

How digital technologies reshaped capitalism

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Outline

Capitalism and technology

The ICT technological paradigm

Digitalization, platforms and the reshaping of capitalism

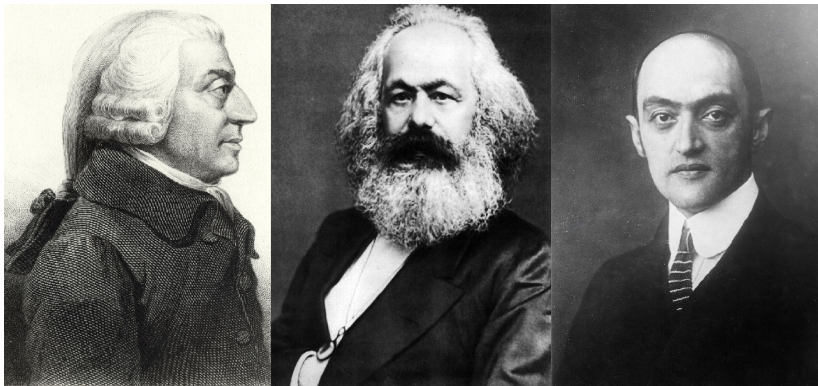
The Amazon case

Discussion

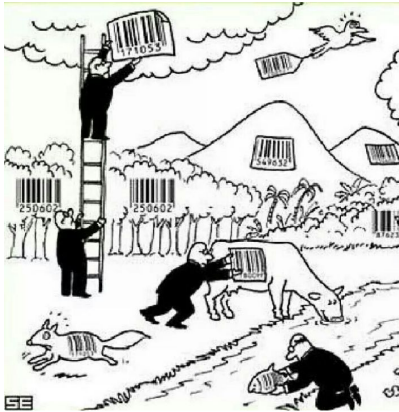
The drivers of technology

- ▶ **Capitalism (profit logic):** replacing labour, lowering wages, increasing control over labour, creating new products and markets → Tech mainly aims at reducing capital and labour costs
- ▶ **The State:** economic vs military power objectives, crowding out competitors and increasing military power, shaping strategies and industries (industrial and technology policy) → military tech mainly aims at maximum 'performance'
- ▶ **Technological paradigms:** shape the ways knowledge is developed/applied, push and pull effects, dialectical relationship between capital logic and State policy, (mis)match between technological, economic, institutional and societal change (see, among others, Dosi, Freeman, Perez)

Capitalism and technology: the classics



Capitalism and technology: commodification



Capitalism and technology: history matters

- ▶ **Major discontinuities** giving rise to new paradigms (e.g., steam engine, electricity, ICT), affecting shape of industries, markets and societies → changing power relationships (capital vs labour, within and between economies)
- ▶ Within each **technological paradigm**: patterns of adoption/diffusion and factors accelerating/hampering it, close and changing relationships between the evolution of military and commercial technology, different criteria shaping tech change (control, cost, performance, sustainability)
- ▶ **Industrial and technology policies**: affecting trajectories concerning both speed and direction

The ICT technological paradigm: military vs civilian trajectories

- ▶ From 1960s, rise in information technology driven by **demand for military electronics** for aerospace and nuclear systems ('Sputnik shock' and Vietnam's war), ARPA, centralised model aiming at increasing command and control capabilities (e.g., IBM's mainframe), key of military procurement and vertically integrated industry
- ▶ 1980s: **lower costs of chips/electronics/communication technologies**, growing commercial markets, decentralised computing model (personal computers, dial-up technology and networks), from Arpanet to NSFNET
- ▶ **Star Wars** and concentration of US high-tech companies in military fields, powerful oligopolies, divergence between civilian and military trajectories → leadership of Japan (and then South Korea and China) in electronics, different industrial policy strategy (Japan and Europe focusing on civilian/commercial objectives, e.g., 'Frontier', 'Human Frontier Science' (Japan), 'Eureka' (Europe))

The rise of digital platforms

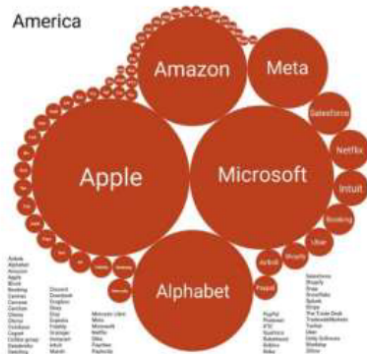
- ▶ **The ICT paradigm leads to digitalisation and platform model:** global networks, tailored services, commodification of personal data, 'surveillance capitalism' (Zuboff, 2019), large expansion of new civilian activities
- ▶ **Unprecedented concentration of techno-economic power,** systemic-infrastructural nature, outside public regulatory frameworks, massive acquisitions of startups and competitors (Coveri et al., 2022)
- ▶ **High financial dimension:** market capitalization larger than the GDP of countries like Japan → (apparently) platforms do not need funds from military contract...is it true?

