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WisdomTree Europe

Cybersecurity: The Megatrend that All Others Depend Upon

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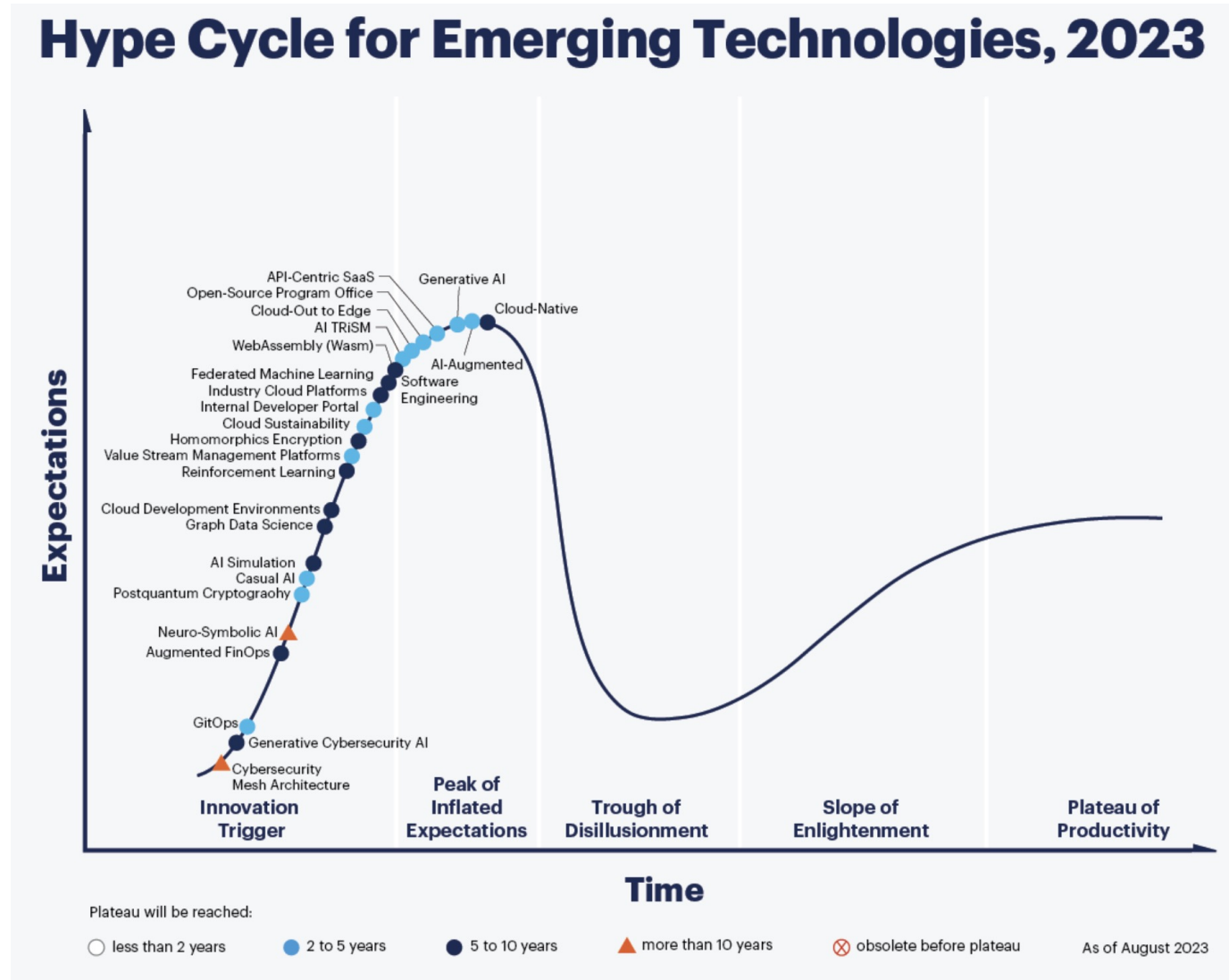
Cybersecurity: the megatrend that all others depend upon

November 2023



AI: The HOT Topic of 2023 (But Cybersecurity is in the Background Closely)

The Hype Cycle is Useful in Giving us Context



Source: <https://emtemp.gcom.cloud/ngw/globalassets/en/articles/images/hype-cycle-for-emerging-technologies-2023.png>

Quite a Headline!

TECH

The \$900,000 AI Job Is Here

Salaries rise as employers such as Netflix and Walmart seek candidates with artificial-intelligence skills

Source: Cutter, Chip. "The \$900,000 AI Job Is Here." [Wall Street Journal](#). 14 August 2023.

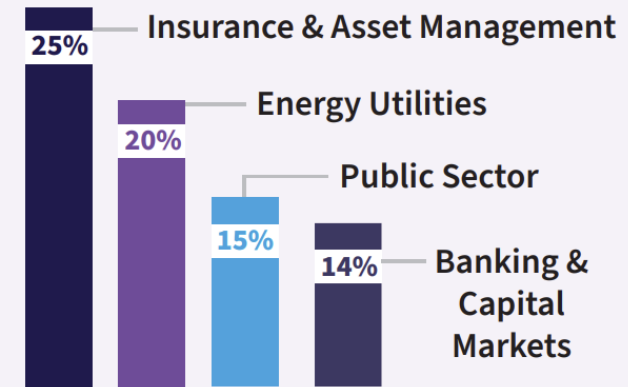
Cybersecurity Skills are Tough to Come By in 2023



83%
of corporate
boards recommend
increasing IT
security
headcount

Source: Fortinet 2023
Cybersecurity Skills Gap

Few business leaders in critical sectors feel confident that they have the talent they need



Source: WEF Global Cybersecurity Outlook 2023

3.4 million
global
shortage of
cybersecurity
professionals



Source: (ISC)2 2022 Cybersecurity Workforce Study



By 2025, **lack of talent or human failure** will be responsible for over half of significant cybersecurity incidents

Source: Gartner Predicts 2023

Source: https://www.nist.gov/system/files/documents/2023/06/05/NICE%20FactSheet_Workforce%20Demand_Final_20211202.pdf

Many Different Employment Options Exist in Cybersecurity

Leaders identified the following skills as highly needed



Source: WEF Global Cybersecurity Outlook 2023

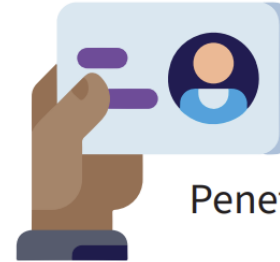
35% Growth

The Information Security Analyst occupation will grow much faster than the average job during 2021-2023

Source: Bureau of Labor Statistics



Top Cybersecurity Job Titles



- Cybersecurity Analyst
- Software Developer
- Penetration & Vulnerability Tester
- Cybersecurity Consultant
- Network Engineer
- Cybersecurity Manager
- Systems Engineer
- Senior Software Developer
- Systems Administrator

Source: CyberSeek January 2023



LEARNING



SKILL



PRACTICE

59% of technologists say hands-on learning is the best way to apply new skills

Source: Pluralsight State of Upskilling 2023

Source: https://www.nist.gov/system/files/documents/2023/06/05/NICE%20FactSheet_Workforce%20Demand_Final_20211202.pdf

Tool Sprawl! Does the Average Organization Need More than 30 Tools?

On average, organizations rely on 30+ tools for overall security and six to ten tools dedicated to cloud security.³ Upwards of 75% of our State of Cloud-Native Security survey respondents reported that the number of cloud security tools they use creates blind spots that affect their ability to prioritize risk and prevent threats. Why are so many tools being utilized? It's telling that 77% of organizations struggle to identify what security tools are necessary to achieve their objectives.

Source: <file:///C:/Users/ChristopherGannatti/Downloads/state-of-cloud-native-security-2023.pdf>

Cybersecurity Covers a Broad Swath of Technology Focal Points

- + **Cybersecurity** market and supply chain is **far broader than solutions purely focused on cyber defence**.
- + **The life cycle and efficacy** of different products is **accelerating** due to the fast pace of **technology innovation** and **rapid evolution of the threats**.
- + WisdomTree believes that **the best way to capture the changes in the market is to understand the trends** that are driving it and to **identify the products and services** that are positioned to provide creative and effective solutions.
- + Process of collaboration with industry experts outlines **the themes, products, and services** that are expected to be **of critical importance** to the industry **in the coming years**.
- + **Each theme** includes the **threats** and **technology trends** driving the theme, as well as some suggested **products and services** that can serve as **solutions to the challenges** created.

