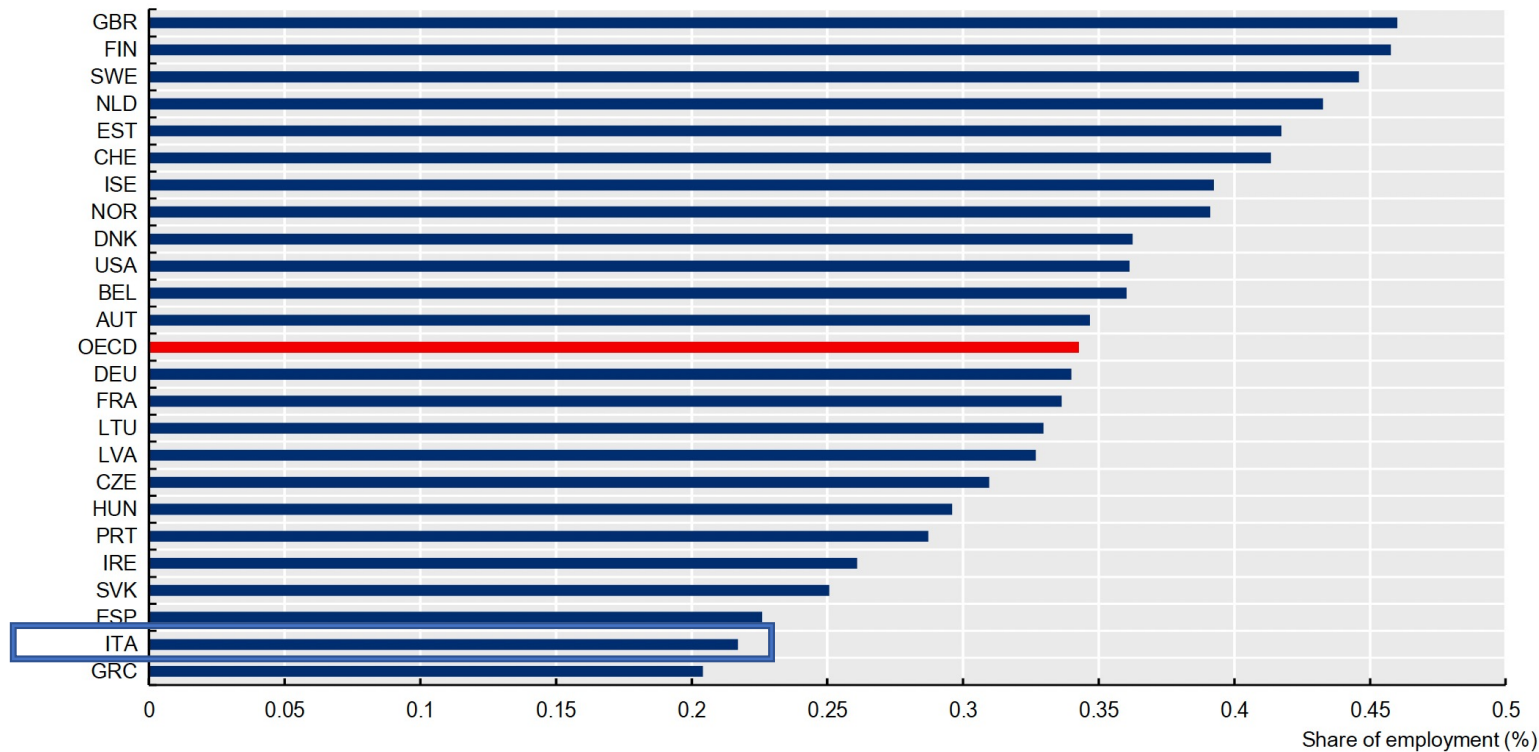


The study by Accenture and Frontier Economics also estimates that AI has the potential to increase labor productivity in countries.

The impact ranges from an 11 percentage points increase in Spain to 37 percentage points in Sweden.

Source: Accenture & Frontier Economics, 2024

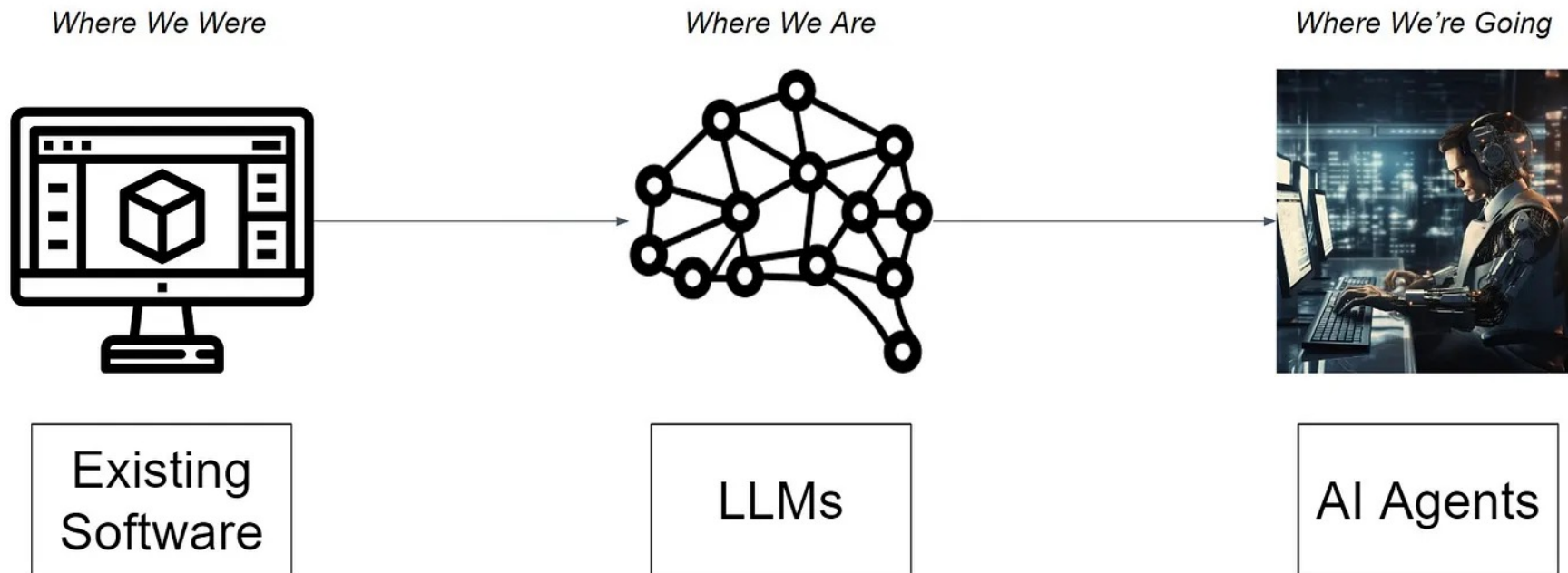
Quota di occupati con skill AI skills nei paesi OCSE



