THE STATE OF AI TALENT 2024

zeki

TOMORROW'S TALENT TODAY

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EXECUTIVE SUMMARY

The State of AI Talent 2024 celebrates the top AI scientists and engineers who are building the most transformative technology of our generation.

Artificial Intelligence is already changing the world around us and we are only at the start of the journey. In this report, we **reveal how this talent moves around the world and why**.

Our insights are purely data-led, drawing on a carefully curated dataset, which melds unique technology and data to **deliver insights on 140,000 top AI scientists and engineers globally**, all of whom have advanced skills and expertise and most of whom are in the early stages of their career.

TRANSIENT TALENT DESIRES OUTSIZED IMPACT

They are found in over 90 countries, trained at over 2,000 universities and hired by over 20,000 businesses. Their advanced skills mean that this talent can create new technologies, not just adopt those that are already on the market. As a result, this talent is increasingly in high demand as the best businesses around the world, large and small, build teams capable of reinventing products, processes and services and not just enhancing existing ones. These companies know that their relevance in the market depends on attracting this type of transformational talent.

EXECUTIVE SUMMARY CONTINUED

This talent, therefore, has many more choices on how they bring their skills and expertise to the market. They are taking up the opportunity at pace. They are highly mobile across borders and move roles frequently. They are positioning themselves more systematically to gain visibility and reach. Salary is not the only determinant. They are increasingly motivated by the value of bringing new uses of AI into the market, whilst also making AI more trustworthy and relevant to the society and generation they are part of--- we call them "walking intellectual property."

US BIG TECH MISSING OUT

The increasing number of companies seeking to acquire this talent will need to position themselves sharper and better in the market to compete. The Big Five US technology companies, Amazon, Apple, Google, Meta and Microsoft get most of the media attention around AI but they are minority players in terms of top AI talent, with a talent acquisition model which is under threat. Other large companies globally, that are creating AI-driven innovation way beyond the consumer internet and knowledge economy, hire five times as much top AI talent as the Big Five. And the over 10,000 small companies in our data also hire more top AI talent overall than the Big Five.

HEALTH SECTOR LEADS GLOBAL MARKET SHIFT

The global market is also shifting away from heavy US dominance. National champions are emerging in some major economies and anchoring talent at home. The health sector, particularly in Europe, has attracted a twenty-fold increase in top AI talent in the last 10 years. Other highly regulated industries, like banking, defence and automotive are now building out their top AI scientists and engineers. Their input into AI regulation would be highly valuable because they know what works best.

The report also describes the winners and losers in the market at a country and sectoral level. For countries, the stakes are high. If they lose the talent they have trained, they will be beholden to the technologies of others. The global rush to develop vaccines during Covid is a stark reminder to governments that they need to be able to deliver advanced technologies at pace when needed and with full agency rather than joining the queue. Sectors that are not attracting this top tier of AI scientists and engineers are among the most important to society at large, including cyber security and energy companies as well as defence establishments.

EXECUTIVE SUMMARY CONTINUED

CAREER BEHAVIOUR PATTERNS

We look also at where you can find top AI talent. Zeki hires talent from its data and knows first-hand the importance of early, proactive engagement. We look at the characteristics of top AI talent that decides to move overseas or stay closer to home. There are uniform trends globally which form early in the career of top AI talent. We describe also the main sources of supply of top AI talent and where the bottlenecks are which companies can avoid whilst also finding more diverse and yet brilliant talent. We describe the increasing focus of top AI talent on diversity and safety and where this talent congregates to find new ways to approach these issues.

RETENTION DEFINES THE FUTURE

We celebrate and highlight also over 700 companies, large and small, by country and sector, which attract top AI scientists and engineers. Their ability to attract this talent is an endorsement of the myriad ground-breaking products they plan to bring to the market and their appetite to put AI first.

The global market for top AI talent is efficient and dynamic and will become even more so as it deepens and diversifies. The finite amount of top AI talent available will mean that there will be sharper divides between those who can attract and retain this talent and those who cannot. Companies that can retain this talent for longer than normal, against high churn overall in the market, will be the ones to watch going forward. They will have demonstrated an ability to keep this talent motivated and engaged, building sustained intellectual property and in-house AI expertise, that will lead global innovation.

KEY REPORT TRENDS

A TWO TIER MARKET

US Big Tech companies caused a surge in demand for top AI talent from 2015. They played to win and there were losers. A two tier system of countries has emerged - those that import or export top AI talent. The economies of countries with sharp sustained outflows of top AI scientists and engineers will rely on the technologies of other countries, built by their own home-grown talent. Some countries have so far succeeded in turning around their net outflows. But France, Italy, Spain, Israel and India are falling behind.

BIG FIVE CHURN

The Big Five (Amazon, Apple, Google, Meta and Microsoft) are already a minority stakeholder in a market dominated by other large global companies. Top AI scientists and engineers see the Big Five as a quick gateway to other roles. Amongst them, Google has first pick of top AI scientists and engineers. Their model is high churn at high volume; a model at risk as their market share falls and costs rise. Others are now copying their model to gain first mover advantage.

NO MIDDLE GROUND

The top AI talent market is diversifying and deepening. Large companies hire five times more top AI scientists and engineers than the Big Five. New AI national champions are emerging outside the USA. The AI talent ecosystem amongst small companies is most vibrant in the health sector. But there is little middle ground for AI-led companies. Large companies dominate the market and move fast to acquire talented start-ups. Small companies face going big, getting bought, or going out of the market.

MARKET SHIFT

The market is shifting. Major manufacturing, automotive, health, defence, consultancy companies and banks are reinventing themselves as AI-led technology organisations. The ability of health companies to attract and grow their top AI talent is exponential. These sectors are beginning to hire top AI scientists and engineers at a collective scale that will bring them into competition with US Big Tech. But cyber security and energy companies, as well as defence establishments, are failing to attract top AI scientists and engineers.

BRAIN DRAIN

The United Kingdom, Germany, the Netherlands, the Gulf countries and Nordic countries are seeing now net inflows of top AI scientists and engineers whilst India, Spain, Italy and Israel are experiencing sharp sustained net outflows. France and Canada have few levers to redress their loss of talent and risk also falling behind their neighbouring advanced economies on AI despite the quality of their top talent. Asian and Southeast Asian countries exchange talent only with the USA. The brain drain of top AI scientists and engineers from Africa is a myth.

FIRST MOVER ADVANTAGE

Top AI talent is highly mobile with the most mobile showing uniform characteristics early in their career. Only the minority of the very top AI scientists and engineers are in the USA. As competition increases, companies will need better tools to spot emerging stars earlier to gain first mover advantage. Brand positioning will sharpen to help differentiate in an increasingly crowded field of talent spotters. A key element of this will be contributing thought leadership on AI, especially on the issues that we see as increasingly counting for young rising stars.

About Zeki

Zeki is a talent intelligence platform. We provide actionable intelligence to governments, companies, and foundations on how top talent moves around the world, what motivates it, where to find it, and how to retain it. Zeki finds promising talent no one else can.

The key to Zeki's work is novel technology. Our data-led approach to talent intelligence **identifies, curates, and ranks the global cohort of top-tier of talent**. Zeki provides direct insights on their:

- performance and potential
- career positioning and network
- reputation and influence

See the Data & Methodology section for greater detail.

Our co-founder, **Tom Hurd**, was the Head of Intelligence Analysis in the UK before serving as Head of the UK's Homeland Security department. He was also responsible for setting up the UK's Joint Biosecurity Centre, a data-led organisation that **brought data science and public health expertise together** to spot earlier and more accurately COVID-19 outbreaks.

Contact us: enquiry@thezeki.com

About Zeki continued

AI is at the forefront of **over $2 trillion spent annually** on research and development given its transformative potential across many sectors of the global economy. Acquiring the best AI scientists and engineers is essential to **leading the global race to transform and innovate** using AI.

The Zeki State of AI Talent 2024 report provides **precise intelligence on the global talent market** and which countries, universities, and businesses are winning or losing the AI talent race.

ZEKI INTELLIGENCE PRODUCTS

Our business is data-led talent intelligence. We provide actionable insights that can transform your talent pipeline.

We analyse. You recruit.

ZEKI HORIZON
MARKET ANALYTICS

Actionable intelligence reports on global science and engineering talent in deep technology fields including Artificial Intelligence, Quantum, Engineering Biology, and Life Sciences.

ZEKI BENCHMARK
BRAND POSITIONING

Data-led evaluation of your organisation's market position, including your reputation and capacity to recruit and maintain top scientific and engineering talent--- and how your talent compares to competitors.

ZEKI DISCOVERY
TALENT ACQUISITION

Our talent dataset is singularly unique. Find pre-qualified talent to augment and diversify your talent pipeline. Streamline due diligence on job applicants.

Data and methodology

Zeki offers a single view of talent based on **three verticals:**

RESEARCH PERFORMANCE

Publications, data repositories, funding, co-author network

CAREER POSITIONING

Career timeline, mobility, professional network

COMMUNITY - THEIR 360

Selected for awards, competitions, scholarships, leadership roles

AI is a highly dynamic sector with new talent and expertise coming into the market on a daily basis.

Zeki's goal in this report is to bring transparency to this talent, in particular the top young emerging talent who are at the frontier of discovery and innovation.

To achieve this, we created a curated dataset of talent who were selected either to present papers at the 20 most prestigious AI conferences or had their work published in one of the top 20 AI journals. We collected this data going back 10 years, thereby compiling a comprehensive dataset of the works and research connections of over 140,000 people at the forefront of AI discovery. We enhanced this data, using a variety of open sources aligned with advanced machine and reinforcement learning, to plot their career paths.