 Data Security	 Cloud Security
 Shift-Left	 Smarter Security
 Security of Things	 Perimeterless World
 Resilience & Recovery	 Layer 8

Source: WisdomTree

WisdomTree's Thematic Universe

2020 and 2021 were a Different Reality for Thematic Strategies

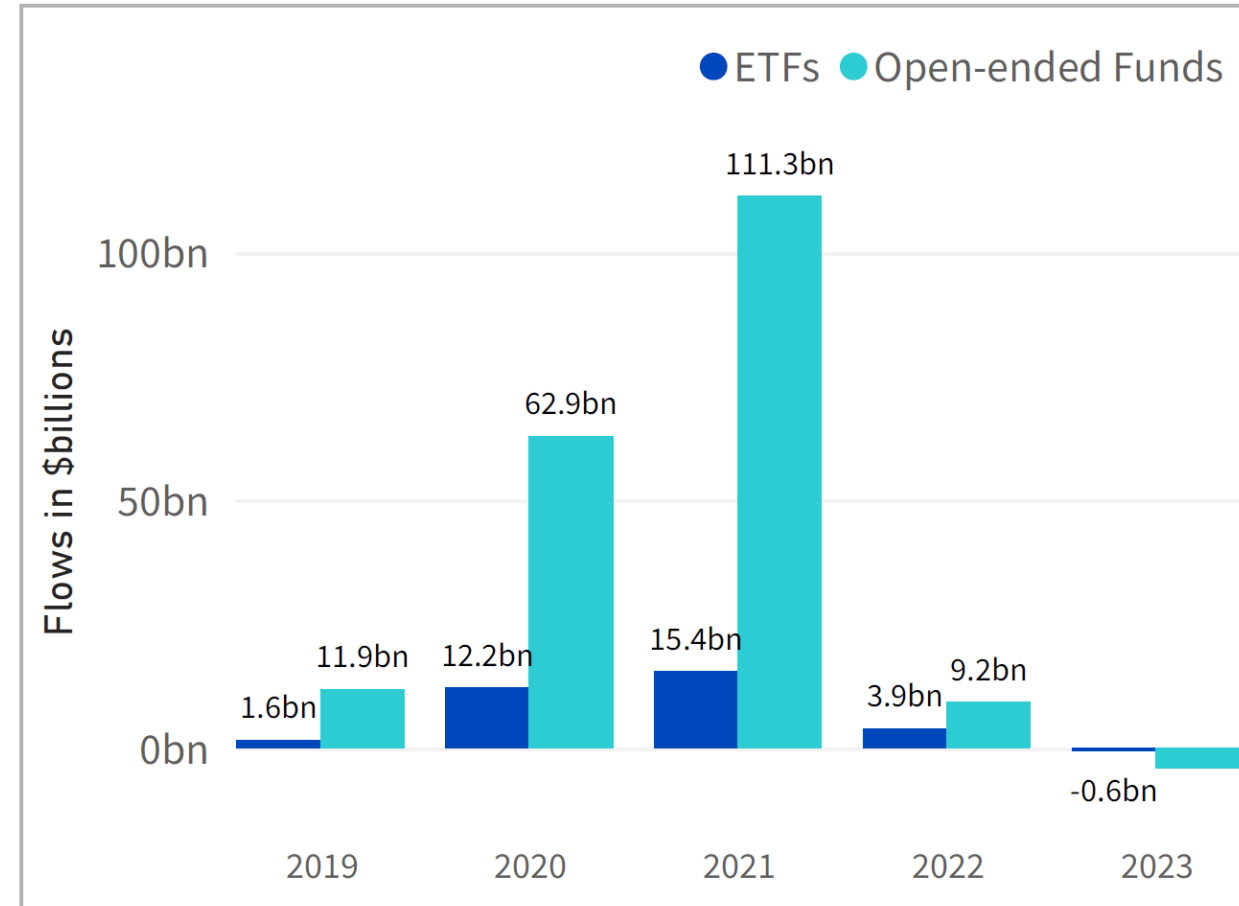
Thematic universe overview

+ AUM in thematic Exchange Traded Funds (“ETFs”) and open-ended funds in Europe continued to shrink in September dropping by more than 6.5% to \$296 billion. The decrease was mostly driven by negative performance across themes. The end of September AUM is around 2.7% higher than at the end of December 2022, mostly due to positive performance across themes as flows continue to be negative at -\$4.6 billion year-to-date. ETFs’ market share remained steady at around 13%, with a total AUM of \$38.9 billion.

+ Performance in September was negative across all themes, with only 7 themes beating the MSCI ACWI. Year-to-date, 11 themes have outperformed the global equity benchmark, with the top 8 being all tech-related and led by "Semiconductors", "Blockchain" and "AI & Big Data".

+ Year-to-date flows are negative across both wrappers, but open-ended funds are responsible for 88% of the total outflows, predominantly within the "Environmental Pressures" and "Demographic & Social Shifts" clusters.

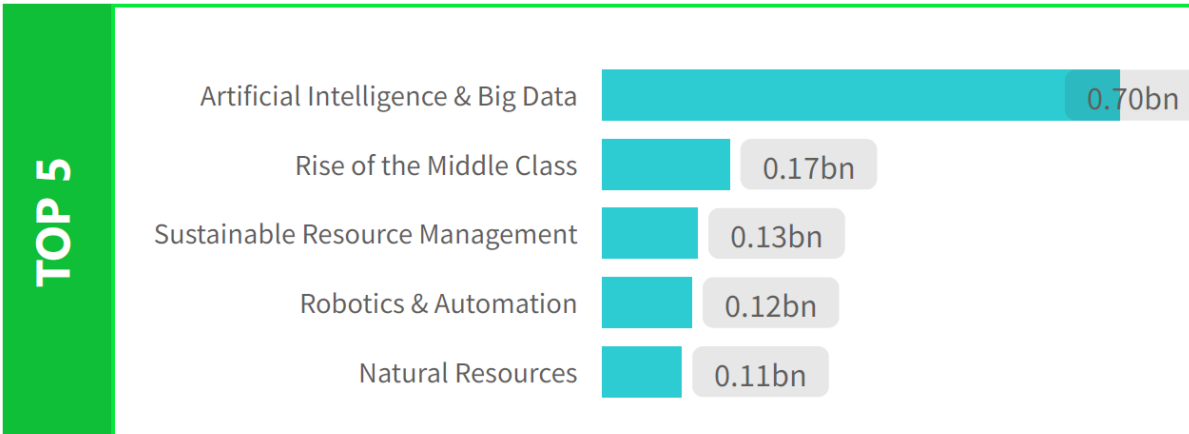
Recent yearly flows in Europe



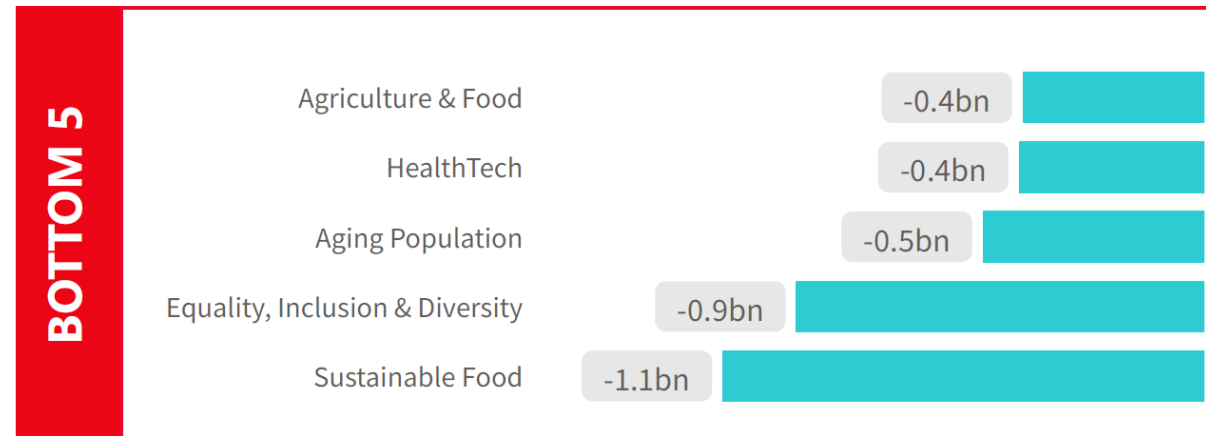
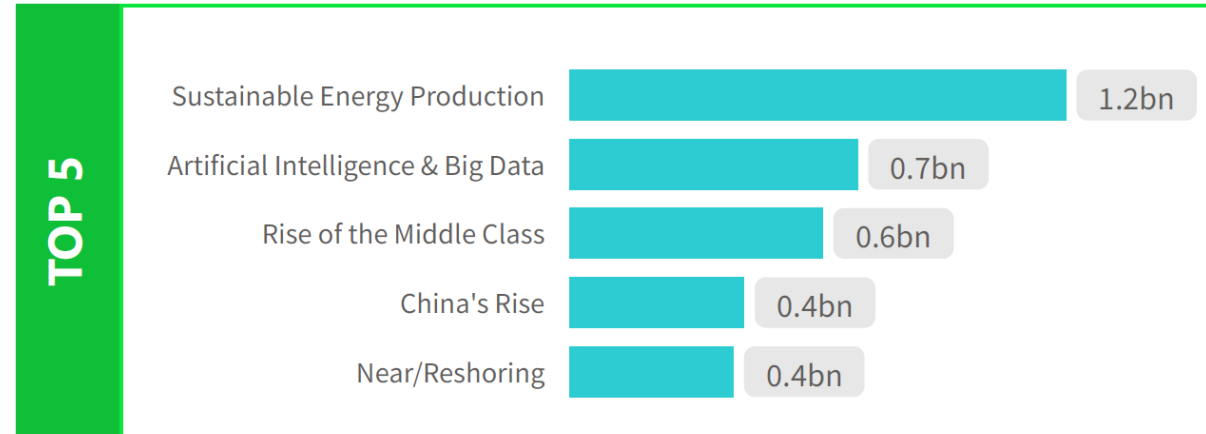
Source: WisdomTree, Morningstar, Bloomberg. All data as of 30/09/2023 and based on WisdomTree's internal classification of thematic funds. Performance is based on monthly returns from Bloomberg and Morningstar More information on the WisdomTree Thematic classification can be found in the Appendix. **Historical performance is not an indication of future performance, and any investments may go down in value.**

What Topics have seen the most Inflows (and Outflows)?