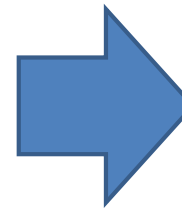
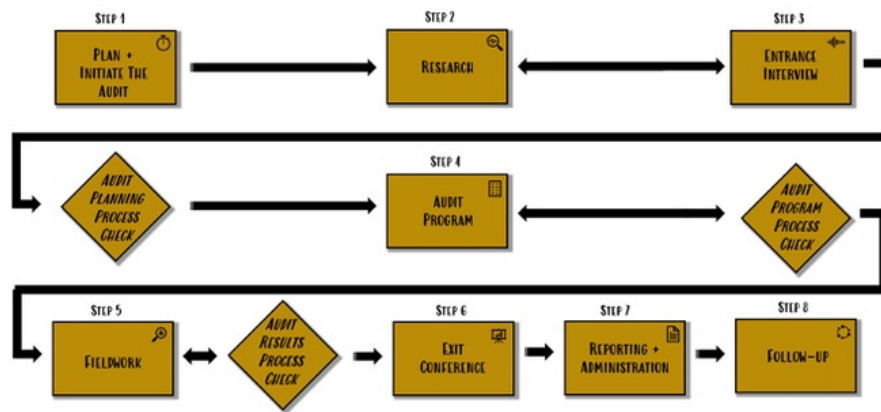
Note: Estimates obtained by summing the product of within-occupation shares of AI skill demand and employment shares by occupation. Within-occupation AI shares identified according to AI skill lists enumerated in Alekseeva et al. (2021_[10]).

Source: OECD analysis of Lightcast, European Labour Force Survey (EU-LFS) and Current Population Survey (CPS) data.

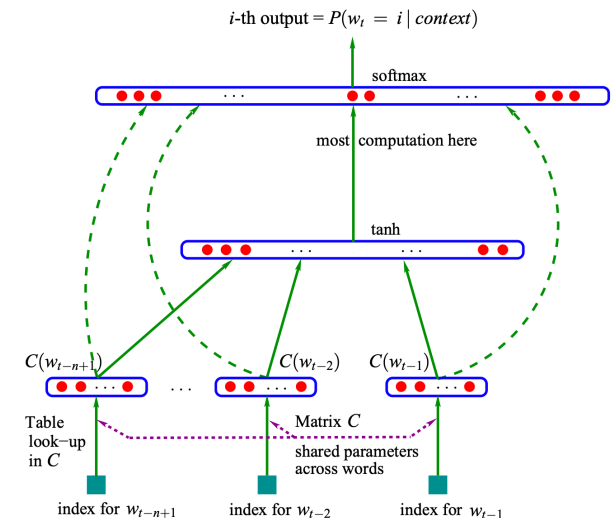
AI Agents - From Software to Autonomous Software



Con Generative AI, il workflow dei processi organizzativi collassa in un «language model» che va pre-istruito e contestualizzato



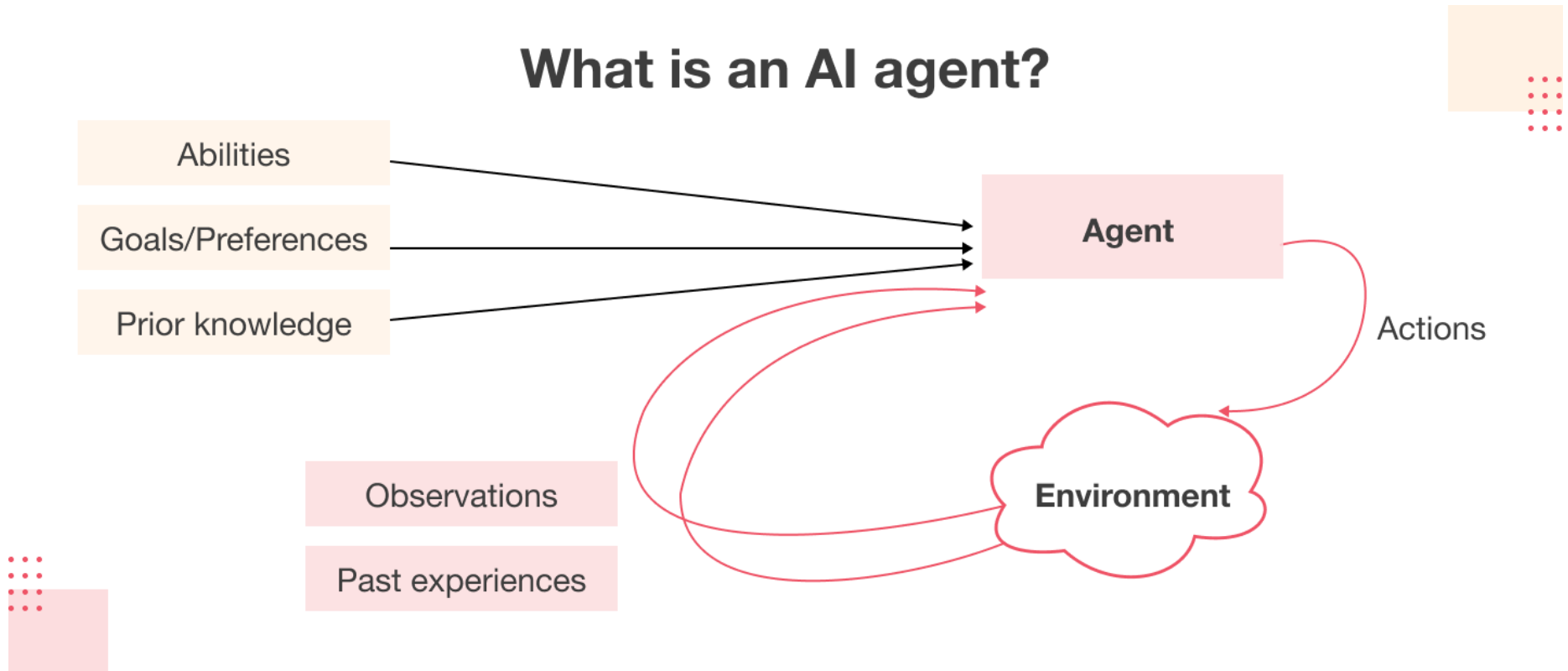
Language Model of Computational Linguistic