The rise of digital platforms

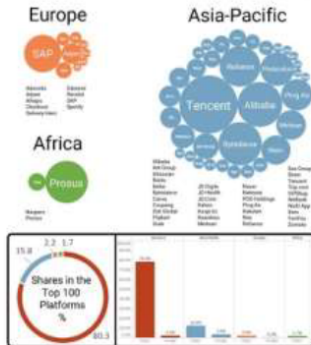
- ▶ **Large digital platforms - i.e., 'Big Tech' - as key drivers of structural change in contemporary capitalism:**
- ▶ **Concentration of techno-economic power** (e.g., Vasudevan, 2022; Coveri et al., 2022) → market capitalization larger than the GDP of countries like Japan or Germany (Alphabet, Amazon and Meta: more than \$3 trillion market value as of April 2024)
- ▶ Reshaping the operation of **knowledge and innovation networks/ecosystems** (e.g., Gawer and Cusumano, 2014; Jacobides et al., 2024) → strengthened rather than challenged by innovation-based competition (Kurz, 2023)
- ▶ **Surveillance-based business model** (Zuboff, 2019) challenging the very conceptualization of the firm (Pitelis, 2022, 2025)
- ▶ Exacerbating the process of **labor fragmentation**, increasing inequalities (Schor and Vallas, 2020)

Stylized facts: a polarized platform world

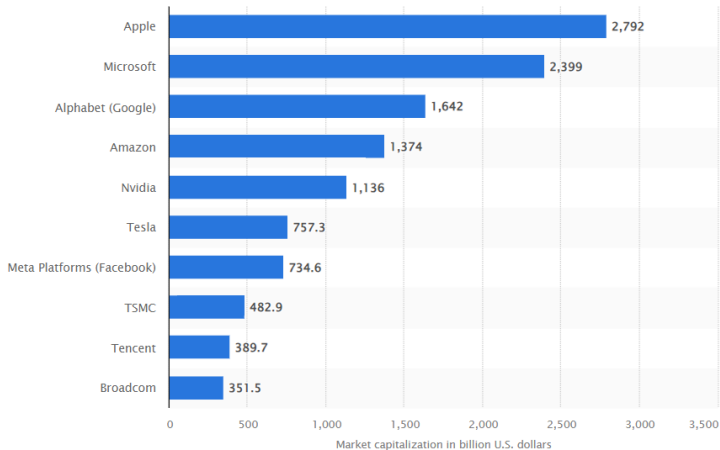
Top 100 Worldwide Platforms



Market Cap / Valuation: from most recent financing
Total Value: \$14.1 billion
as of August 2023

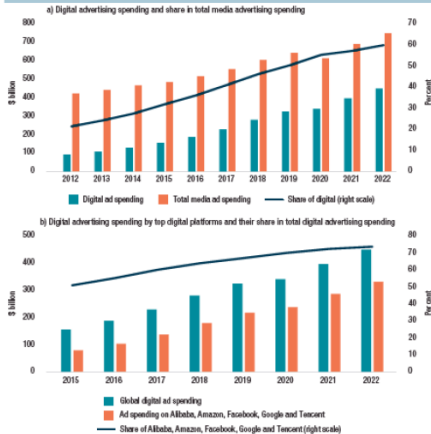


Stylized facts: market capitalization (2023)



Stylized facts: online advertisement spending (UNCTAD, 2021)

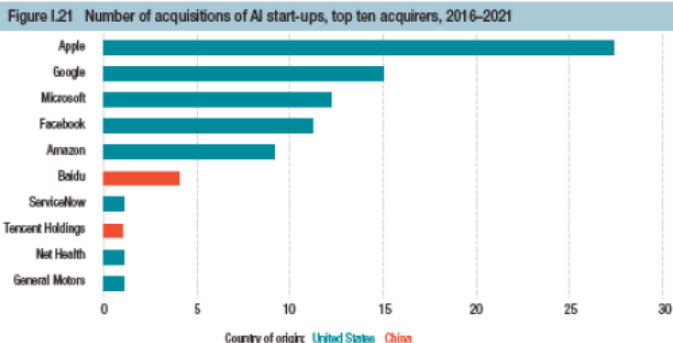
Figure I.14. Digital advertising spending, 2012-2022



Source: UNCTAD, based on data from eMarketer, Global Digital Ad Spending Update Q2 2020, available at www.emarketer.com/content/global-digital-ad-spending-update-q2-2020.