YTD Top/Bottom flows in Europe ETFs



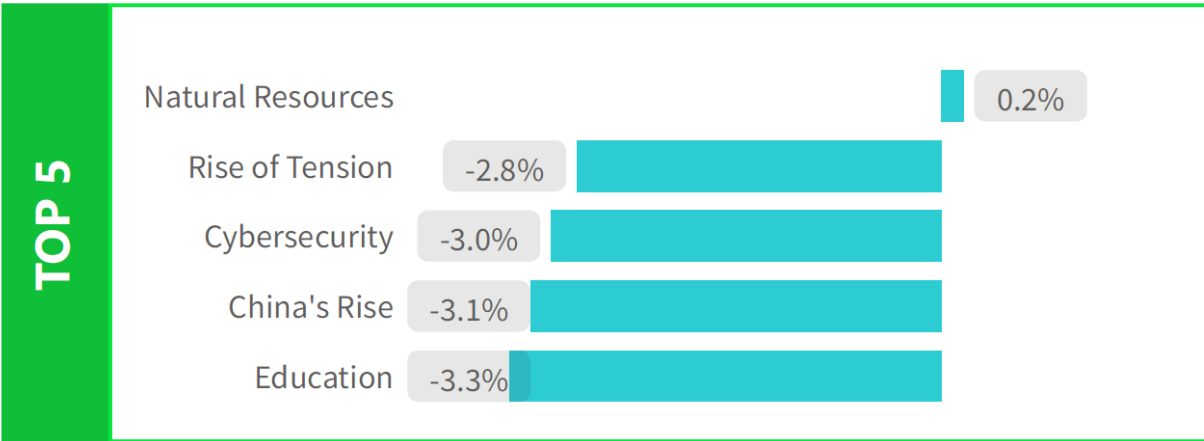
YTD Top/Bottom flows in Mutual Funds



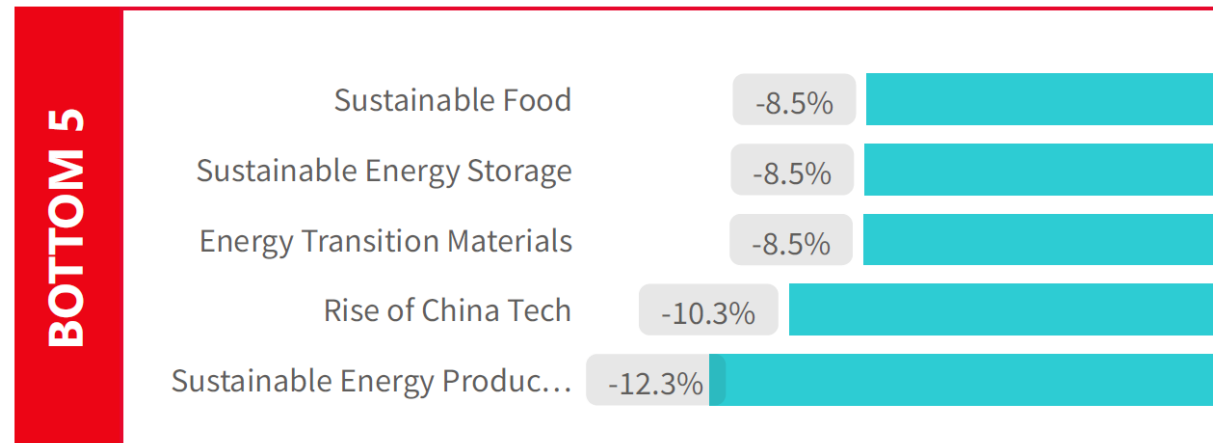
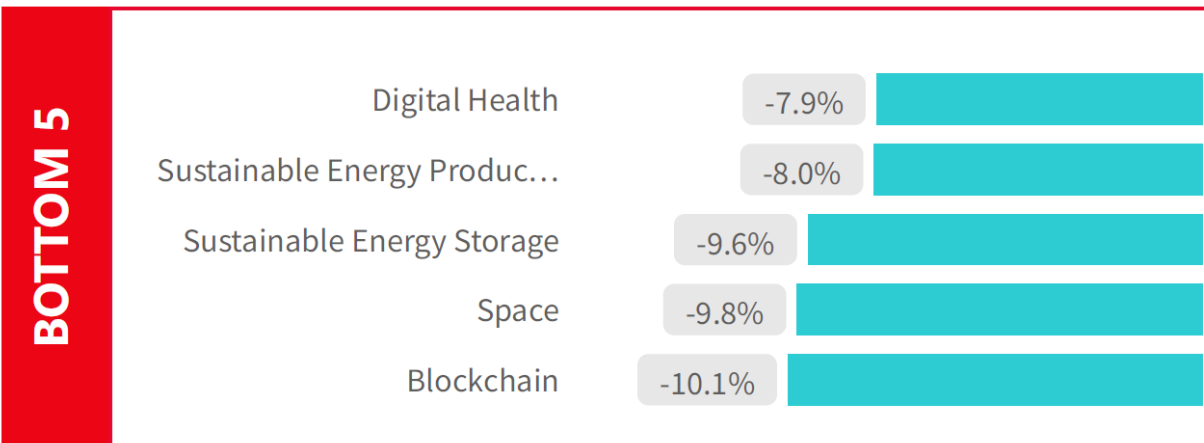
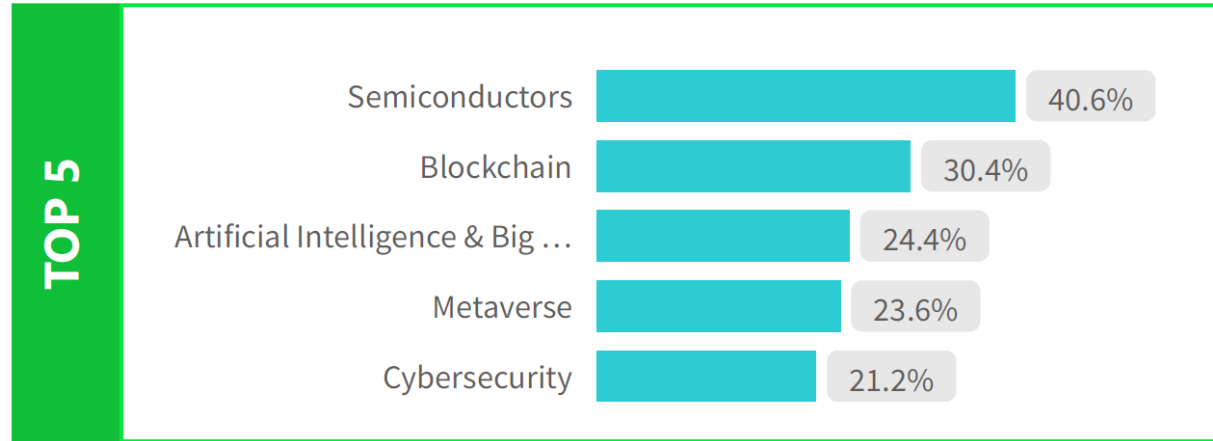
Source: WisdomTree, Morningstar, Bloomberg. All data as of 30/09/2023 and based on WisdomTree's internal classification of thematic funds. Performance is based on monthly returns from Bloomberg and Morningstar More information on the WisdomTree Thematic classification can be found in the Appendix. **Historical performance is not an indication of future performance, and any investments may go down in value.**

While Months can be Volatile, 2023 has been Relatively Strong...