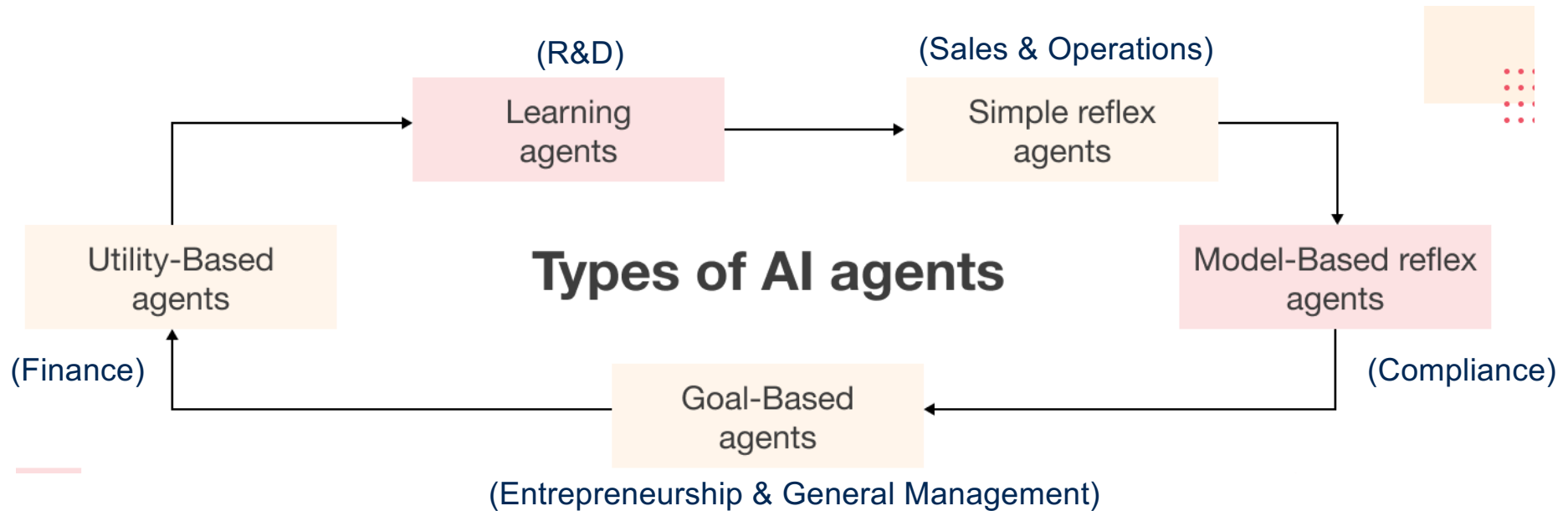
***Da un modello «procedurale» a un modello «conversazionale»
E dal formalismo all'inclusività***

Arrivano gli «intelligent agents»...

What is an AI agent?



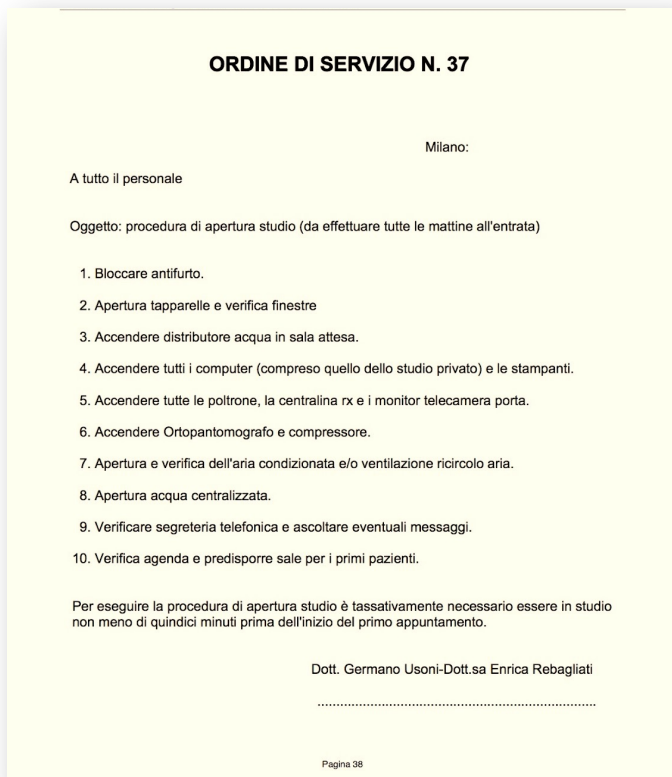
QUALI SARANNO I DIVERSI TIPI DI «AI agents»?



Cinque tipi principali di agenti AI:

1. **Simple reflex agents** sono programmati per rispondere a specifici stimoli ambientali sulla base di regole predefinite.
2. **Model-based reflex agents** sono agenti reattivi che mantengono un modello interno dell'ambiente e lo utilizzano per prendere decisioni.
3. **Goal-based agents** eseguono un programma per raggiungere obiettivi specifici e intraprendere azioni basate sulla valutazione dello stato attuale dell'ambiente.
4. **Utility-based agents** considerano i potenziali risultati delle loro azioni e scelgono quello che massimizza l'utilità attesa.
5. **Learning agents** eseguono tecniche di machine learning per migliorare il loro processo decisionale nel tempo.