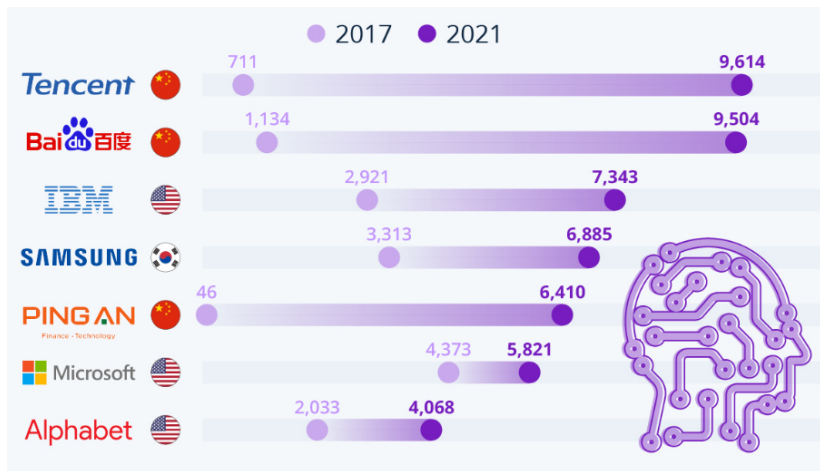
Note: 2020 to 2022 are estimates.

Stylized facts: concentration of technological power, start-up acquisition (UNCTAD, 2021)



Source: UNCTAD, based on CBInsights, available at www.cbinsights.com (accessed 22 January 2021).

Stylized facts: concentration of technological power, share of global AI patents (Lexis, 2023)



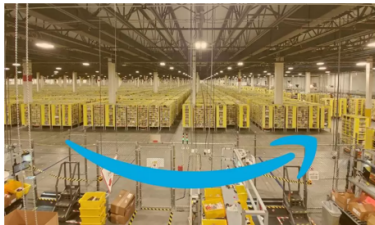
Stylized facts: the 'privatization' of knowledge (Rikap and Lundvall, 2021)

Table 3.2 Selected tech giants' top co-authors (2014–2019)

<i>Microsoft</i>	<i>Google</i>	<i>Amazon</i>	<i>Tencent</i>	<i>Alibaba</i>
University of California	University of California	University of California	Chinese acad of science	University of Science and Technology of China
University of Washington	Stanford University	Microsoft	Chinese University of Hong Kong	Chinese acad of science
University of Sci & Tech of China	Microsoft	University of Washington	Tsinghua University	Zhejiang University
MIT	MIT	Google	Peking University	Tsinghua University
Tsinghua University	Harvard	IBM	Shanghai Jiao Tong University	Peking University
University of London	Carnegie Mellon University	Georgia Inst of Technology	Sun Yat-sen University	Shanghai Jiao Tong University
Carnegie Mellon University	University of Illinois	Carnegie Mellon University	Zhejiang University	Microsoft
Google	University of Washington	University of Texas	Harbin Institute of Technology	Fudan University
Stanford University	IBM	MIT	Beihang University	Nanyang Technological University
ETH Zurich	New York University	Indian Inst of Technology	Nanyang Technological University	Nanjing University