Top 5/Bottom 5 by performance in September



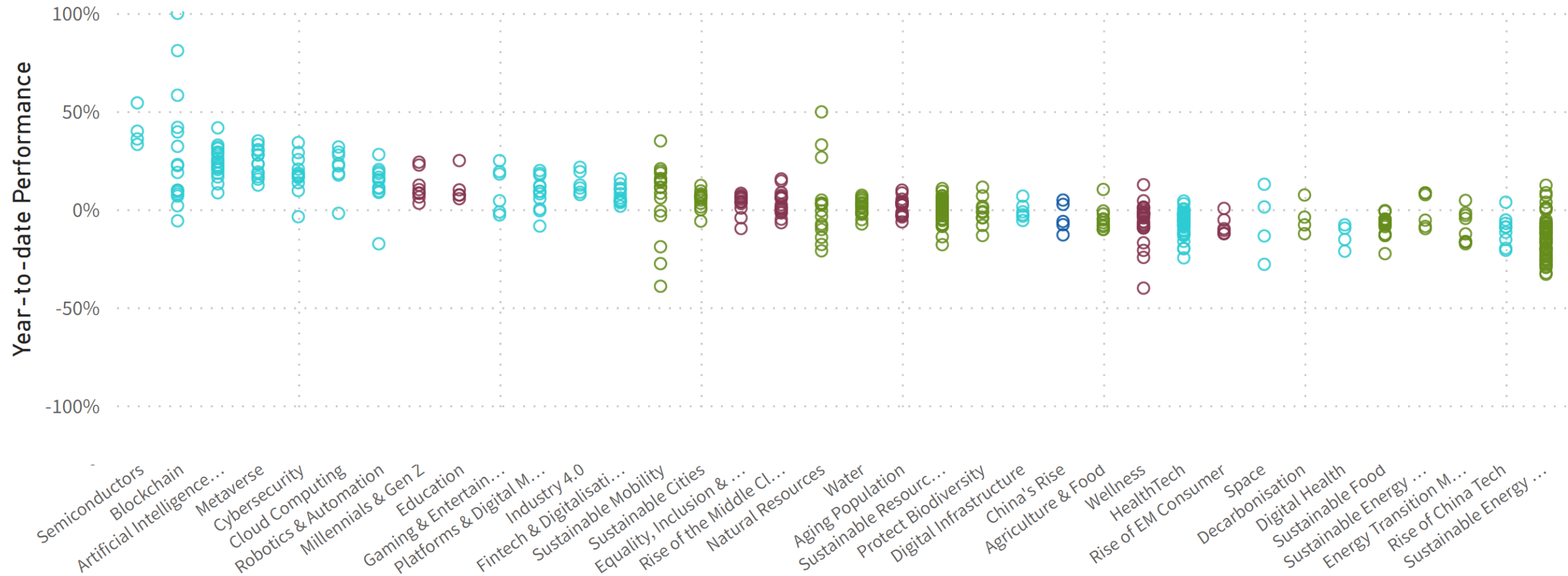
Top 5/Bottom 5 by YTD performance



Source: WisdomTree, Morningstar, Bloomberg. All data as of 30/09/2023 and based on WisdomTree's internal classification of thematic funds. Performance is based on monthly returns from Bloomberg and Morningstar More information on the WisdomTree Thematic classification can be found in the Appendix. **Historical performance is not an indication of future performance, and any investments may go down in value.**

We cannot emphasize it enough: Thematic funds can seek exposure to the same topics in very different ways

Dispersion of YTD performance of all ETFs and mutual funds by themes in Europe



Source: WisdomTree, Morningstar, Bloomberg. All data as of 30/09/2023 and based on WisdomTree's internal classification of thematic funds. Performance is based on monthly returns from Bloomberg and Morningstar More information on the WisdomTree Thematic classification can be found in the Appendix. **Historical performance is not an indication of future performance, and any investments may go down in value.**

Macro & Market Elements

The Valuation Picture Relates to the IPO Picture

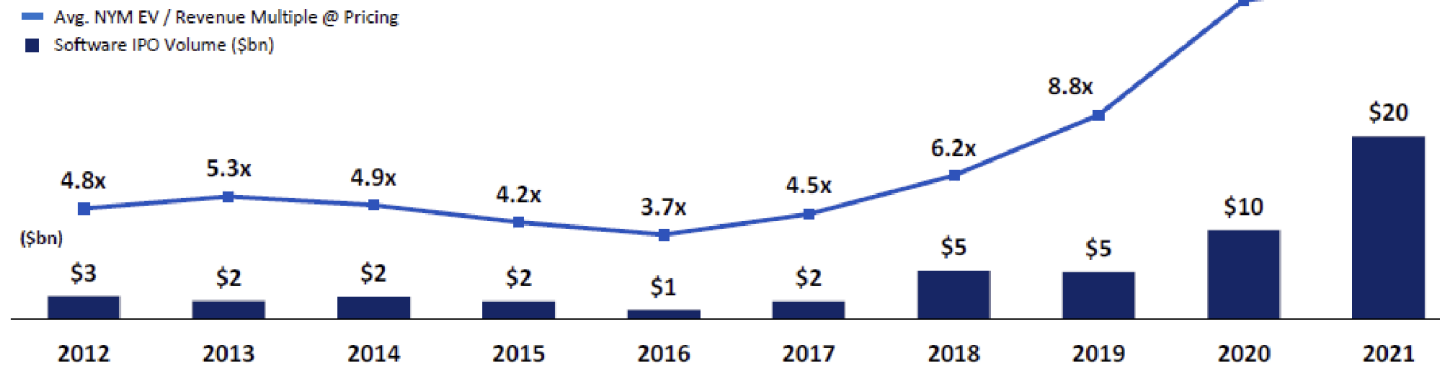
Evolution of Pricing Multiples for Software IPOs



Select Pricing Multiples⁽⁴⁾

2012 (n=15)	2013 (n=13)	2014 (n=21)	2015 (n=13)	2016 (n=8)	2017 (n=11)	2018 (n=16)	2019 (n=15)	2020 (n=16)	2021 (n=42)
workday 18.5x	veeva 10.7x	castlight 19.5x	atlassian 8.7x	blackline 5.3x	mulesoft 5.8x	elastic 9.9x	datadog 17.5x	snowflake 34.6x	gitlab 38.3x
splunk 7.4x	freeeye 10.2x	new relic 7.8x	shopify 6.6x	coupa 5.1x	mangodb 5.7x	anaplan 7.4x	zoom 14.7x	twilio 21.1x	toast 34.0x
servicenow 7.0x	tableau 7.8x	hortworks 7.6x			okta 5.7x	flourish 7.3x	sumo logic 11.6x	jitrig 20.9x	sentinel 31.2x
	textura 6.5x	paylocity 5.6x			sailpoint 5.2x	zscaler 6.9x	crowdfunder 11.6x	zoominfo 15.9x	hashcorp 28.9x
	cvent 5.4x	hubspot 5.5x				smartsheet 6.9x	paperduty 8.9x	zoominfo 12.9x	perx 26.8x
		opower 5.4x				relmatix 6.8x	bill.com 7.9x	mcafee 12.0x	confluent 24.8x
		5.3x				tenable 6.7x	dynatrace 7.6x	ilincino 11.9x	ojo 22.5x
						docsign 6.2x	medallia 7.0x	jamf 10.2x	vtex 22.0x
						upwork 6.1x	sproutsocial 5.8x	sumo logic 10.1x	freshworks 21.6x
						terrapower 5.8x	fastly 5.2x		manday 18.8x
						zuora 5.5x			engage2mart 15.7x
						dropbox 5.5x			avidexchange 15.0x
						carbon black 5.4x			
						avalar 5.2x			

Software IPO Volume and Average NTM EV / Revenue Pricing Multiples



35
 Source: Factset and Dealogic. Excludes MLPs, BDCs, REITs, and deals under \$20mm base sizing.
 (4) Selected logos represent companies with forward pricing multiples above 5.0x for 2012-2019; above 10.0x for 2020, and above 15x for 2021.

Source: <https://nextbigteng.substack.com/p/saas-ipo-window-inflection-reopening>

Geopolitical Tensions are One Venue for Cyber Risks and Threats



A Red Cross sign on a medical vehicle in Ukraine. The International Committee of the Red Cross is seeing a sharp rise in cyberattacks by civilian hackers related to conflict areas worldwide. PHOTO:

Source: Stupp, Catherine. "Cyberattacks Intensify on Israeli and Palestinian Human Rights Groups." [Wall Street Journal](#), 20 October 2023.

Some Cyber Incidents Read like Spy-Thrillers

WORLD

Climate Advocates Fighting Exxon Were Hacked in Far-Flung Scheme, Prosecutors Say

An Israeli private detective faces sentencing in Manhattan next week in the hacking-for-hire campaign

Source: Mulvaney, Erin. "Climate Advocates Fighting Exxon Were Hacked in Far-Flung Scheme, Prosecutors Say." [Wall Street Journal](#). 12 October 2023.