We further enriched our dataset with over 2 million unique data points collected by Zeki, which describe thought leadership and organisational roles played by individuals in the community, including winners of awards and scholarships as well participants in hackathons and competitions. This data allows us to describe meritocratic processes in the community – who has chosen or been chosen to play wider roles or has been recognised by their peers for their excellence.

Data and methodology continued

Finally, we scored every individual data point in our dataset based on a Zeki scoring system that weighs the prestige and impact of each event or action taken.

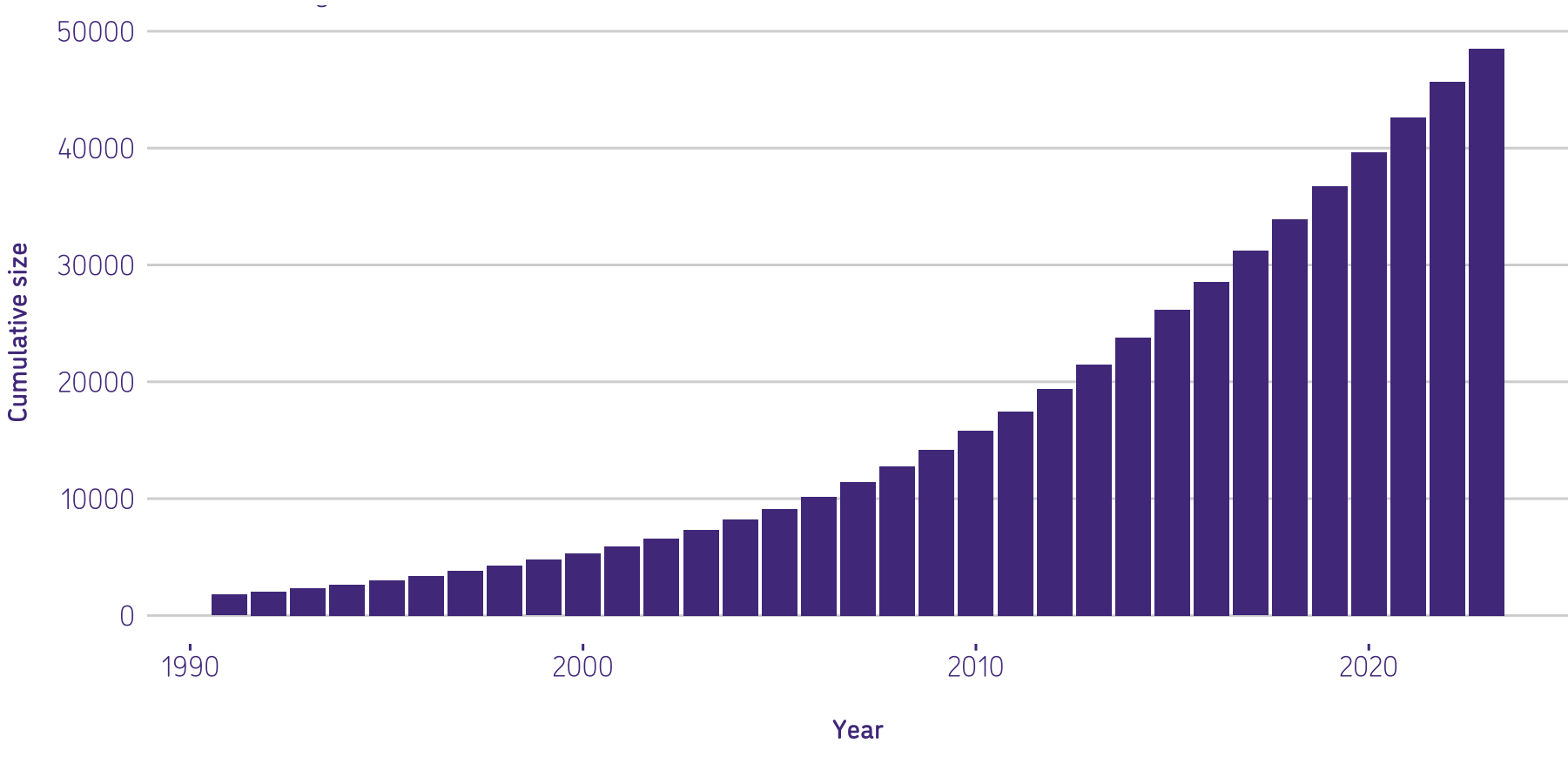
We then **anonymised and filtered the dataset to 47,500** individuals who we had high confidence had achieved an advanced level of education - a PhD - and were not located in China, as our focus is on talent within the Western-led AI ecosystem.

We judge this cohort to be the talent in the AI ecosystem most likely to have a transformational effect because of their advanced skills. **We refer to this talent throughout the report as top AI talent.**

The graph below shows that the vast majority of the talent in ouar dataset are **young emerging researchers** who have completed their education in the last 10 years.

Within this Zeki dataset, we celebrate talent from **94 countries** educated or working at **2,296 universities** or employed by over **20,000 companies or organisations** globally.

Date of PhD graduation of talent in Zeki dataset



CHAPTER ONE

Winners and losers in the global competition for top AI talent

In this chapter we look at how top AI talent moves around the world, driven by supply and demand in the market.

Countries and companies that attract and retain this talent benefit from the intellectual property they create, giving them advantage. This talent is in essence "walking IP".

Governments are increasingly realising the consequences for their economies if they do not retain the talent they have trained. Many have now set out national AI strategies which prioritise the need to attract and retain talent.

US NATIONAL AI RESEARCH & DEVELOPMENT STRATEGIC PLAN 2023

'The United States is home to an abundance of talent in many areas but has historically relied on foreign born talent to bolster its technology workforce—especially in R&D in emerging technologies. Half of the current AI experts in U.S. academia and industry were born outside of the United States. Federal resources can support university, industry, and civil society efforts to host visiting students and scholars with pathways to U.S. citizenship'.

UK GOVERNMENT STATEMENT 2018

'Through our modern Industrial Strategy we're joining with industry to invest close to £1 billion in AI, to position the UK as one of the best places in the world to develop and use this exciting new technology. This investment will help us to recruit and retain the best talent in AI and ensure that we are leading the way on research and development in the sector'.

KEY FINDINGS

UNITED STATES HAS DOMINATED DEMAND FOR TOP AI TALENT FOR 10 YEARS

US Big Tech expansion created a surge in demand for top AI talent in 2015. US Big Tech played to win, causing twice as many top AI scientists and engineers to come to the USA than to leave in the last ten years.

THIS CREATED A DISLOCATION IN THE GLOBAL MARKET

Major net losers of talent emerged, particularly the advanced economies of Europe, and a two-tier system of importers and exporters took hold.

GOVERNMENTS ARE WAKING UP TO THE RISK

Governments started putting in place national AI strategies that prioritised the attraction and retention of top AI talent. The stakes were high. Failure to address the imbalances would limit their ability to gain key technologies, leaving them to rely on others.

KEY FINDINGS CONTINUED

SOME COUNTRIES ARE NOW RETAINING THE TALENT THEY WERE LOSING

The United Kingdom and Germany have now started to redress their net outflows of top AI talent, achieving the same equilibrium that Switzerland, The Netherlands and the Nordic countries had achieved.

BUT MOST COUNTRIES ARE NOT

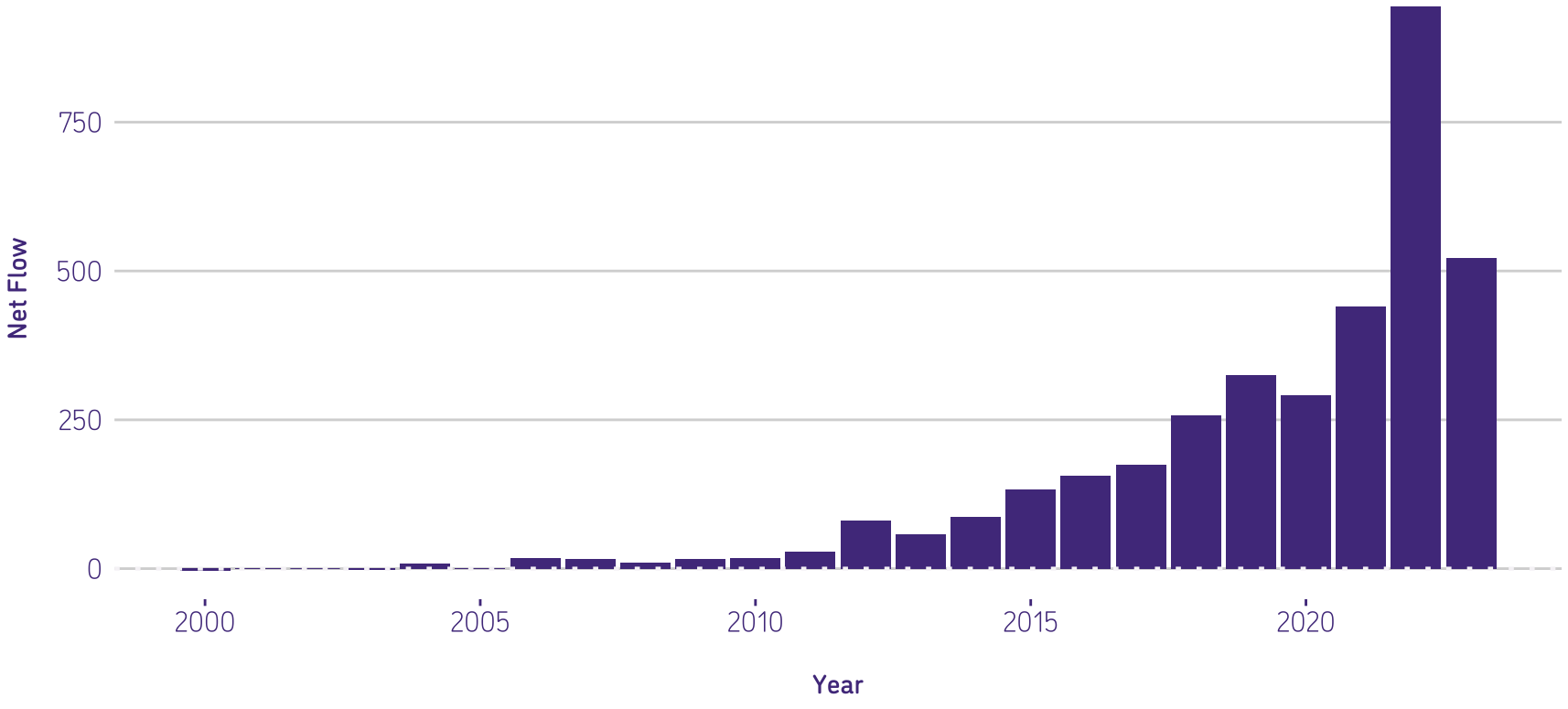
France and Canada are starting to redress their imbalances but with fewer levers to do so. Italy, Spain, India and Israel are still experiencing sustained net outflows of top AI scientists and engineers, mainly to the USA.