Source Authors' analysis based on Web of Science

Stylized facts: digital platforms and labor fragmentation



amazonmechanicalturk

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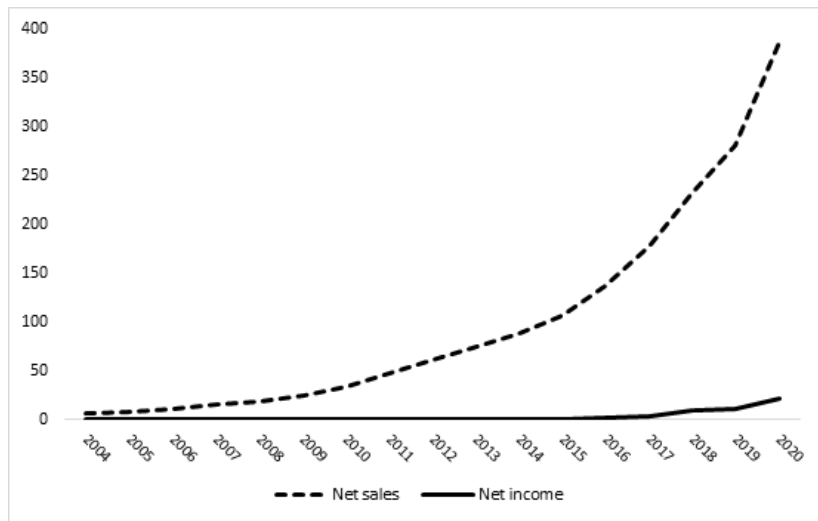
The Amazon case

- ▶ Beyond market power: if platforms represent an evolution of the capitalist enterprise towards a greater concentration of power and control, Amazon can be considered their **role model**
- ▶ Established in 1994 as an e-commerce book retailer, it now operates in **a wide array of sectors** including: retail (e-commerce and brick-and-mortar), logistics, video, music, entertainment (e.g., gaming platforms as Twitch), data storage and web-services (AWS), financial services for both consumers and firms (e.g., Amazon Pay), smart devices (e.g., Alexa, Amazon Halo), autonomous cars (e.g., Amazon Zoox) - Kenney et al. 2020, Aversa et al. (2020).
- ▶ A sectorial and geographical (excluding China) ubiquity reflected in some of the Amazon's most popular nicknames: **'the everything' and 'the everywhere store'** (Rikap, 2020).

The Amazon case

- ▶ It is a **'decentralized' concentration of power** (Bellofiore, 2011): Amazon expands its control over a multitude of markets investing almost exclusively on those assets and technologies allowing to maintain a tight control of its digital and physical networks. Precisely in line with the idea of Cowling and Sugden (1998), 'control has to be maintained on strategic issues'.
- ▶ **The pervasiveness of Amazon's control is rewarded by the financial market**, highlighting a peculiar discontinuity concerning the attitude of investors: market value continues to increase - 1.557 trillion dollars of capitalization, the most valuable U.S.-based internet company - despite Amazon accumulated relatively small profits compared to total revenues since its birth (Kahn, 2016)

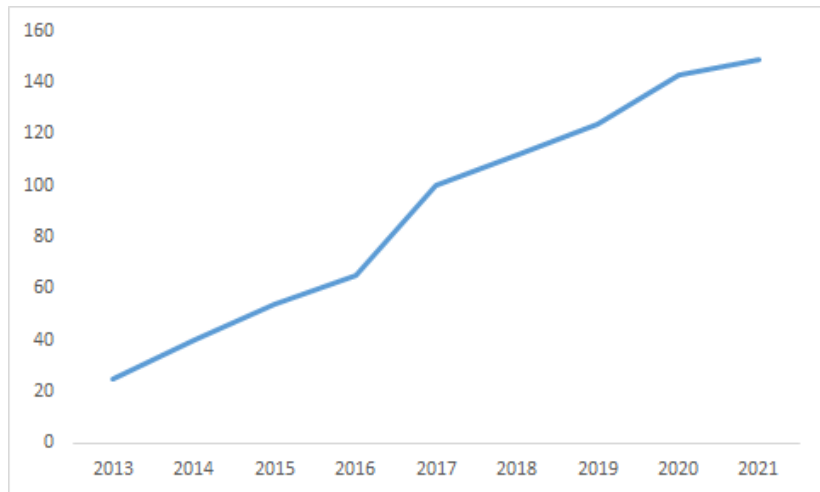
Annual net sales and net income of Amazon, 2004-2020