The Centralized Nature of Credit Reporting Creates an Ongoing Target



Equifax, which is based in Georgia, was fined the equivalent of about \$13.6 million by U.K. regulators. (Elijah Nouvelage/Bloomberg News)

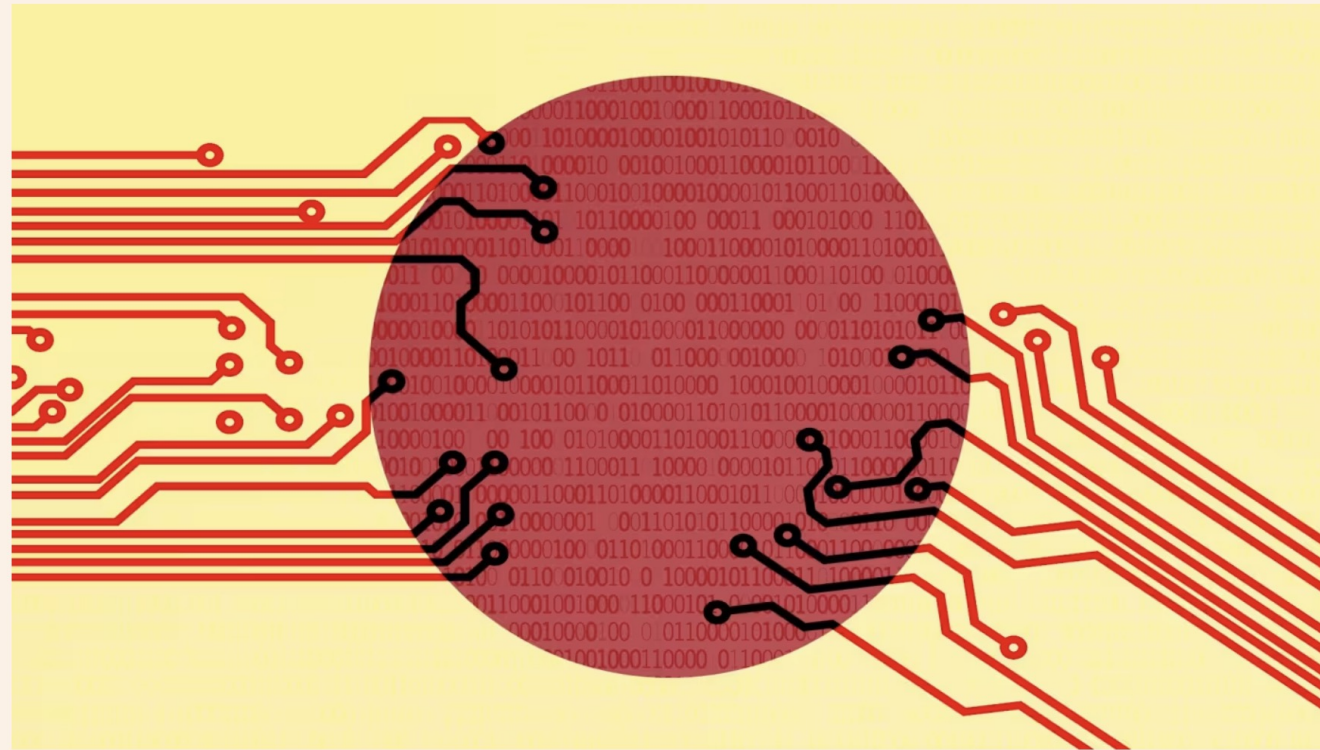
Equifax's ([EFX](#)) U.K. arm was fined around \$13.6 million Friday for failing to protect the data of millions of British customers in a [2017 hack of the credit-reporting company](#).

Source: Patrick, Margot. "Equifax's U.K. Arm Fined Over Data Breach." [Wall Street Journal](#). 13 October 2023.

Different Countries have Different Offensive and Defensive Capabilities

Japan's cyber security agency suffers months-long breach

Infiltration comes as allies scrutinise Tokyo's defences against hacking



The discovery of the incident comes at a time of unprecedented scrutiny of Japan's vulnerability to cyber attack © FT montage

Source: Lewis, Leo. "Japan's cyber security agency suffers months-long breach." [Financial Times](#). 29 August 2023.

Asymmetric Situation: Hackers Only have to be Right Once...

Three industries, however, are frequent targets of such attacks because of the extra pressure in getting systems back to normal, Dr. Salmon said. They are: utility companies, because complaints from customers often make news; hospitals, because of the risk the disruption presents to patients; and casinos, because of the reputational hit that could come from data breaches of customers' private information.

“Their security team has to be right 100 percent of the time,” Dr. Salmon said. “And the threats are always growing, always adapting, always getting more complicated. The attacker just has to be right once.”

Source: Medina, Eduardo. “‘Cybersecurity Issue’ Forces Shutdown at MGM Hotels and Casinos.” [New York Times](#), 11 September 2023.

How Will AI be Used? (The Answer has Implications for Cybersecurity)

The ‘End of Work’ Was Already Predicted...a LOOONG Time Ago

The End of Work

“We are being afflicted with a new disease of which some readers may not yet have heard the name, but of which they will hear a great deal in the years to come - namely, *technological unemployment*. This means unemployment due to our discovery of means of economising the use of labour outrunning the pace at which we can find new uses for labour.”

- John Maynard Keynes, [Economic Possibilities for our Grandchildren](#) (1930)

Source: Wu, Kai. “A Human View of Disruption.” [Sparkline](#). February 2021.

Eventually, it will be Harder to say what AI WON'T do...

Exhibit 1: AI applications across industry and 1H transcript themes in red

Healthcare	Financials	Advertising & Digital Content	Retail & Freight	Energy & Industrials	Customer Service	Business Intelligence
Smart Implants (Ex: Hip & Knee)	AI Thematic Fund Offerings	Marketing Efficiency	3D Shopping & Product Try On	AI Tools for Pipelines	Customer Analytics	Developer Tools & Assisted Code
Medical Imaging	New Trade Pricing Tools	Enhanced Ad Targeting	Sidewalk Robots for Deliveries	Geological Models	Insurance Claims and Records	AI-Related Consulting
Pathology Detection	Generate Client Portfolio Reviews	Recommendation Engine	Supply Chain Efficiency	AI-Enabled Microgrid Tools	Transcribe and Summarize	Integrated Smart Home Interface
Personalized Medicine	Automated Trade Prices, Execution	Higher Ad Conversion	Inventory Management	Energy Usage Analytics	Client Onboarding	Automate Back Office Tasks
Identify Biomarkers	AI Portfolio Management	Ad Auction Dynamics	Demand Prediction	Energy Trading Enhancements		Fraud Prevention and Protection
New Drug Development	Increase Trading Velocity	Content Creation	Truck Routing Capabilities	Labor Scheduling		Cybersecurity Capabilities
Analysis of Genomic Data	Product Cross-Selling	Customized Travel Itineraries	Higher Fleet Utilization	Reservoir Optimization		Risk Assessment & Management
Physician Point of Service Tools		Video Game Development	Autonomous Fleet Networks	Leak Detection & Track Emissions		Accelerated Data Analysis
						Predictive Modeling

Source: Morgan Stanley Research

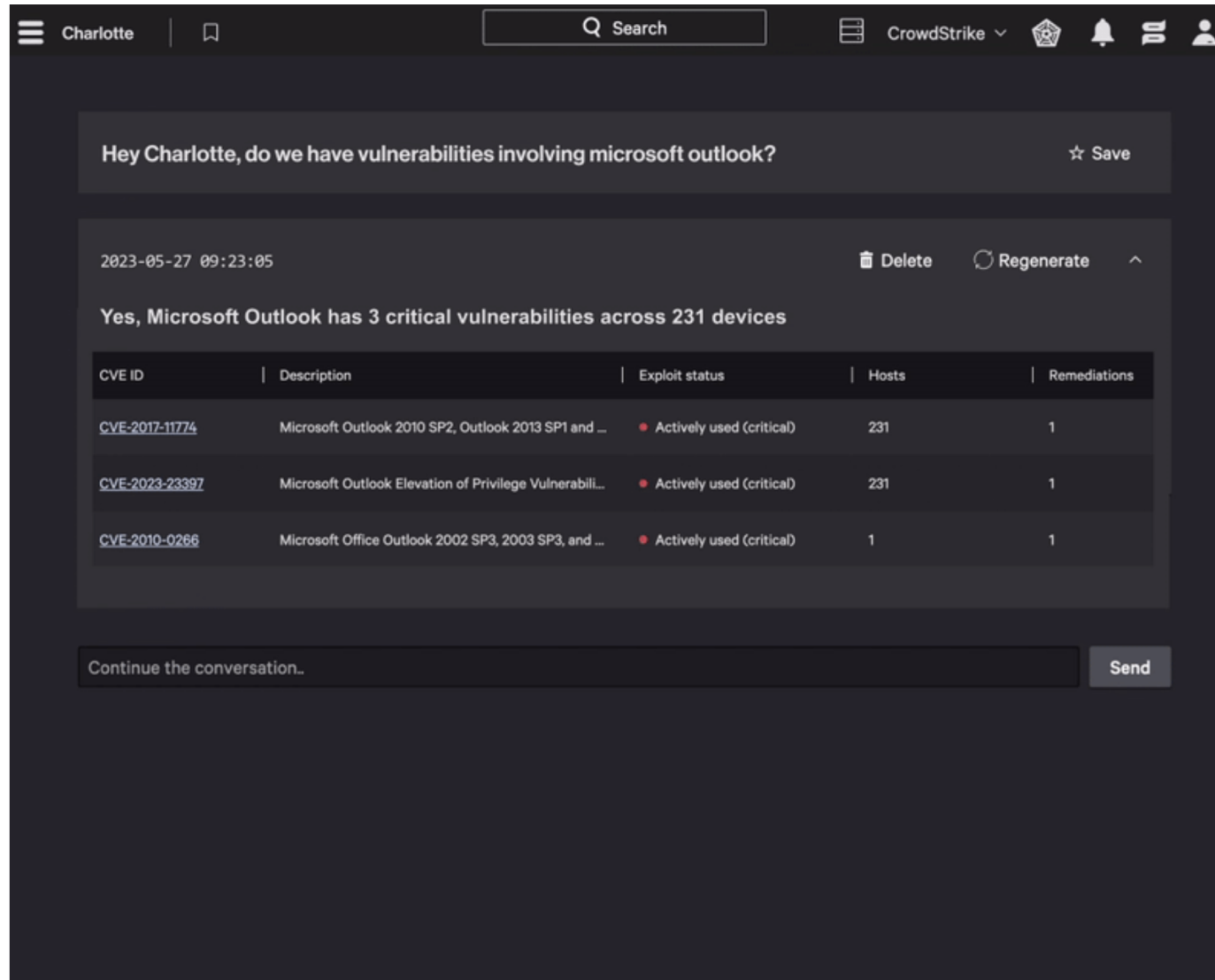
Source: Stanley et al. "Global Trendspotting: Quantifying AI." [Morgan Stanley Research](#). 14 August 2023.