THE HEALTH OF YOUR AI ECOYSTEM IS WHAT MAKES THE DIFFERENCE

Top AI scientists and engineers are more likely to stay in the country where they were trained if the universities in that country are not top targets of US Big Tech, there is a national champion who anchors talent at home, and a broad and diverse ecosystem of small companies.

The USA has relied on very high inflows of top AI talent which started to increase rapidly in 2015.

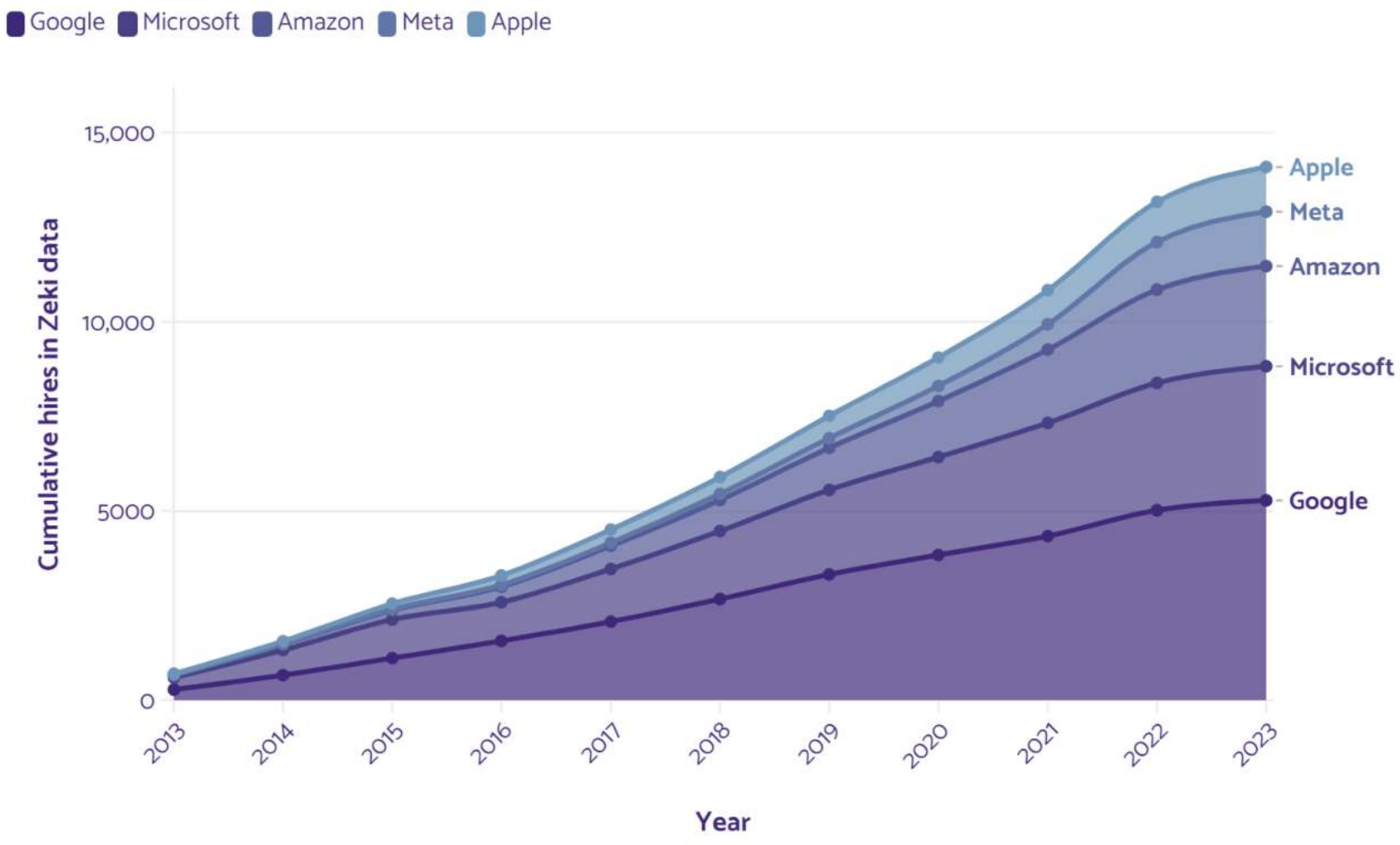
As capacity for advanced degrees grew at universities in the USA, this created a virtuous circle of more people going to the USA for training. Thus providing a greater pipeline of talent for US Big Tech to recruit from local campuses - which in turn encouraged a further wave of graduates to travel to the USA and join their predecessors on a well established path to success.



The Big Five (Amazon, Apple, Google, Meta and Microsoft) have also been a big driver of US demand for top talent.

The Big Five may have made significant lay offs in 2023 but not of top AI talent, which they continued to recruit. They have played to win and so far succeeded. The growth rate of hiring in the Big Five over the last five years is **138 percent**.

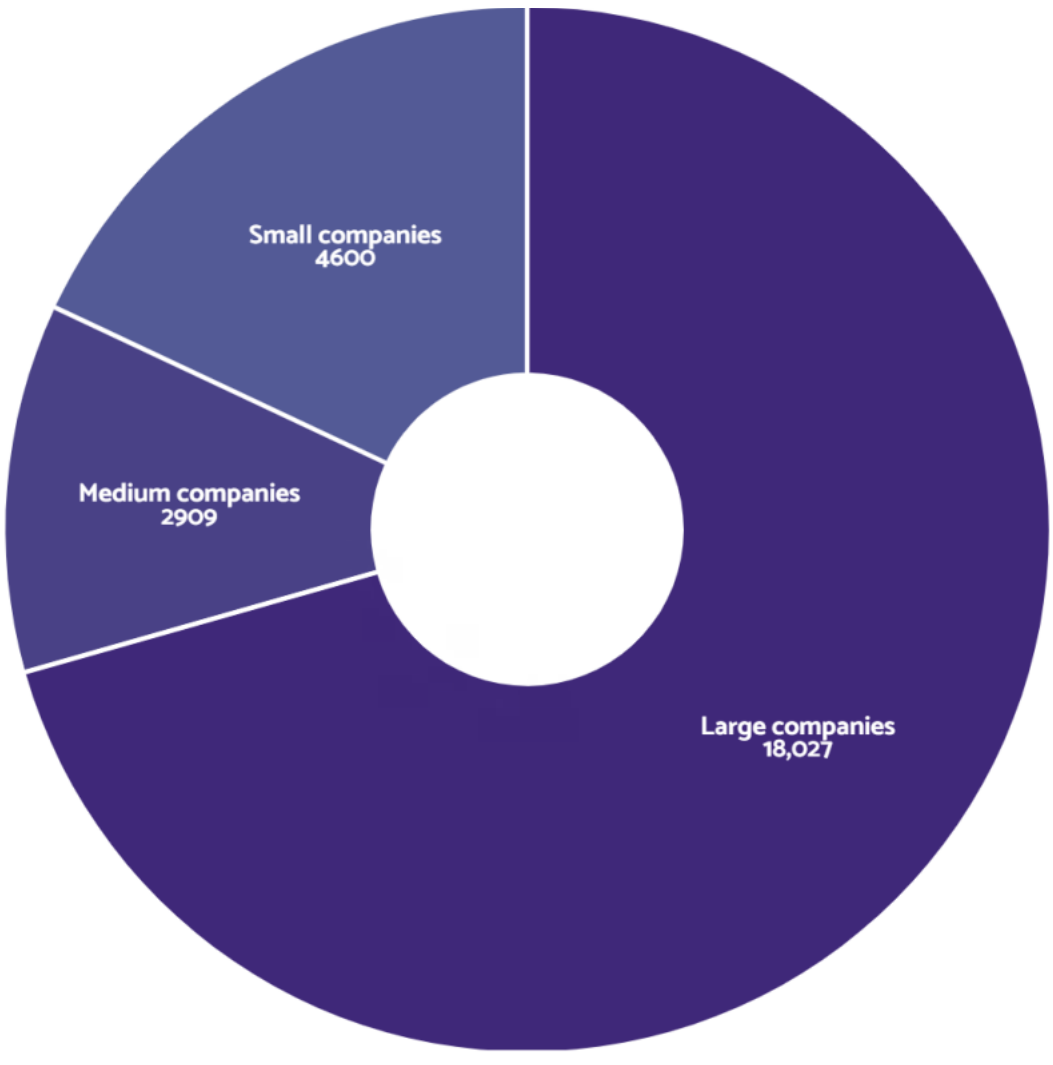
Hiring in the Big Five tech companies



The US AI ecosystem is also broad and deep with demand for talent at all levels.