Smettere di scrivere ordini di servizio e cominciare a fare training su un modello di linguaggio



Large Language Model (LLM)

[ˈlɑːrj ˈlɑŋ-ɡwɪj ˈmä-də]

A deep learning algorithm that's equipped to summarize, translate, predict, and generate human-sounding text to convey ideas and concepts.

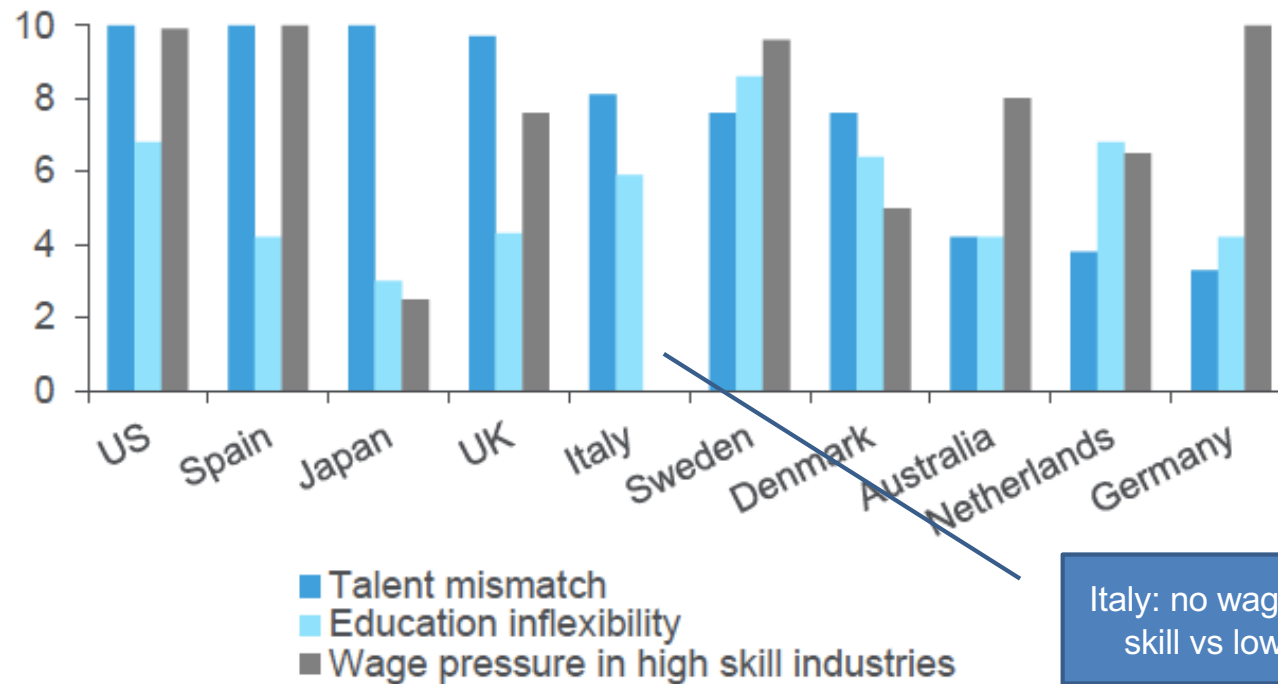
Investopedia



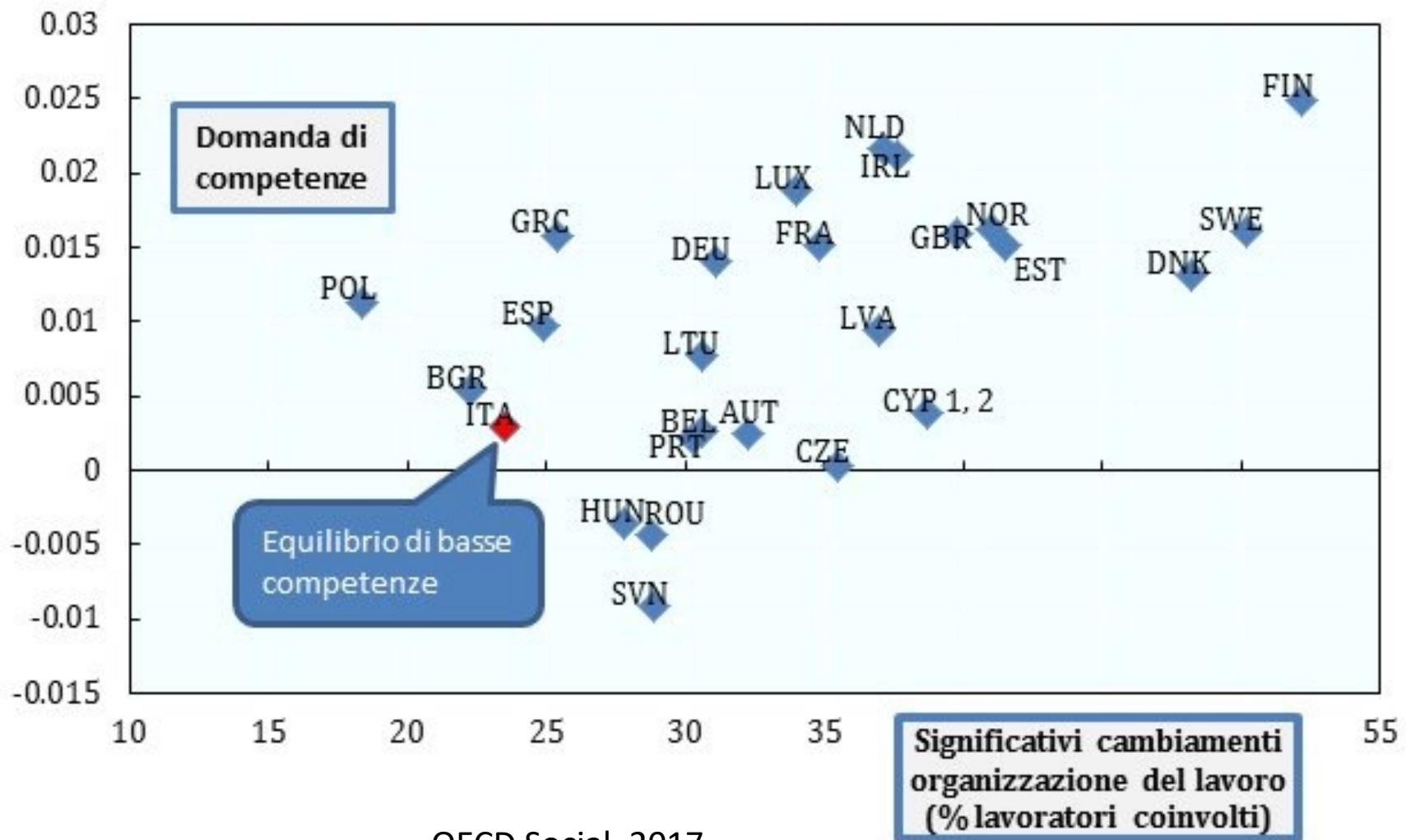
«AI won't replace human professionals, but those who use it will replace those who don't»