Inaccuracy, cybersecurity, and intellectual-property infringement are the most-cited risks of generative AI adoption



Source: McKinsey Global Survey on AI, 1,684 participants at all levels of the organization, April 11–21, 2023

Use Case: CrowdStrike's Generative AI



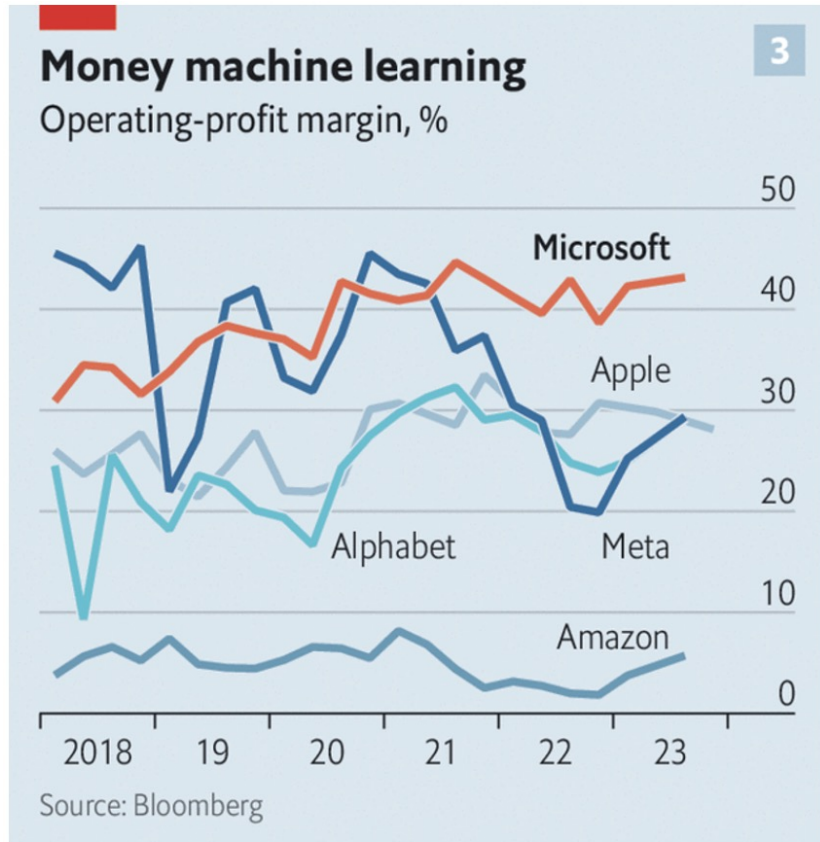
The screenshot displays the CrowdStrike Charlotte AI interface. At the top, there is a navigation bar with the name 'Charlotte', a search bar, and various system icons. The main chat area shows a user query: 'Hey Charlotte, do we have vulnerabilities involving microsoft outlook?' with a 'Save' button. The AI response, dated '2023-05-27 09:23:05', states: 'Yes, Microsoft Outlook has 3 critical vulnerabilities across 231 devices'. Below this text is a table with columns for CVE ID, Description, Exploit status, Hosts, and Remediations. The table lists three critical vulnerabilities: CVE-2017-11774, CVE-2023-23397, and CVE-2010-0286. At the bottom, there is a text input field with the placeholder 'Continue the conversation...' and a 'Send' button.

CVE ID	Description	Exploit status	Hosts	Remediations
CVE-2017-11774	Microsoft Outlook 2010 SP2, Outlook 2013 SP1 and ...	Actively used (critical)	231	1
CVE-2023-23397	Microsoft Outlook Elevation of Privilege Vulnerabil...	Actively used (critical)	231	1
CVE-2010-0286	Microsoft Office Outlook 2002 SP3, 2003 SP3, and ...	Actively used (critical)	1	1

https://www.crowdstrike.com/blog/crowdstrike-introduces-charlotte-ai-to-deliver-generative-ai-powered-cybersecurity/?utm_campaign=msto&utm_content=crwd-awns-en-x-tct-us-ppsp-x-x-ai-x_x_x-mo&utm_medium=sem&utm_source=goog&utm_term=artificial%20intelligence%20network%20security&cq_cmp=20323086868&cq_plac=&gad=1&gclid=Cj0KCQjw_5unBhCMARisACZyS0aMTG84EaBZ4VS1i00eUb7o-mcYohes0ctFbjvN8j3Ws4id9L0yikaAsOnEALw_wcB

Software

Microsoft: The Software Leader? [Some Argue that Microsoft is the World's Biggest Cybersecurity Company]



The Economist

- Microsoft sells a wide range of software—don't need separate email and spreadsheet chatbots, for example.
- Microsoft moved very quickly to partner with OpenAI. 'First-mover' advantage makes it an easier choice for many large firms seeking to try generative AI.

Source: "How Microsoft could supplant Apple as the world's most valuable firm." [Economist](#), 27 September 2023.

BVP Tracks the ‘Cloud 100’—an Important Barometer of Private Software

Eight years of The Cloud 100

The 2023 Cloud 100 list is worth \$654 billion, with OpenAI as our new #1

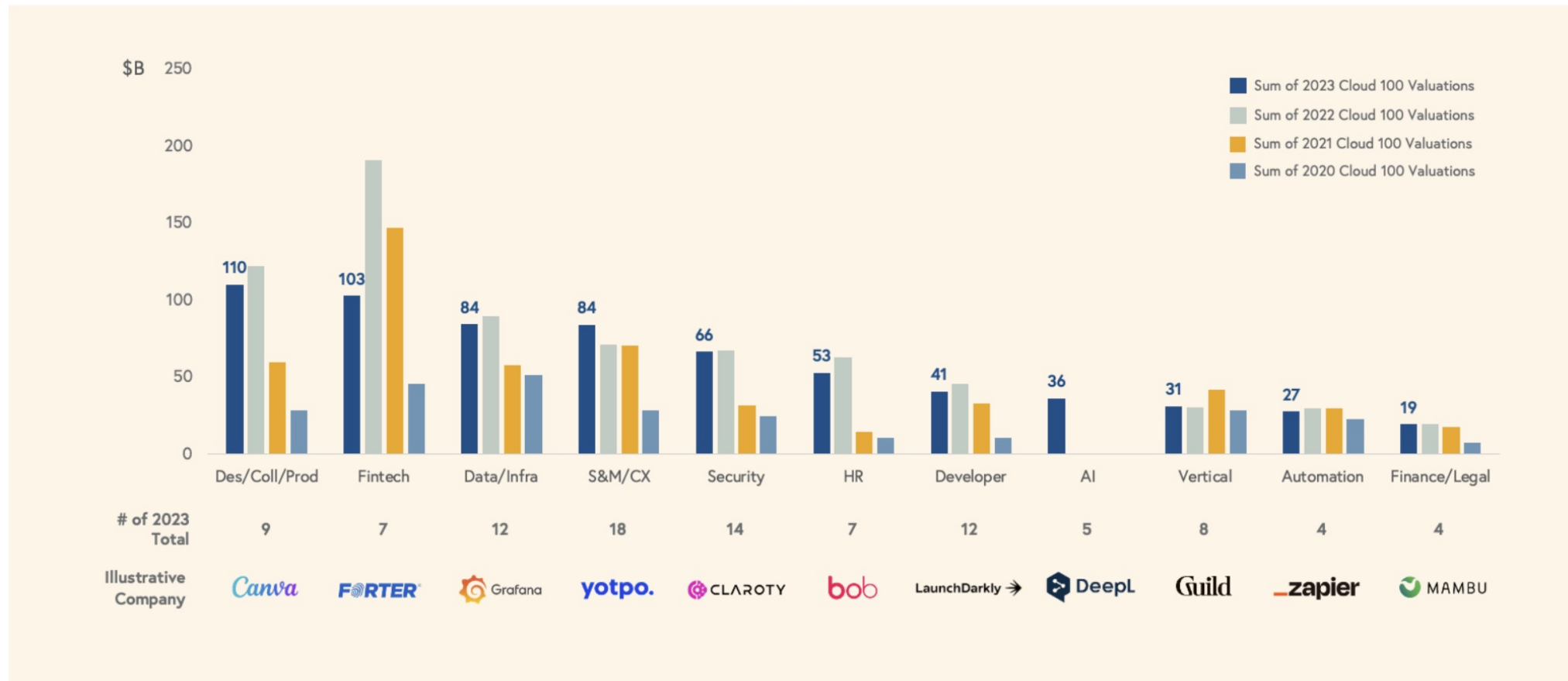
	2016	2017	2018	2019	2020	2021	2022	2023
CLOUD #1	slack	stripe	stripe	stripe	snowflake	stripe	stripe	OpenAI
CLOUD #100	Skyhigh	Canva	pendo	DASHLANE	LaunchDarkly →	AXONIUS	Front	DeepL
LIST VALUE AT C100	\$99B	\$116B	\$138B	\$166B	\$267B	\$518B	\$738B	\$654B
TODAY'S VALUE	\$558B 5.7x	\$730B 6.3x	\$660B 4.8x	\$646B 3.9x	\$676B 2.5x	\$644B 1.2x	\$662B 0.9x	\$654B 1.0x
# EXITS	80	73	60	43	34	14	1	-
EXIT VALUE	\$277B	\$316B	\$320B	\$273B	\$272B	\$125B	\$20B	-
AVERAGE EXIT VALUE	\$3.5B	\$4.3B	\$5.3B	\$6.3B	\$8.0B	\$8.9B	\$20.0B	-