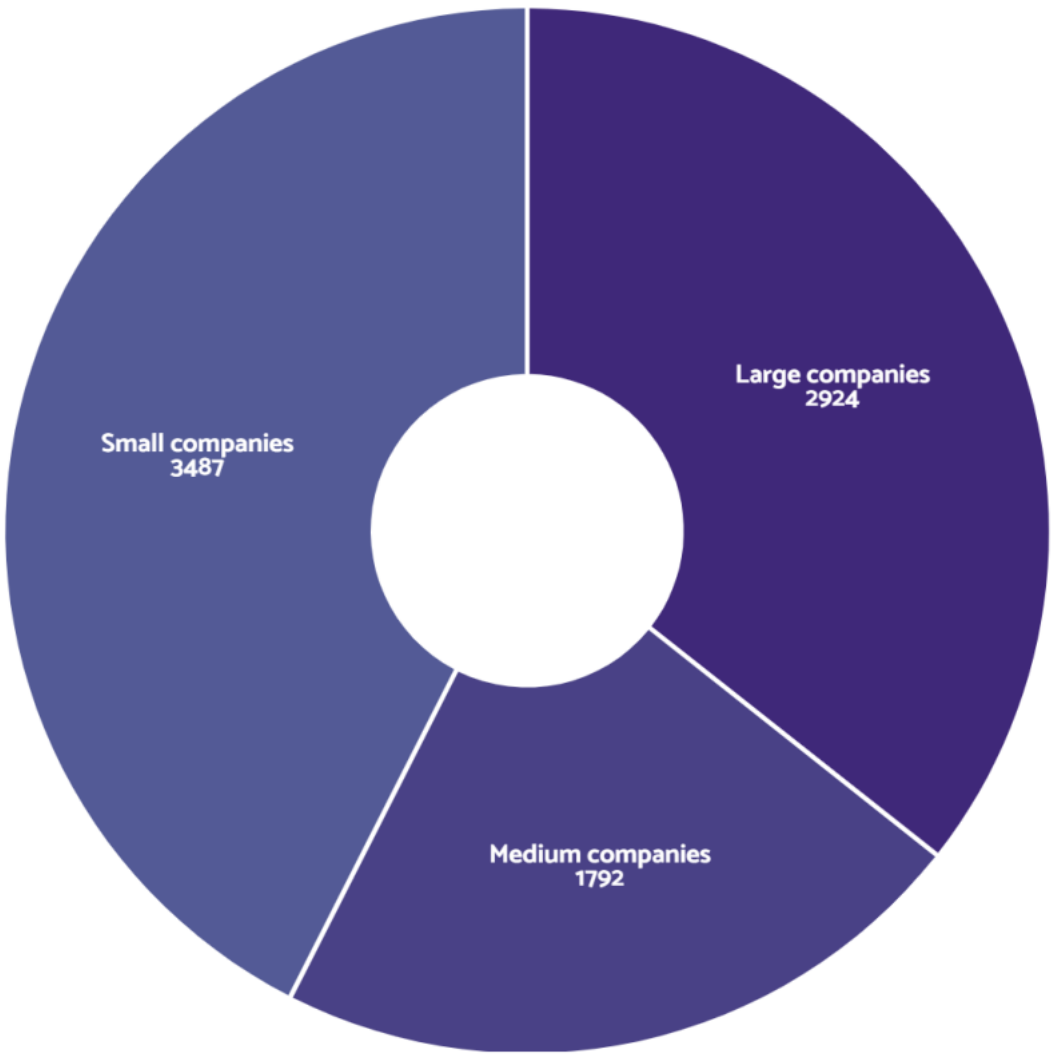
Top AI talent in the USA is highly concentrated in large companies, capturing **70 percent of top AI talent** that leave academia. There is little middle ground with middle-sized companies hiring only 11 percent of top AI talent.

Diffusion of AI talent by number of hires in Zeki data



The USA is home also to nearly 3,500 small companies who **hire 18 percent of top AI talent in the USA**. This is **over three times more companies** than in any other advanced economy.

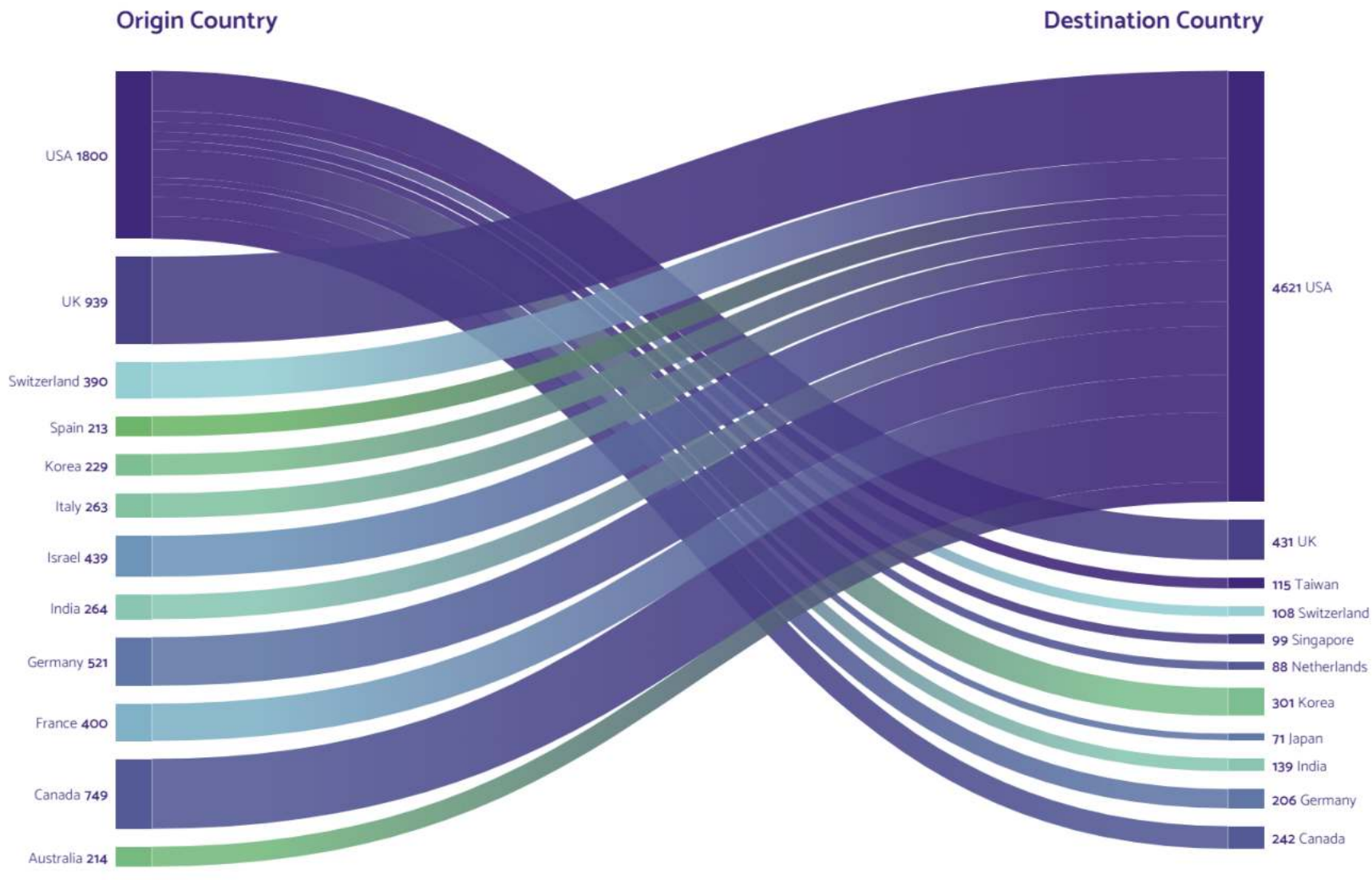
Diffusion of AI talent by size of organisation in Zeki data



As a result, over the last ten years, **the USA has attracted and retained twice as much top AI talent** as it has supplied into the market, drawing talent from the across the world, but in particular from Europe, Israel and Canada.

We judge that the majority of talent leaving the USA are likely foreign nationals, mainly from East and South East Asian countries, returning home after completing their advanced degree education.

Inflows and outflows of talent to and from the USA



Incoming and outgoing flows of talent in Zeki data

Country	Outgoing	Incoming	Staying	Country type	Net flow	Percentage of leavers(%)
USA	2867	6458	18253	Importer	3591	14%
United Arab Emirates	1	154	3	Importer	153	25%
Saudi Arabia	40	175	15	Importer	135	73%
Sweden	196	291	328	Importer	95	37%
Korea	326	394	523	Importer	68	38%
Norway	49	117	95	Importer	68	34%
Denmark	121	185	173	Importer	64	41%
Netherlands	426	468	359	Importer	42	54%
Taiwan	117	141	133	Importer	24	47%
Chile	22	40	14	Importer	18	61%
Iceland	2	13	0	Importer	11	100%
Estonia	11	16	20	Importer	5	35%
Singapore	303	307	239	Importer	4	56%
Finland	156	133	232	Exporter	-23	40%
Ireland	137	107	87	Exporter	-30	61%
Brazil	169	87	168	Exporter	-82	50%
Russia	117	17	46	Exporter	-100	72%
Japan	325	223	452	Exporter	-102	42%
Greece	206	96	189	Exporter	-110	52%
Australia	496	364	768	Exporter	-132	39%
Germany	1045	883	928	Exporter	-162	53%
Belgium	332	165	319	Exporter	-167	51%
Switzerland	705	519	426	Exporter	-186	62%
India	485	273	580	Exporter	-212	46%
Spain	552	159	594	Exporter	-393	48%
Israel	527	93	382	Exporter	-434	58%
Italy	670	168	691	Exporter	-502	49%
UK	2088	1529	1931	Exporter	-559	52%
Canada	1164	587	911	Exporter	-577	56%
France	1005	418	1008	Exporter	-587	50%

This surge in US demand for top AI talent has led to a major dislocation in the global market from the mid-2010s until today.