Artur Niemczewski, Insurance NED, CEO

Figure 94. Skill Shortages and Mismatch

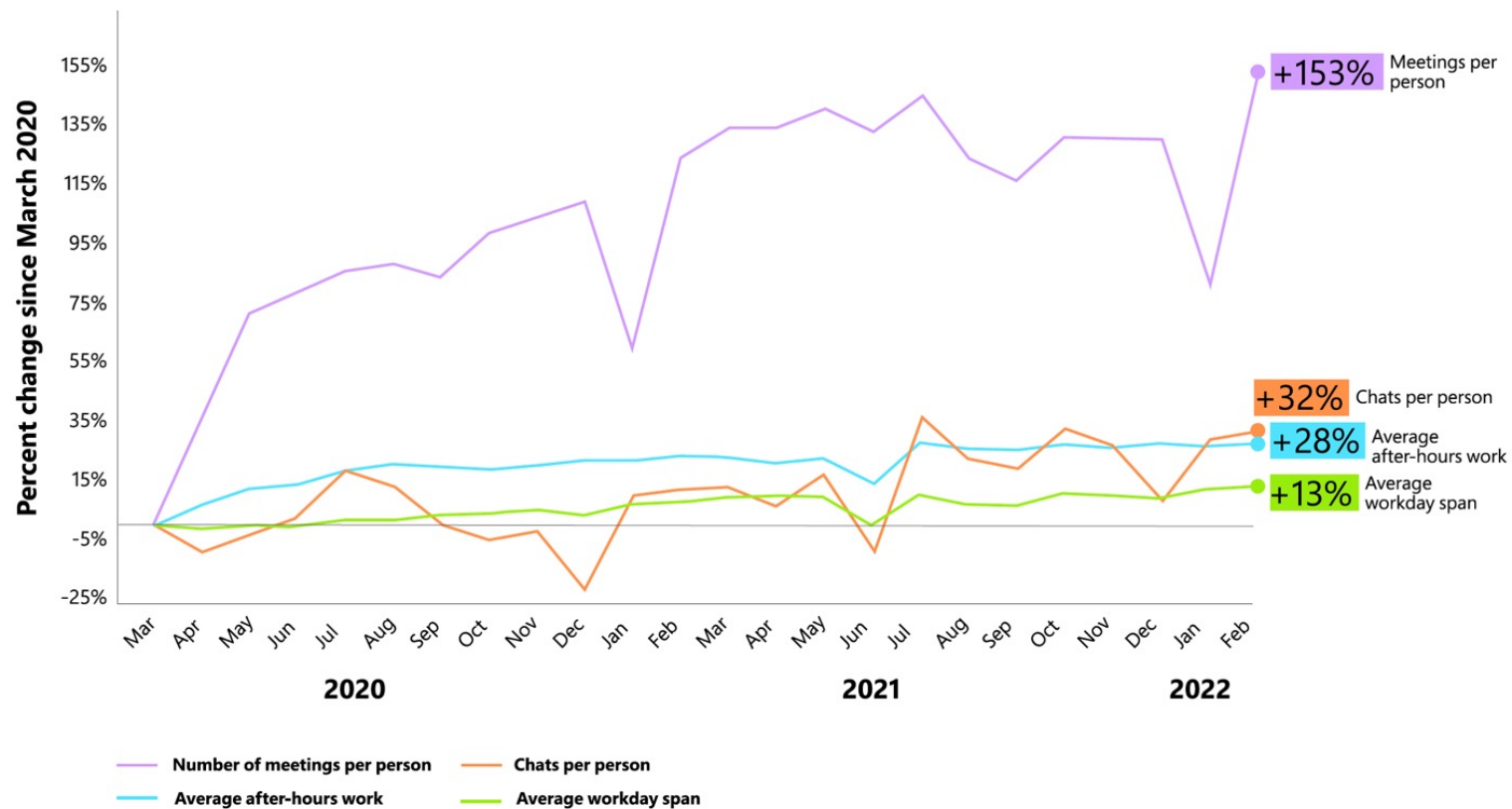


Source: Hays Global Talent Index (2015). Notes: Each element of the index scored out of 10. 'Talent Mismatch' measures the gap between the skills that businesses are looking for and the skills available in the labour market. A higher score indicates that businesses are facing a serious problem in matching available candidates with unfilled jobs. For 'Education inflexibility', lower scores indicate there is a better chance that the education system is flexible enough to meet labour market needs. 'Wage pressure in a high skill industry' measures the rate at which wages in high-skill industries are growing relative to those in low-skill industries relative to the past – a high score is indicative of the emergence of sector-specific skills shortages in areas like engineering or technology.