Source: <https://www.bvp.com/atlas/the-cloud-100-benchmarks-report?from=feature>

AI is a totally new category!

Total Cloud 100 list valuation by category

Design, Collaboration, and Productivity leads as the most valuable category; Fintech, the runner-up category, experienced notable write-downs in the past year



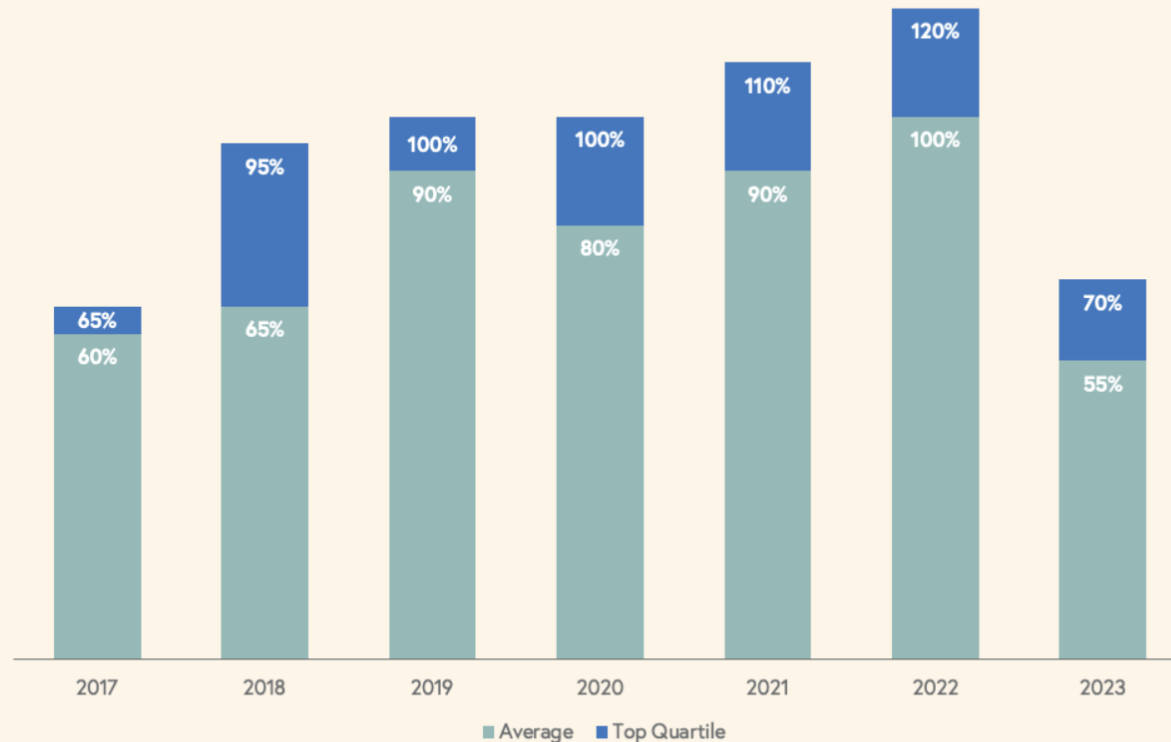
Source: <https://www.bvp.com/atlas/the-cloud-100-benchmarks-report?from=feature>

Expected Growth Rates Tell Us 2023 was a Tough Year...

Cloud 100 growth rates declined in 2023

The average Cloud 100 company is forecasting +55% YoY growth in 2023, nearly half the rate seen in 2022. The top quartile companies are growing +70% YoY

CLOUD 100
GROWTH RATES

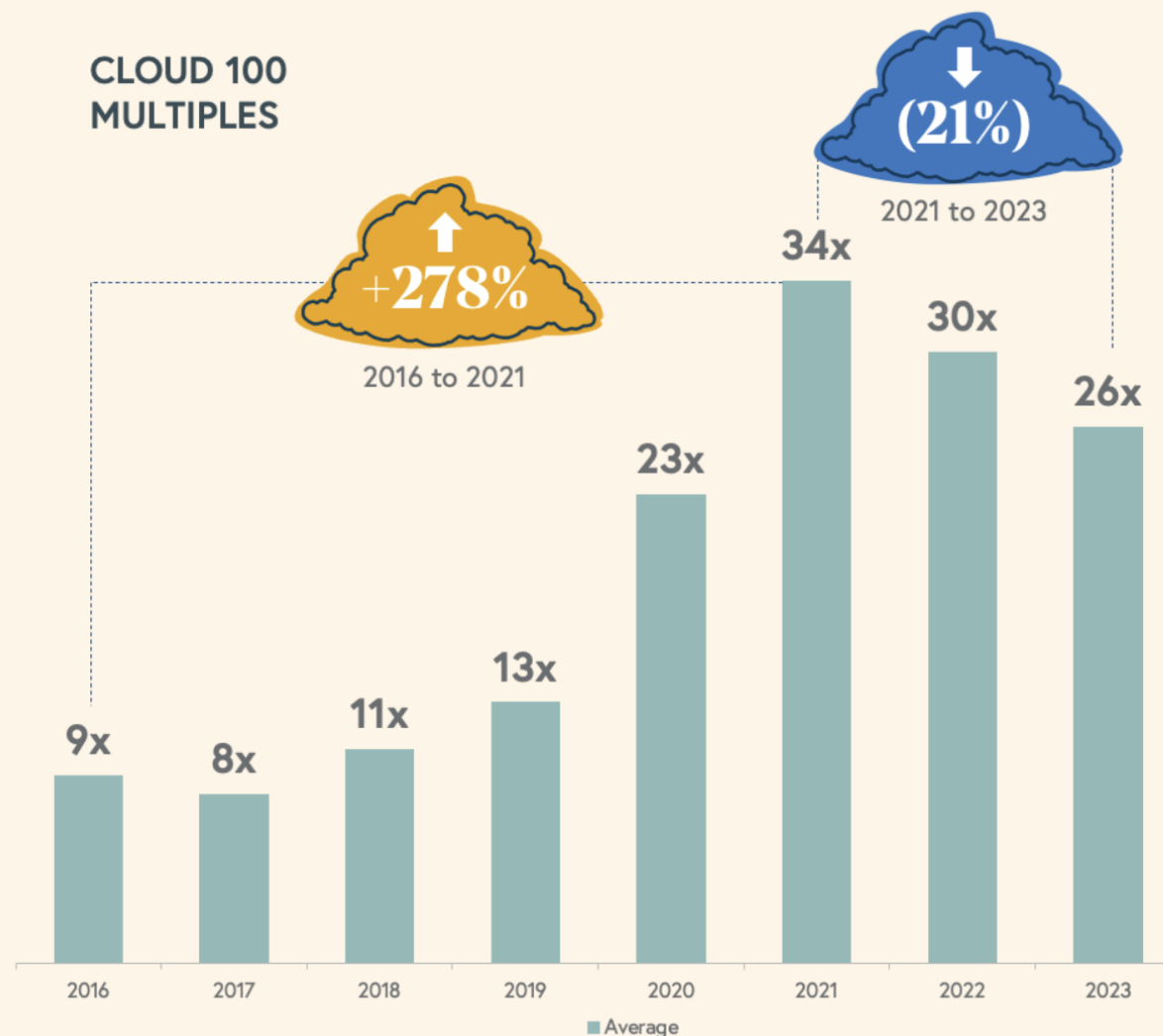


Source: <https://www.bvp.com/atlas/the-cloud-100-benchmarks-report?from=feature>

Valuations—Not Inexpensive, but Declining...