Nearly all other major economies started to experience sustained outflows of top AI talent they had trained, mainly to the USA. This has created a two-tier system in the market of talent importers and talent exporters.

The table on the previous page shows how much talent in our dataset a country has imported or exported - with surprising winners and losers. The flow of talent out of India, Spain and Italy has been particularly deep and sustained. As we describe in Chapter Five, these countries have few levers in place to counteract these imbalances.

Israel has a thriving AI talent ecosystem but over half the talent it educates then moves to the USA. The Gulf countries are attracting talent into their academic institutions.

The United Kingdom, Germany, the Netherlands and Switzerland have experienced net inflows in recent years as national champions like Google DeepMind, Siemens, Philips and Roche anchor talent at home. Nordic countries have experienced inflows into their increasingly diverse and deep AI ecosystems.

Canada and France are also now starting to redress their sustained outflows but from a low base and without obvious national champions in their industries that will anchor talent at home.

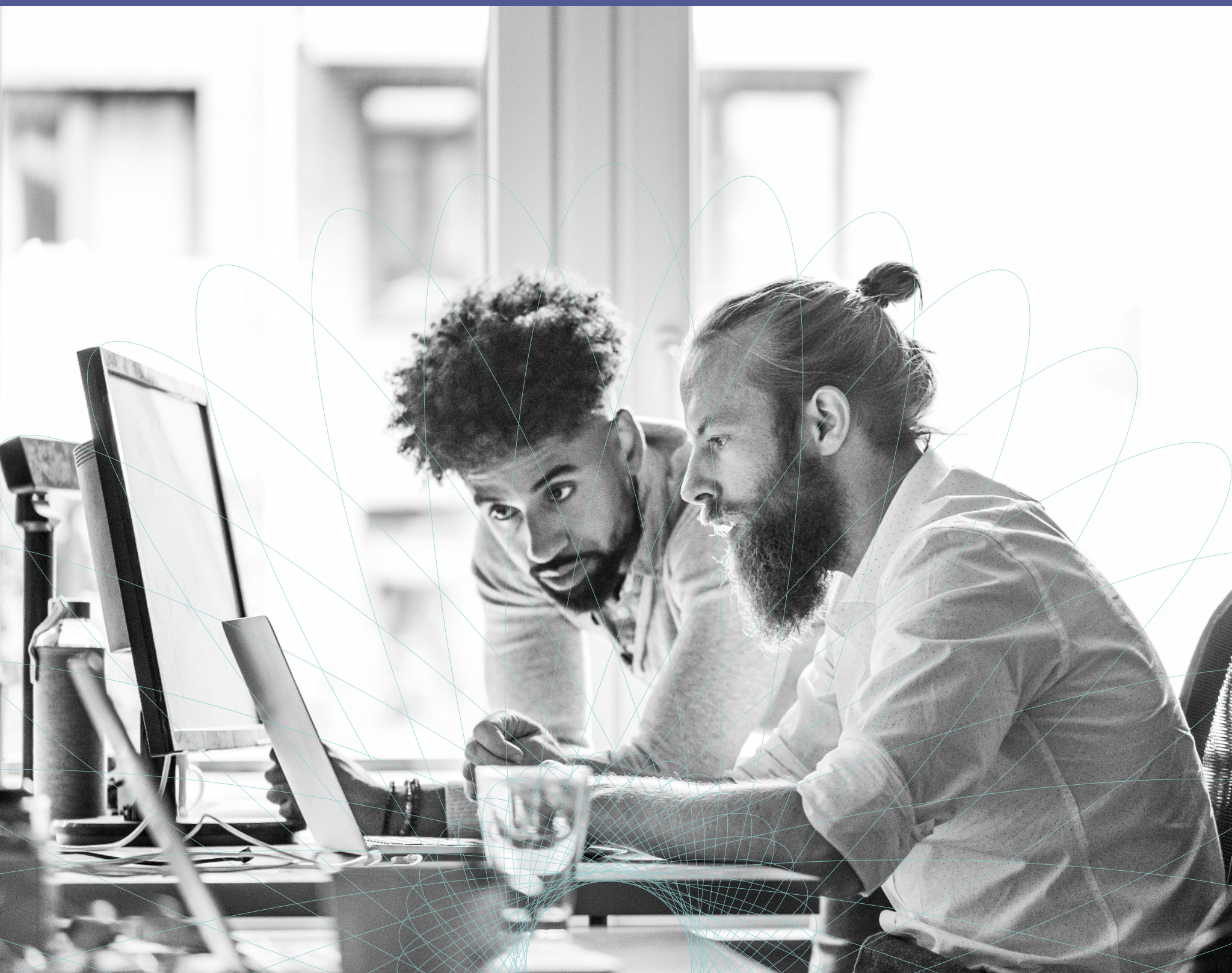
What is also clear in the table is the remarkable success of the USA in retaining the talent it educates, with only 14 percent leaving. No other country comes near to achieving this retention rate. Indian graduates make up the majority of overseas students who apply for the US H1-B temporary highly-skilled visa after completing their US education.

The Big Five companies (Amazon, Apple, Google, Meta and Microsoft) have been a key, but not the sole, driver in creating these imbalances globally as we cover in the next chapter.

The health of a country's AI ecosystem is what matters in retaining talent. Top AI talent is more likely to stay if there is a national champion who anchors talent at home and a broad and diverse ecosystem of small companies that also hires top AI talent.

CHAPTER TWO

The Big Five hold sway but their model is under threat



In this chapter we put the role of the Big Five (Amazon, Apple, Google, Meta and Microsoft) in context within the top AI talent market.

KEY FINDINGS

THE BIG FIVE HIRE BIG BUT NOT THAT BIG

The Big Five has an 11.4 percent share of the overall talent market, making them a minority stakeholder. Large companies globally hire five times as many top AI scientists and engineers than the Big Five. There are early signs of the Big Five concentrating and consolidating their top talent to accelerate their path to more intelligent AI.

BIG FIVE HIRE IN VOLUME AND EXPERIENCE HIGH CHURN

The Big Five concentrate their brand around English-speaking countries and universities, which are known centres of excellence. They hire in big numbers as they have high churn. We assume that they see this very high administrative overhead as the cost of doing business and focus their talent retention only on the most valuable talent.

KEY FINDINGS CONTINUED

THE BIG FIVE ACT AS A GATEWAY INTO TECH NOT A FINAL DESTINATION

Top AI talent moves quickly from the Big Five ecosystem into large and small businesses. They do not tend to go to another Big Five company and will not start a stealth start up until they have more experience.

GOOGLE IS THE WINNER IN ATTRACTING TALENT

Google dominates recruitment from top universities and from other Big Five companies. It has lost talent to OpenAI but is still highly attractive to top AI talent because of its thought leadership in the community and the research excellence of its talent and that of Google DeepMind.

EARLY ACCESS GIVES YOU FIRST MOVER ADVANTAGE

Companies with scholarship programmes can form partnerships with universities and become the default employer of choice from the AI labs at these universities. The Big Five all have scholarship programs but others are also getting into this space to gain first mover advantage.