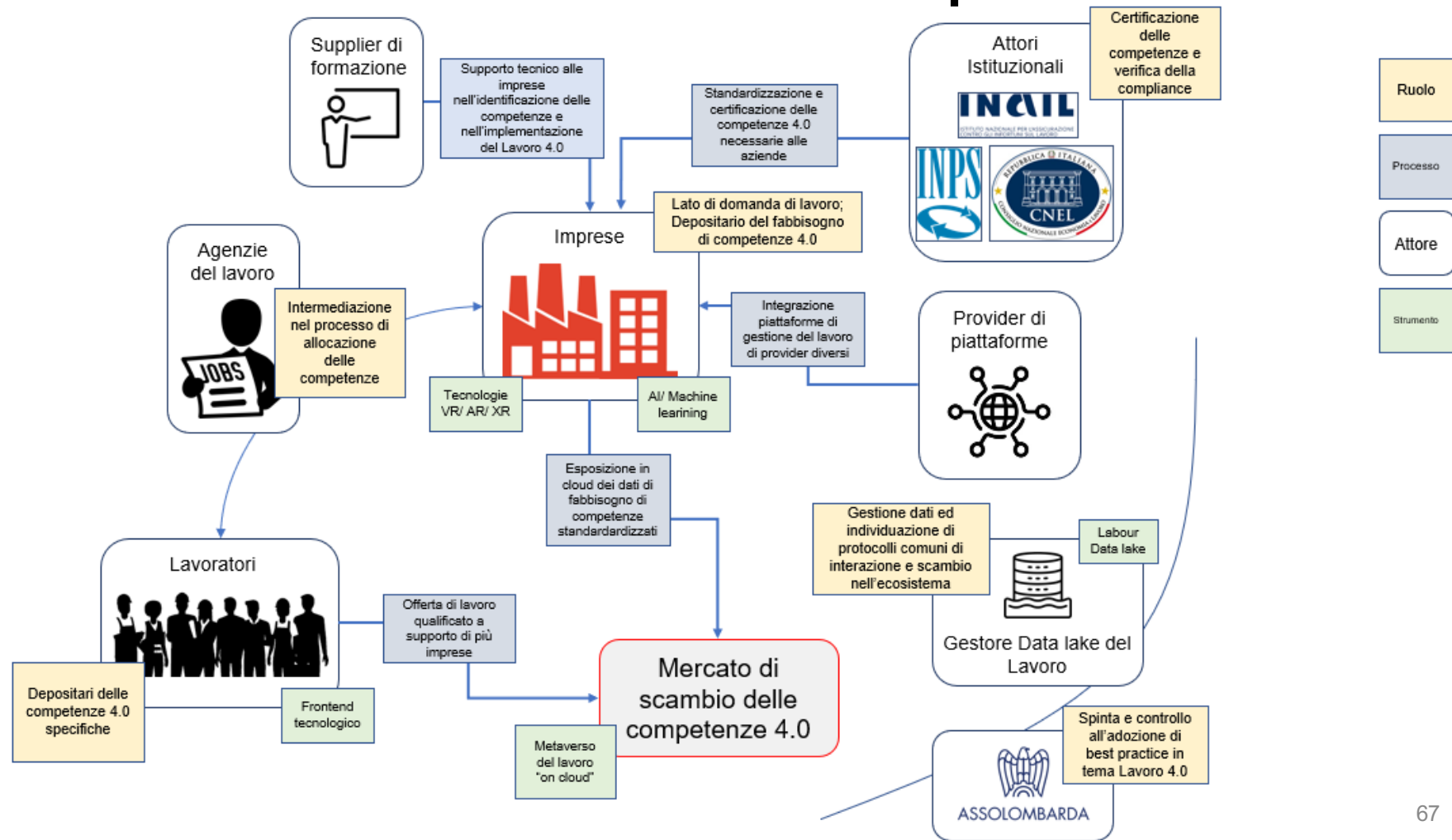


OECD Social, 2017

Come è cambiato il lavoro dopo la pandemia

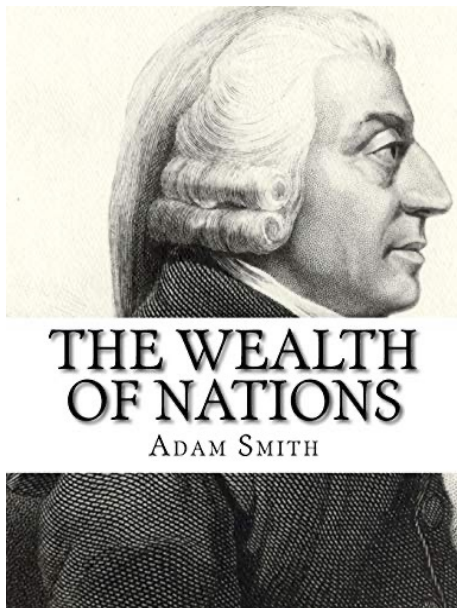


L'architettura di «Ecosistema del Capitale Umano»



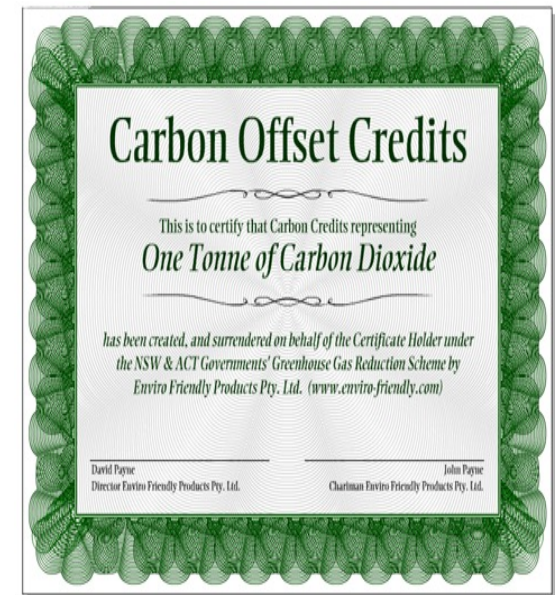
“Non dalla benevolenza del Panettiere”

Lato domanda: creare un mercato dei “Competence Offset Credits”



Il pool di competenze tra regolamentazione e mercato

- Mercato dei “Competence Offset Credit Certificates”, come quello dei “Carbon Offset Credit Certificates”
- Chi ha un saldo negativo di “Competence Offset” deve comprare crediti formativi/educativi dalle organizzazioni che generano un saldo positivo.
- Il mercato genera e aggiorna la tassonomia delle competenze e la relativa liquidità, sotto il presidio di un’authority pubblica di governance.
- Si genera un mercato secondario di “derivati formativi” sul collaterale di competenze professionali, che consente di negoziare contratti comportamentali in modalità spot/future nonché put/call: quel mercato aiuta a indirizzare i curricula formativi delle istituzioni scolastiche e universitarie.



Lato offerta: Capitale Umano «Triplo Zero»



Zero mismatch

- Ridurre le asimmetrie informative sia sul lato domanda sia sul lato offerta, descrivendo con tassonomie standard job position e professional profile. Dare un prezzo di mercato all'opportunità bilaterale.