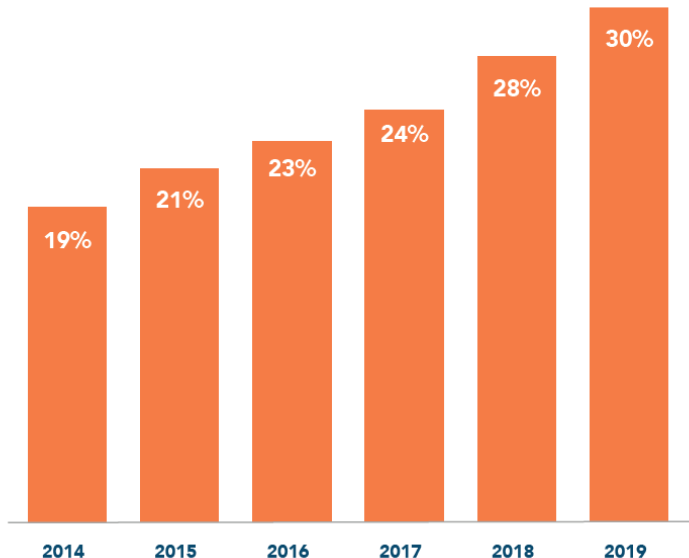
Disentangling the Amazon's growth strategy (1)

- ▶ **Growth and diversification of the digital marketplace:** cross-subsidization and predatory prices, locked-in customers (e.g., Prime - Culpepper and Thelen, 2020), penetrating strategic sectors (e.g., entertainment), extracting value from suppliers and third party sellers (commission, fulfillment and advertising fees - Mitchell et al. 2020), capturing innovation-related value (Zhu and Liu, 2018)
- ▶ **Data and technology:** i) strong investments in technologies (e.g., cloud computing, robotics, machine learning and AI) ensuring a tight control of the (digital and physical) network ii) strategic acquisitions to eliminate competitors and acquire capabilities iii) product innovations to further lock-in customers, suppliers and vendors (e.g., Alexa)

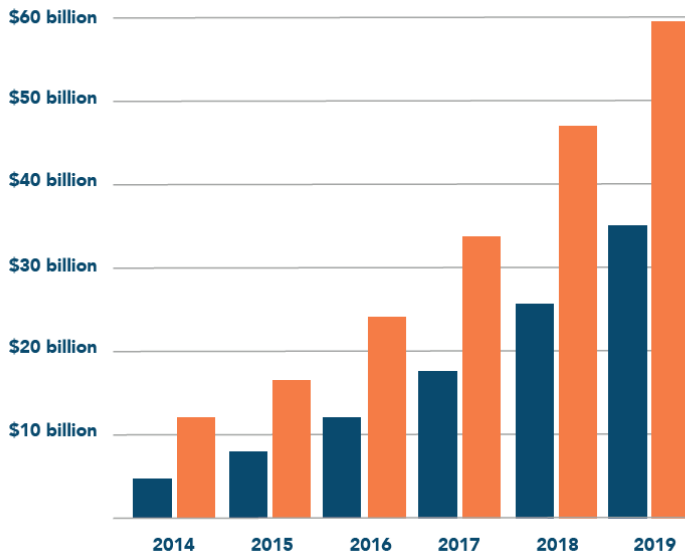
Amazon Prime subscribers in the US (2013-2021, millions)



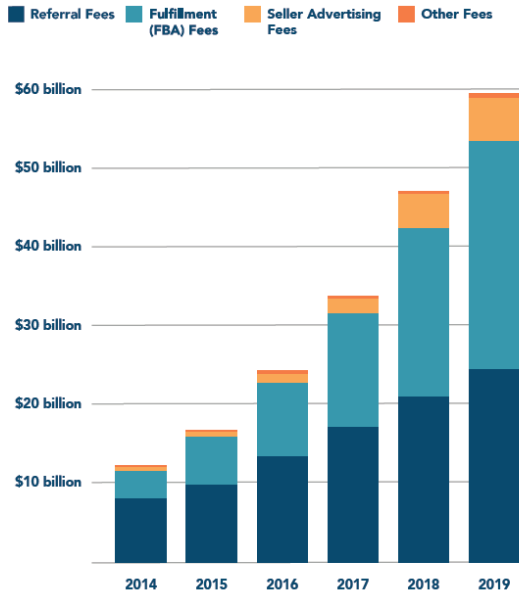
Amazon's Cut of Sellers' Revenue, 2014-2019 (Mitchell et al. 2020)



Amazon's Revenue from AWS and Seller's Fees (Mitchell et al. 2020)