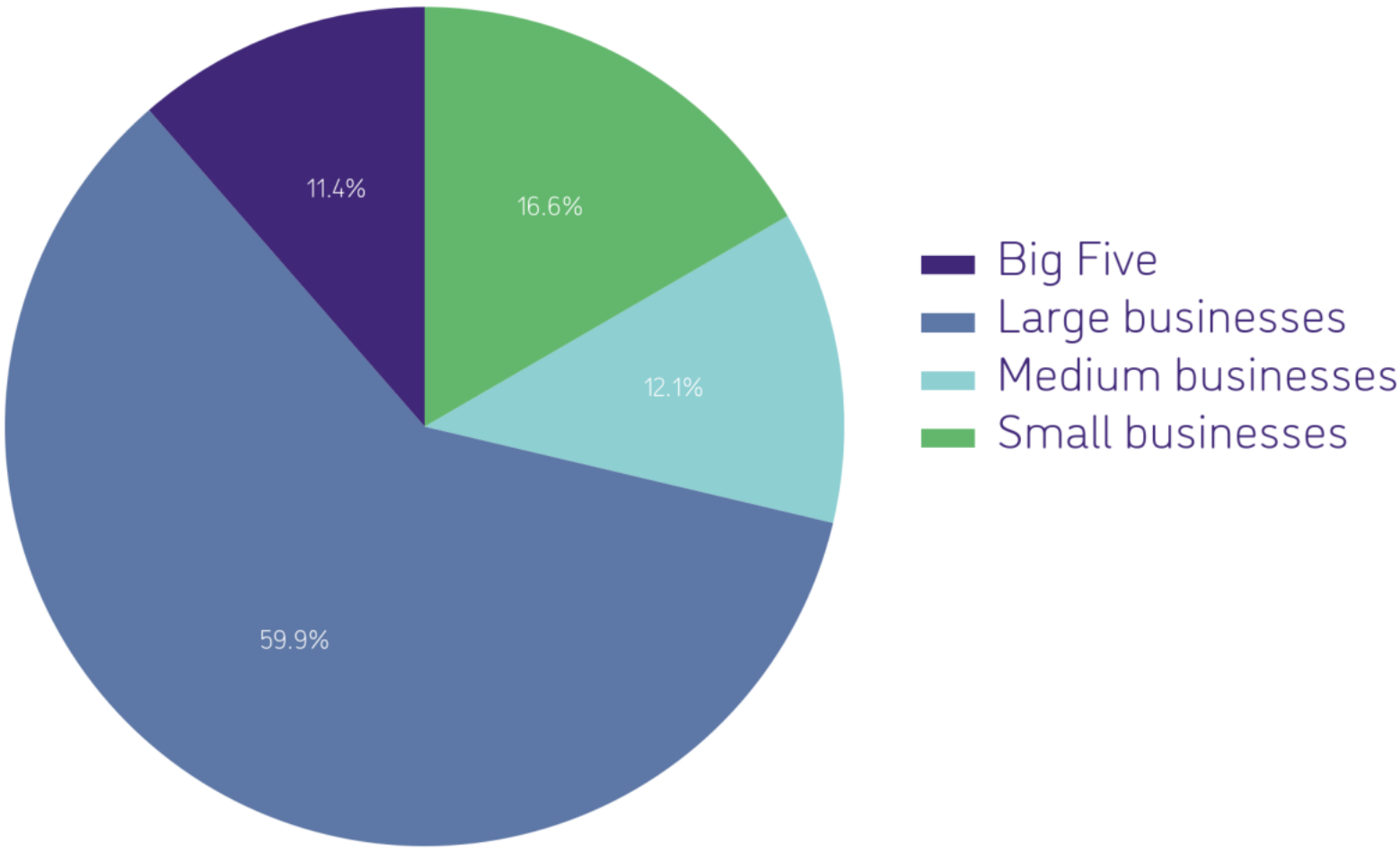
BIG FIVE BUSINESS MODEL UNDER THREAT

Global demand for top AI talent is diversifying and deepening. The Big Five model of high volume, high churn will at best be inflationary in cost against this increased competition or unsustainable as financial resources are increasingly needed to fund greater computing power.

The Big Five have 11.4 percent of the overall talent market.

It is large businesses of over 250 employees which are overall the greatest hirers of top AI talent in the global market, hiring five times as many scientists and engineers than the Big Five. They are growing their share in the future.

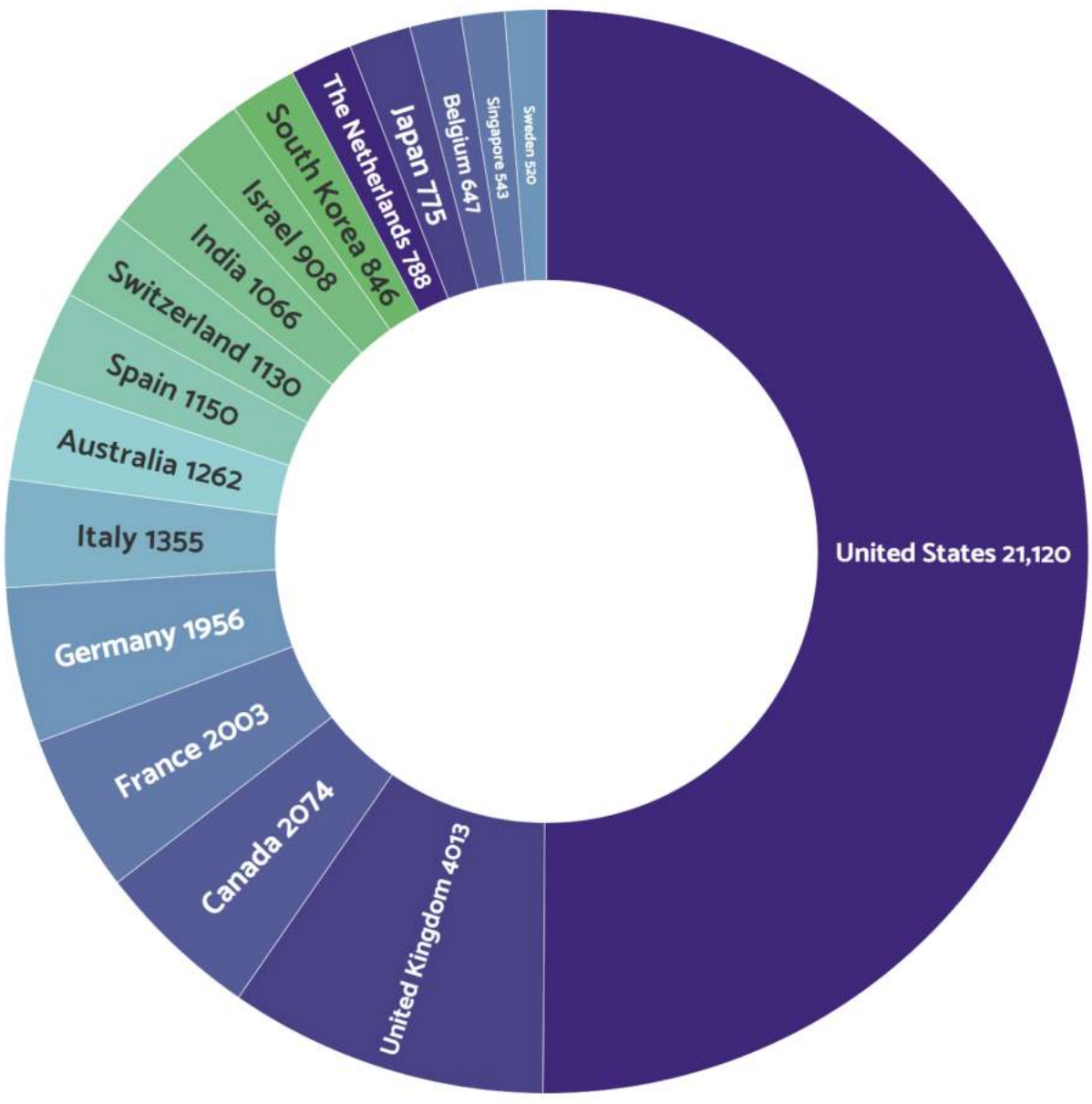
Large businesses dominate in hiring AI talent



The Big Five hire from English speaking countries or from those where the population are highly proficient in English.

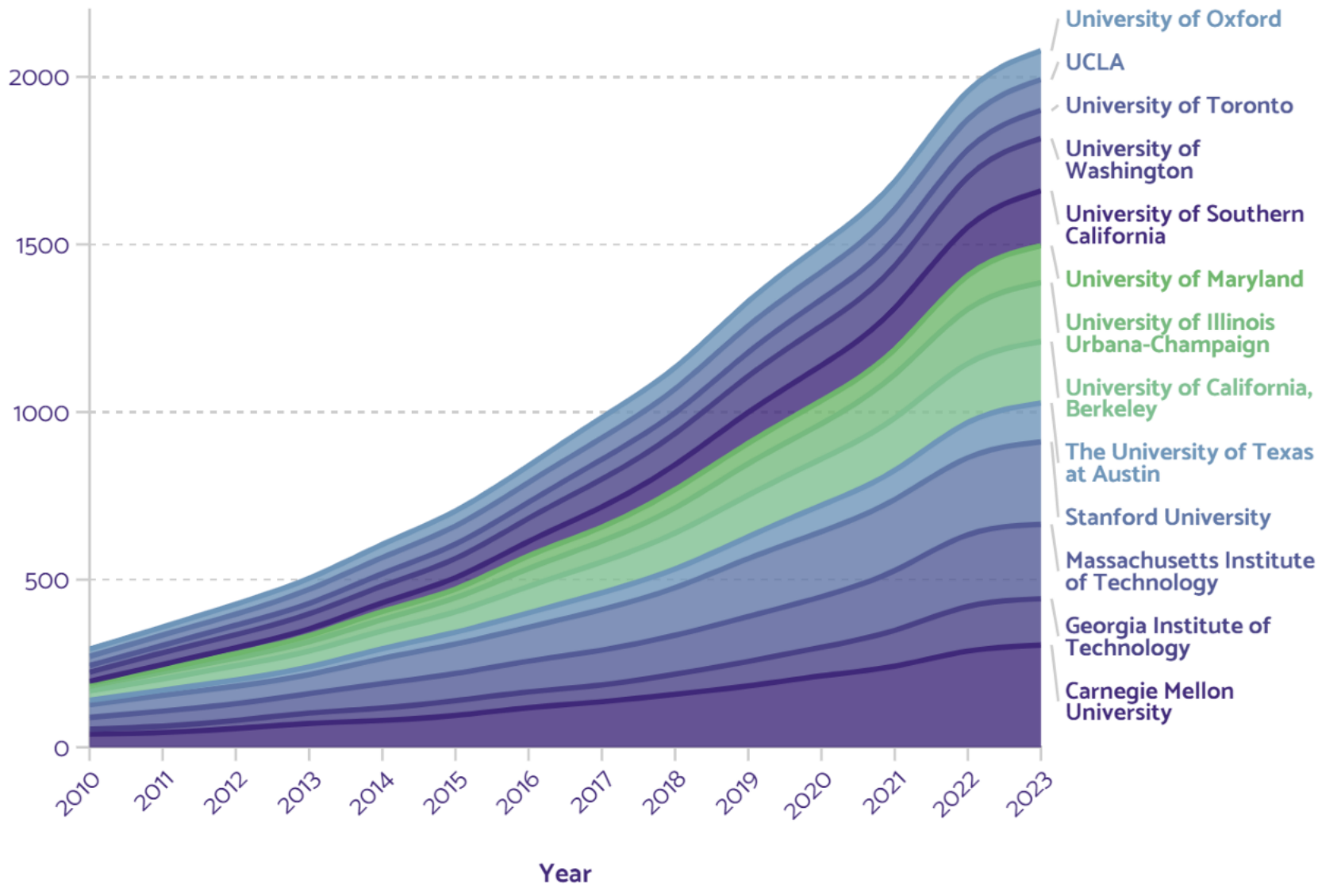
They hire very high numbers of the overall number of top AI talent trained in India and Israel, accelerating the outflow from these countries. The Big Five hire lower numbers from Germany, The Netherlands and Japan.