Zero unemployment

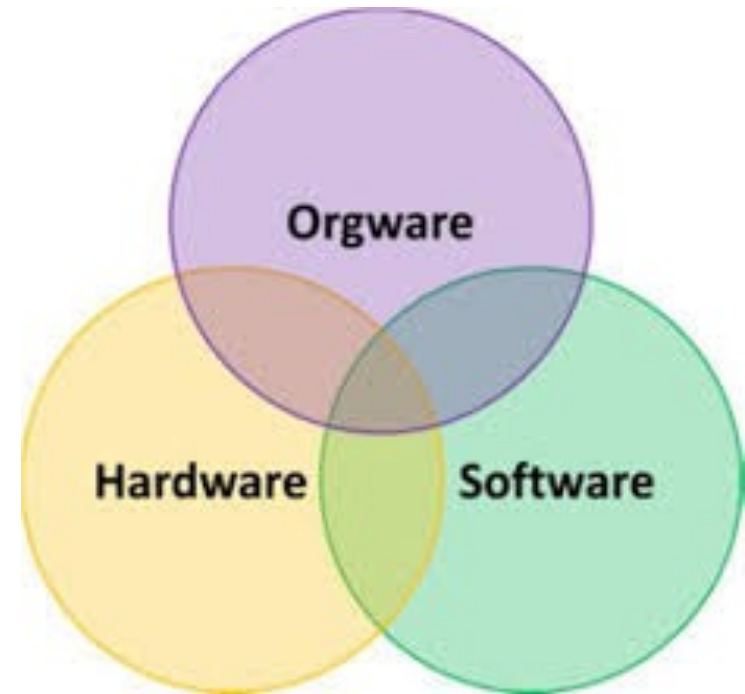
- Tutti i contratti sono a tempo indeterminato, sia nella durata (data di terminazione) che nel flusso (ore/periodo). Ma tutti i contratti sono a task determinato, sia nell'obiettivo sia nelle metriche, e definiscono ex ante i severance & quitting costs.

Zero inactivity

- Obbligo di frequenza a corsi di formazione a distanza, soggetti a test di valutazione e certificazione; l'iscritto senza un contratto di lavoro ha diritto a ricevere una remunerazione sotto forma di fiscalità negativa, fino alla prima offerta di lavoro, anche a titolo di integrazione rispetto a un reddito annuale minimo

Benvenuti nell'Era dell'ORGWARE

- **Hardware**: taylorismo e fordismo
- **Software**: formalizzazione dell'informazione tecnica
- **Orgware**: valorizzazione del capitale umano e «ibrido»

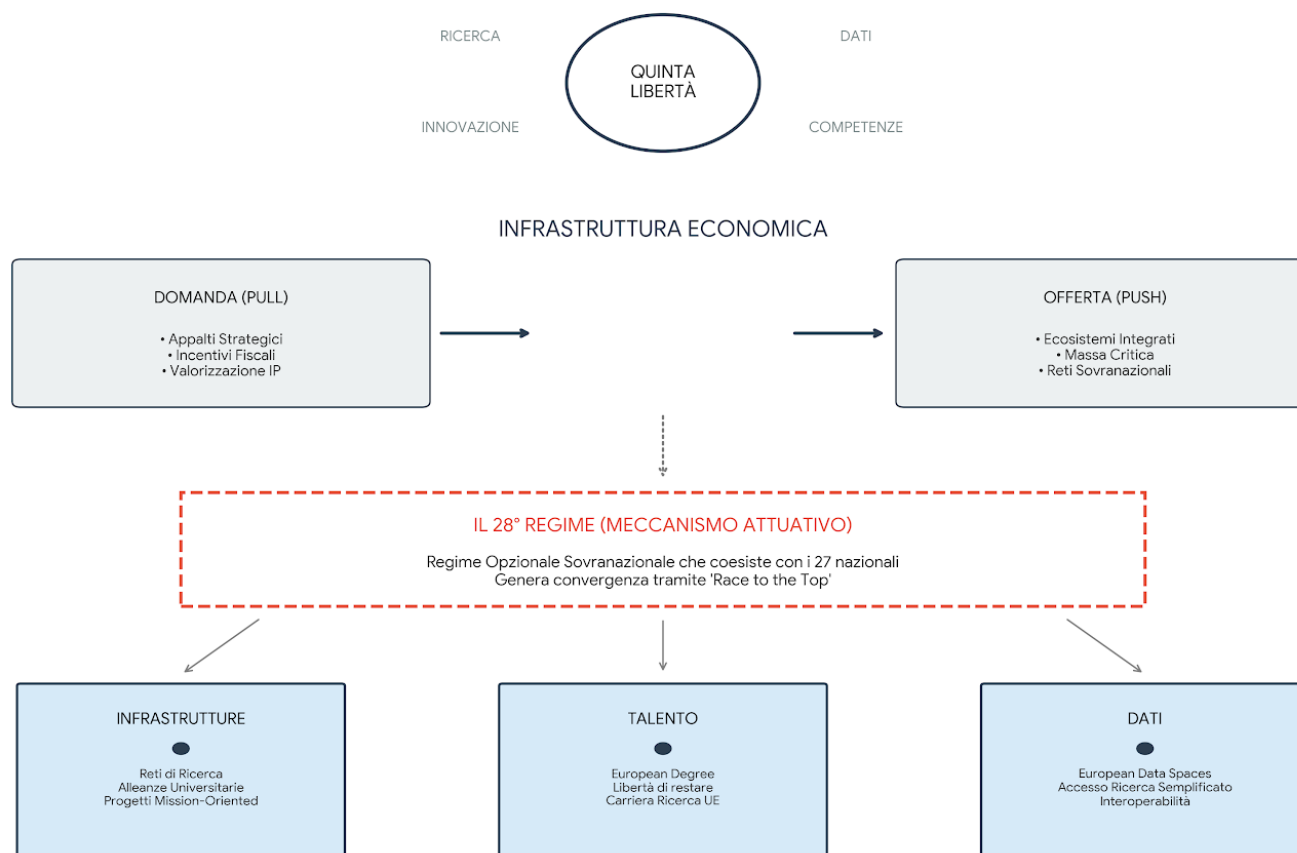


Verso la Quinta Libertà UE: Infrastrutture, Dati, Talento.