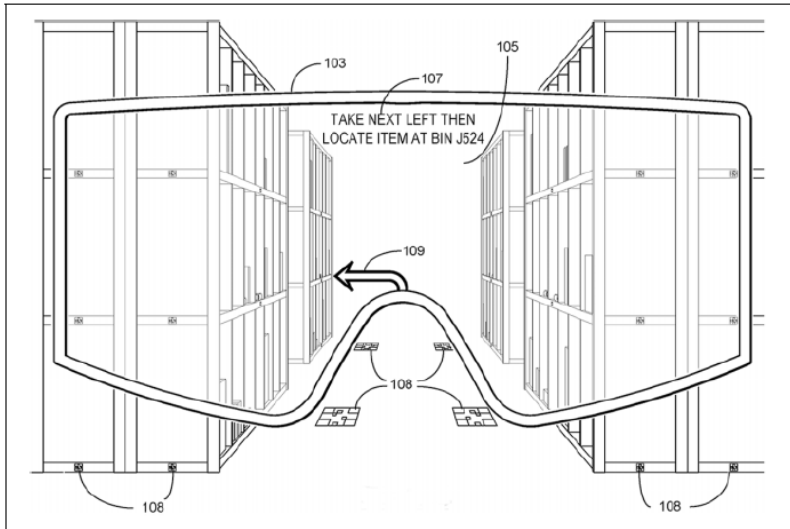
Amazon's Seller Fee Revenue by Category (Mitchell et al. 2020)



Disentangling the Amazon's growth strategy (2)

- ▶ **Labor fragmentation and surveillance:** i) an heterogeneous workforce including high-skilled workers (digital infrastructure, new products and processes), blue-collars (warehouses, delivery) and crowdworkers (AMT) ii) extreme levels of surveillance and exploitation: AI-based practices and algorithmic management, automation and robotization, outsourcing, gamification iii) explicit opposition to unionization with country-level heterogeneities
- ▶ **Governments and 'retaliatory power':** i) fighting hostile regulations (e.g., limitations to data harnessing practices and workers' protection) and reducing the tax burden ii) retaliatory power magnified by a combination of factors: selective localization of headquarters; employment impact of warehouses (second largest employer in the US); traditional lobbying activities; 'alliance' with consumers "...benefit from the direct relationship they enjoy with consumers who rely on the platform as it becomes integrated into the fabric of their daily lives (Culpepper and Theelen, 2020)"

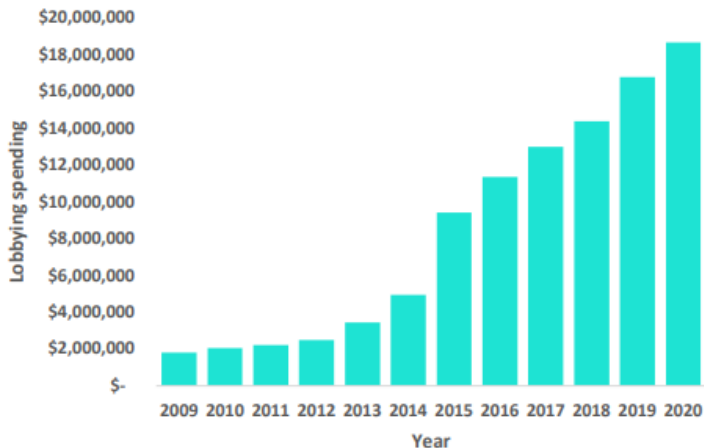
Amazon's VR patent aimed at guide workers' tasks via automated decision making (Delfanti and Frey, 2021)



Top 8 individual corporate spenders on federal lobbying (Public Citizen Report 2021)

Rank	Lobbying Client	Total Spent
1	Facebook Inc	\$ 19,680,000
2	Amazon.com	\$ 18,725,000
3	Comcast Corp	\$ 14,430,000
4	Lockheed Martin	\$ 12,960,810
5	Boeing Co	\$ 12,630,000
6	Northrop Grumman	\$ 12,050,000
7	Raytheon Technologies	\$ 11,960,000
8	Unilever	\$ 11,460,000

Amazon's total lobbying spending by year (2009–2020 - Public Citizen Report 2021)



Discussion: from digital platforms to the military-digital complex

- ▶ As the Internet becomes global, platforms magnify their ability to **control data, digital technologies and related infrastructures** (Rikap et al., 2021), as well as the new media where a large share of the public opinion is formed (Culpepper and Thelen, 2020)
- ▶ Platforms as indispensable partners to produce public goods, both in the civilian and military spheres → **blurring public-private boundaries**, providing platforms with an 'infrastructural status' that can make them indistinguishable from public operators
- ▶ Control of **dual technologies** in security and defence-sensitive domains turn platforms into governments' 'eyes and hears', at home as well as abroad
- ▶ Growing importance of **military procurement** crucially shaped by digital technologies and the digitalisation of war...