Number of Big Five hires per country of top AI talent in Zeki data



The Big Five hire from universities across the world but **focus mainly on acquiring talent from top universities in the USA, Canada and the United Kingdom** where they have established themselves as the prime recruiters of talent from these universities.

Flows to the Big Five from top universities

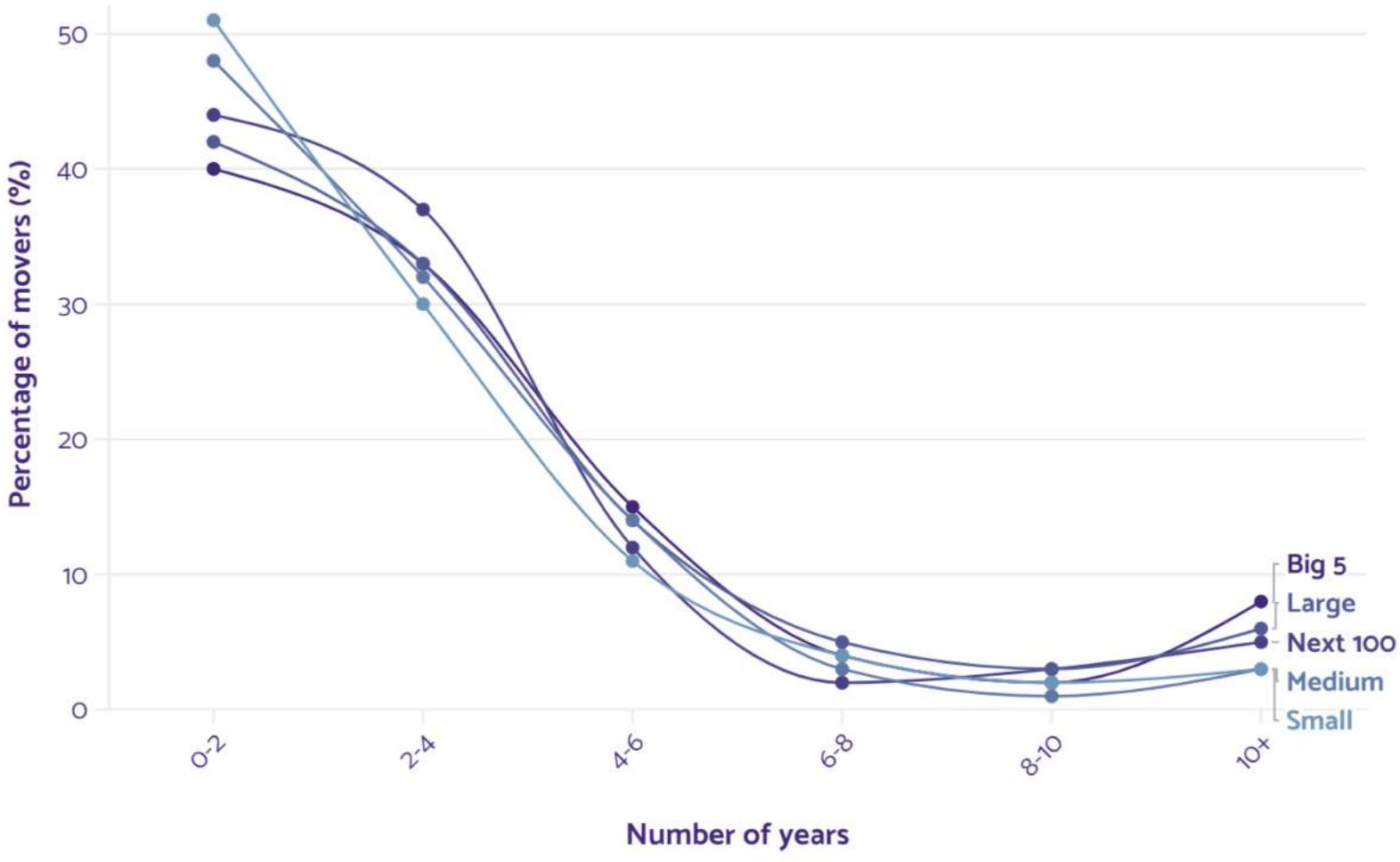


The Big Five hire in volume because of high churn rates which affect all companies in the AI talent market.

High churn rates show how difficult it is for companies to incentivise top AI talent to stay longer than a few years in any one role. This top AI talent, especially those with advanced degrees, is highly motivated to continue to pursue their research interests, making it hard to adjust to working environments where this is not possible.

But the scale of annual talent acquisition by the Big Five means that their churn rate has very high overhead. They are likely to see this as the price of doing business, focussing their retention incentives only on the most highly valued talent.

The Big Five have similar but large churn rates of early employees

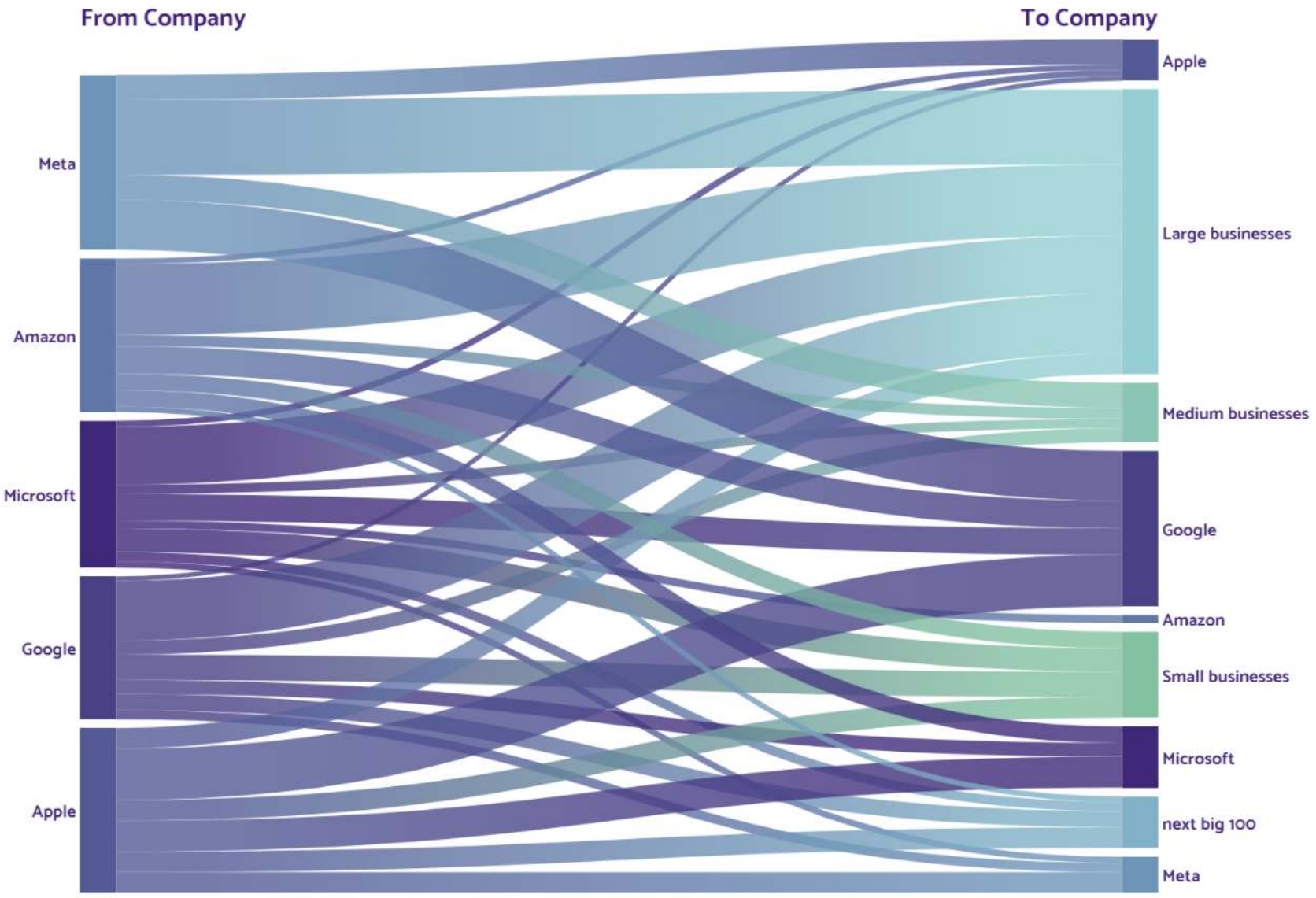


New entrants to the Big Five tend to see the Big Five ecosystem as a stepping stone into their next role in the market.