Cloud 100 multiples continue to reset through 2023

ARR multiples have fallen 21% since the peak in 2021

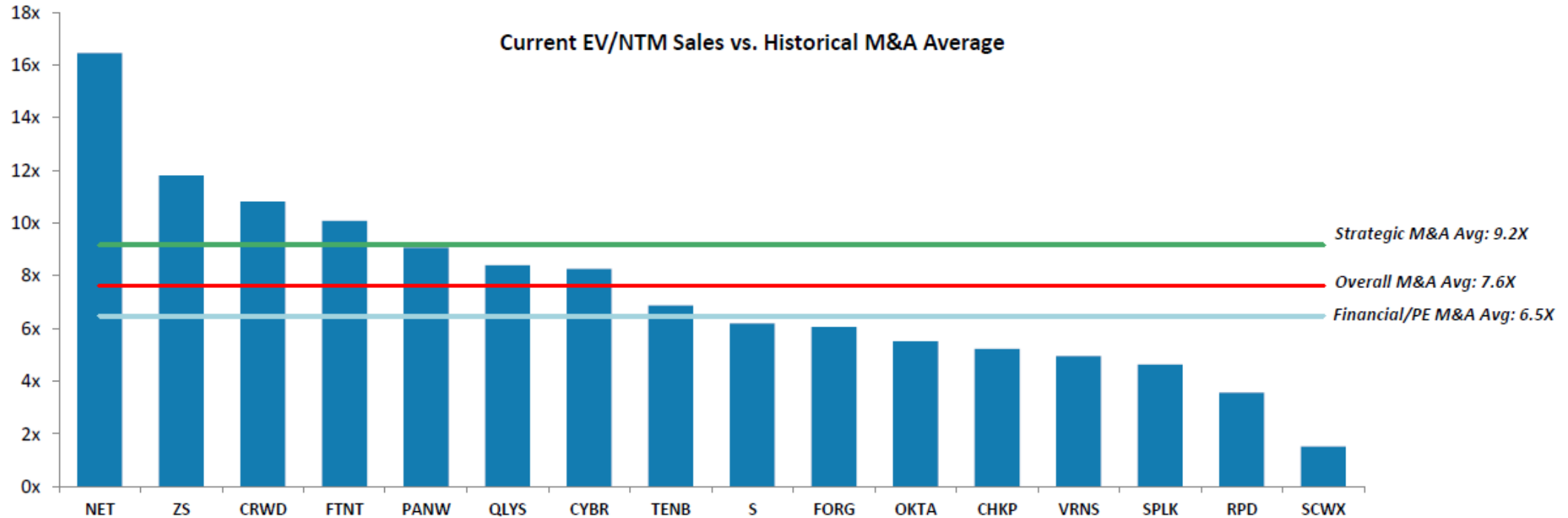


Footnote: Data reflects trailing twelve months from July of each year.

Source: <https://www.bvp.com/atlas/the-cloud-100-benchmarks-report?from=feature>

Don't Forget about M&A Activity—a Cybersecurity Subset

Exhibit 6: M&A Coming Back? Over Half of Public Security Companies Are Trading Below Historical Average M&A Multiple of 7.6X EV/NTM Sales

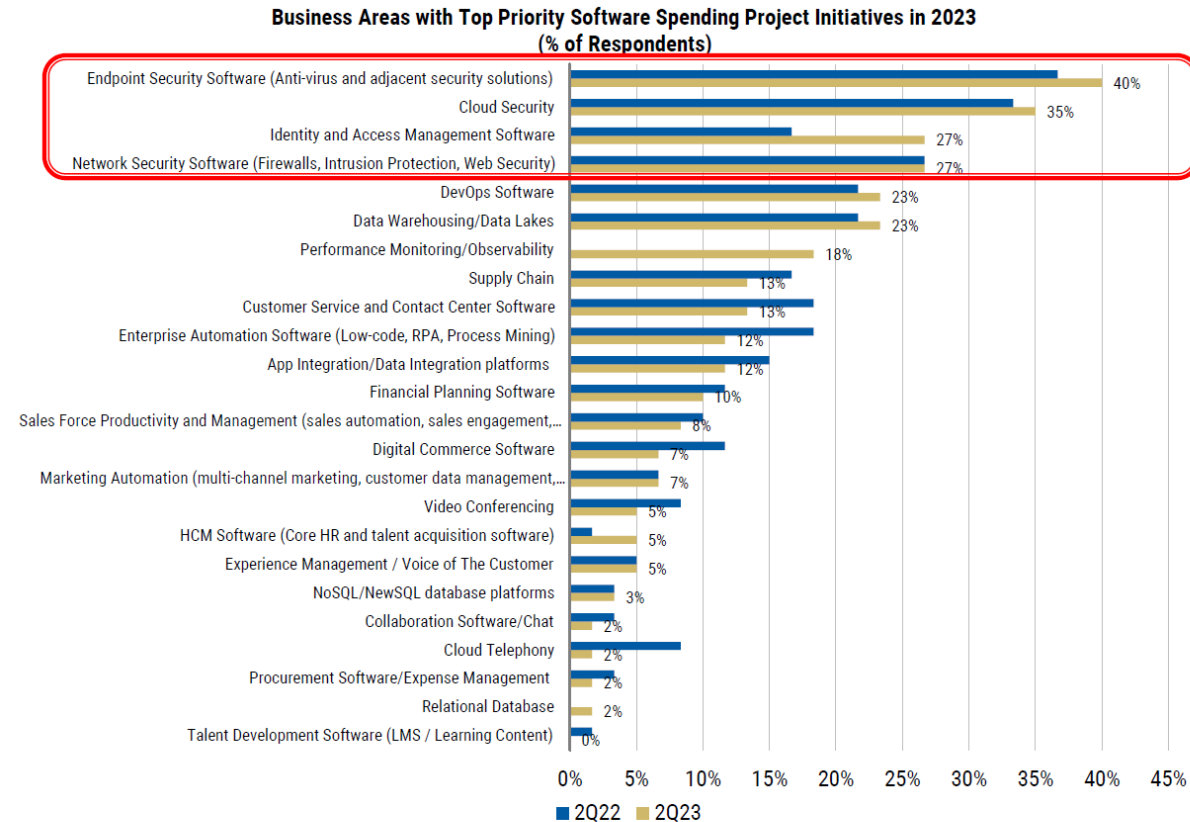


Source: Company data, Morgan Stanley Research estimates

Source: Fodderwala, Hamza. "4 Reasons We're More Bullish Here." [Morgan Stanley Research](#). 31 July 2023.

Spending Trends: Security

Exhibit 5: The Top 4 Software Spending Priorities Were Security-Related in Our Latest CIO Survey: Identity Management Notably Upticked vs Last Survey, While Endpoint Security Took the Top Spot



Source: AlphaWise, Morgan Stanley Research, n=60 (US and EU data)

Source: Fodderwala, Hamza. "4 Reasons We're More Bullish Here." [Morgan Stanley Research](#). 31 July 2023.

AI Specific Company Activities Related to Security

M&A May be Heading back up: The Splunk Example

BUSINESS | TELECOM

Cisco to Buy Cybersecurity Company Splunk in \$28 Billion Cash Deal

Cisco's largest-ever acquisition marks the network giant's latest investment in software

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Palo Alto Networks: Many Security Services from one Player

Our addressable market continues to expand



Security for network traffic managed comprehensively via a single pane of glass



Scalable and comprehensive security across the cloud app development lifecycle



Security reaching 'real-time' using the power of AI to contend with agile bad actors

Source: <https://investors.paloaltonetworks.com/static-files/6e536fbd-7ec6-431d-acec-60c9ace54bf3>

AI can Improve all Aspects of Cybersecurity

We will leverage AI across our entire portfolio

Unique Assets



Sensors installed
across ~48k customers¹



4.86 PBs of high quality
data collected per day



Out-of-the-box automation
to take real-time action

Precision AI

Precision AI will allow us to deliver unparalleled detection and response to achieve near real-time security

Generative AI

Generative AI will redefine and simplify how customers engage with our products and services

Source: <https://investors.paloaltonetworks.com/static-files/6e536fbd-7ec6-431d-acec-60c9ace54bf3>

The Cloudflare Example: 140 Billion Cyber Threats PER DAY!

Data Intelligence & Quality Assurance at Scale

Global sensor network
with paying customers in 180+ countries.

Machine learning systems
improve products with
every customer's request.

Immune system for the
Internet blocking an average of
140 billion cyber threats each day.

Rapid development cycles
and QA through free users
volunteering to test new products.

Note: Cyber threats blocked per day is approximate average over the three months ended June 30, 2023. Other figures as of the three months ended June 30, 2023.

Source: https://cloudflare.net/files/doc_downloads/Presentations/2023/08/Q2-2023-Investor-Presentation.pdf

Conclusions

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- While 2023 Might have been the ‘Year of AI’ Cybersecurity was Right in the Background
- As New Technologies are Deployed, they Need to be Secured Properly—Thematic Flows do not yet reflect this
- Possible intersection of AI & Cybersecurity Relates to # of Professionals Needed
- Threat Landscape is always growing
- While Security is constant, Bad Actors only have to be correct 1x to do damage...at times significant damage.

Source: WisdomTree.

Questions

For more information and insights please visit:

[wisdomtree.eu](https://www.wisdomtree.eu)



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