*Il 28° regime come
meccanismo
attuativo*

LA QUINTA LIBERTÀ UE

Oltre le 4 libertà tradizionali: libera circolazione di Conoscenza e Innovazione





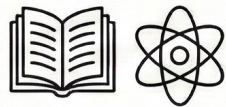
Il nuovo lavoro è «ibrido»

Per cominciare a comprendere l'*homo novus* dell'intelligenza artificiale e dell'interazione con il metaverso della tecnologia, bastano 20 centesimi...



Umberto Boccioni, *Forme uniche della continuità nello spazio*, 1913, Museo del Novecento - Milano

EPISTEME, TECHNE, PHRONESIS: LA STRUTTURA TRIPARTITA DELLA CONOSCENZA NELL'ERA DELL'INTELLIGENZA ARTIFICIALE



EPISTEME (CONOSCENZA SCIENTIFICA)

Comprensione teorica, verità universali, principi astratti.

Focus su "ciò che è" e "perché".
Il fondamento dell'indagine accademica.

Esempi: Matematica, Fisica,
Filosofia.



TECHNE

(ABILITÀ TECNICA/ARTIGIANATO)

Applicazione pratica, conoscenza produttiva, "come" fare o creare cose.

Focus su mezzi ed efficienza.
Esempi: Ingegneria,
Programmazione, Medicina,
Scienza dei Dati.



PHRONESIS

(SAGGEZZA PRATICA/GIUDIZIO ETICO)

Deliberazione etica, intuizione morale, prudenza, buon giudizio in situazioni complesse e particolari.

Focus su "ciò che dovrebbe essere" per la fioritura umana.
Cruciale per navigare nell'ambiguità e nei valori.
La guida per un'azione responsabile.

NECESSITÀ CRITICA NELL'ERA DELL'IA

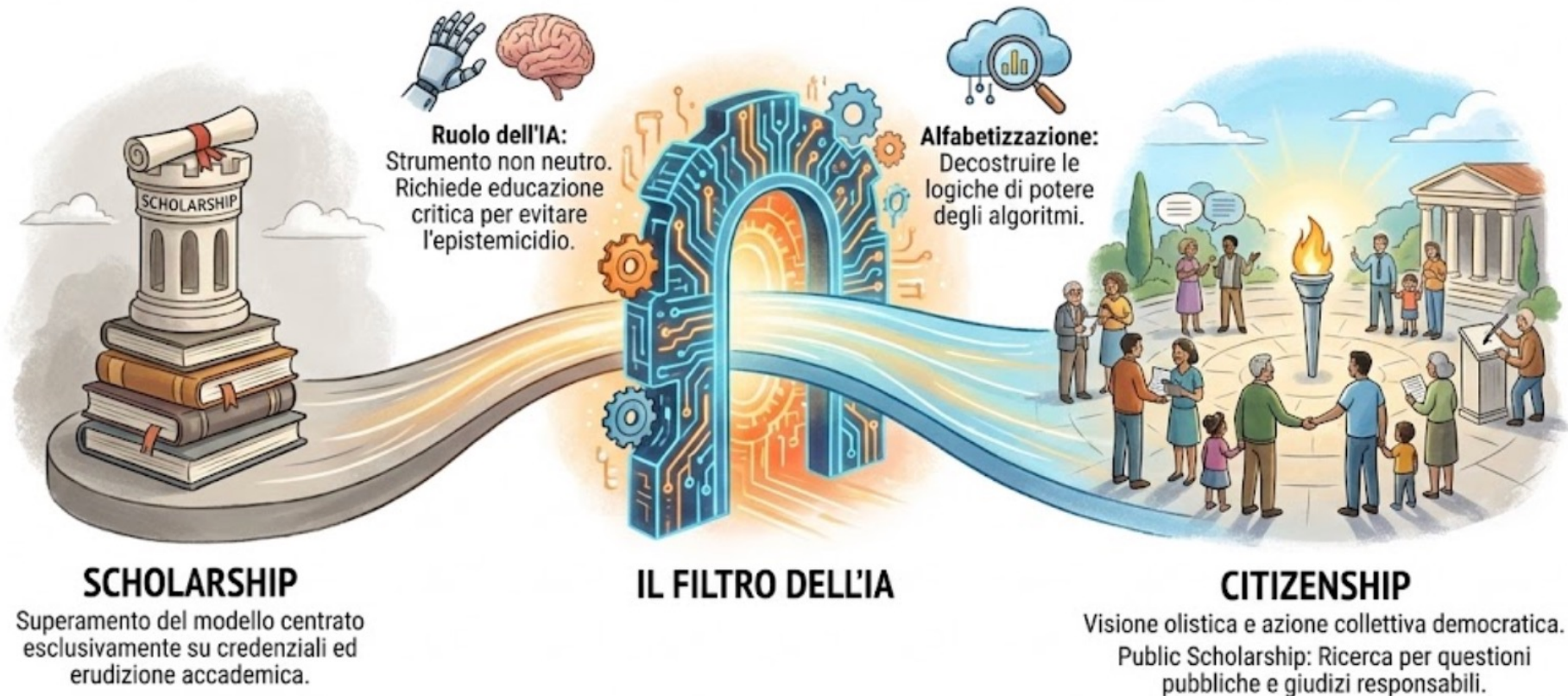
GOVERNANCE DELL'IA CENTRATA SULL'UOMO & PROCESSO DECISIONALE ETICO

L'IA amplifica l'Episteme e automatizza la Techne, ma manca di Phronesis. Il nuovo paradigma educativo deve dare priorità alla Phronesis per garantire che l'IA serva l'umanità, incorporando considerazioni etiche e comprensione contestuale nei sistemi automatizzati.

INTEGRARE LA SAGGEZZA PRATICA PER GUIDARE IL
PROGRESSO TECNOLOGICO VERSO IL BENE COMUNE.

EDUCAZIONE: IL CAMBIO DI PARADIGMA

Superare l'erudizione accademica per formare cittadini attivi nell'era dell'IA



Grazie e buon “lavoro”

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