The majority move to roles outside the Big Five, in particular into large businesses which are the dominant player in the market. On average 40 percent join large businesses.

A significant number, 12 percent, also move to small businesses but not necessarily to very early stage start-ups. Our data shows that, on average, a top AI talent makes at least five career moves before joining a stealth start up.

After Big Five role, talent tends to move into large businesses



We can expect this **trend of movement out of the Big Five ecosystem to accelerate** as the Big Five lose share to a diversifying and deepening market, which we cover in the next chapter.

There are early indications that Google, Microsoft and Meta are consolidating and concentrating their top talent in a **race to make AI more intelligent**. Google has merged its AI Google Brain team with DeepMind. Microsoft has increased its investment in OpenAI whilst Meta has fused its Fundamental AI Research (FAIR) and Generative AI teams.

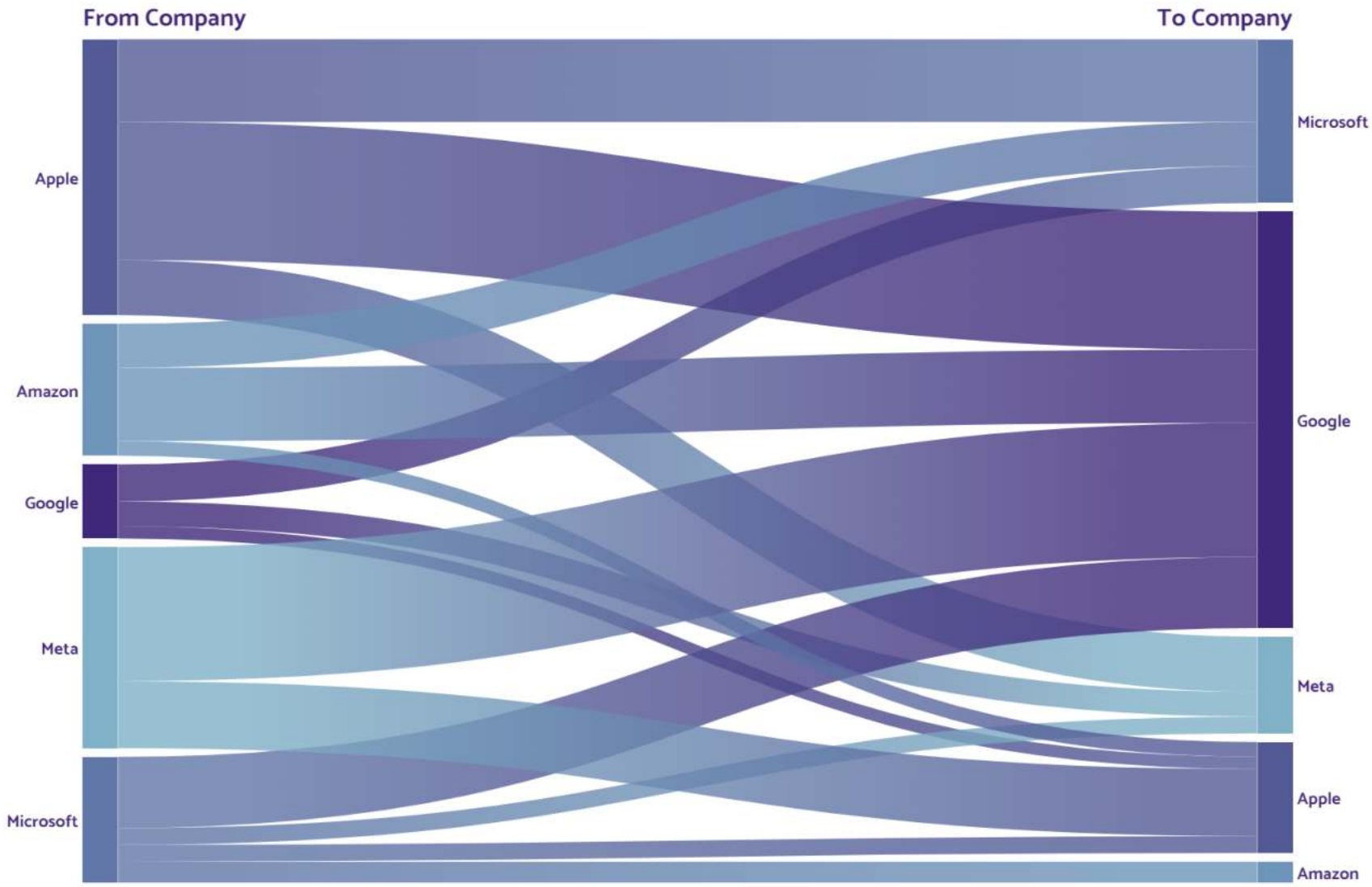
Google has a unique position in the market for top AI talent. *Fortune* magazine has recognised Google as the Best company to work for six straight years.

Google acquires talent from the other Big Five companies, in particular Microsoft. According to Glassdoor's 2024 data, Google scores higher than Microsoft on work-life balance, senior management, compensation and career opportunities; whilst Microsoft scores higher on CEO approval and positive business outlook.

We have noted high mobility of AI talent in the first six years of employment, and especially in the first two years.

Even though most talent leave the Big Five and do not go back, those who stay tend to choose Google as their destination. Thus, in the race to attract the talent that does stay in the Big Five, Google is beating all competitors. Microsoft is a far second, attracting around half the talent that leaves Google.

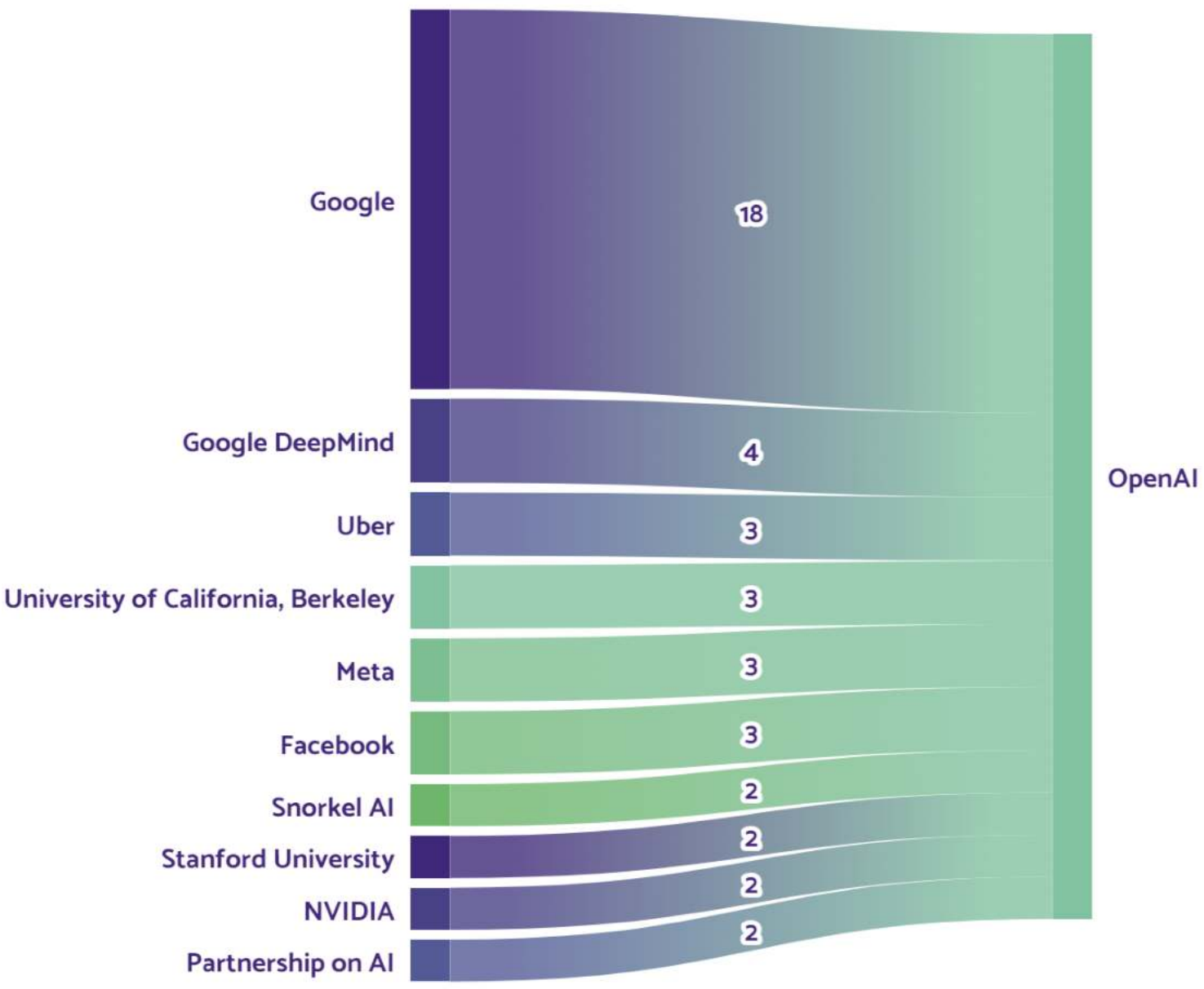
Talent staying in the Big Five gravitates to Google



OpenAI is drawing talent from across the community with even Google losing talent to OpenAI.

So far migration has been in small numbers with OpenAI reported to be offering compensation packages between $5 and $10 million for some hires.

Top flows of top AI talent to OpenAI by previous workplace in Zeki data



Note: Company names correct at time of hiring.

Google DeepMind's top AI talent scores higher than both Google and OpenAI for research excellence, thought leadership and visibility in the research community according to our metrics.

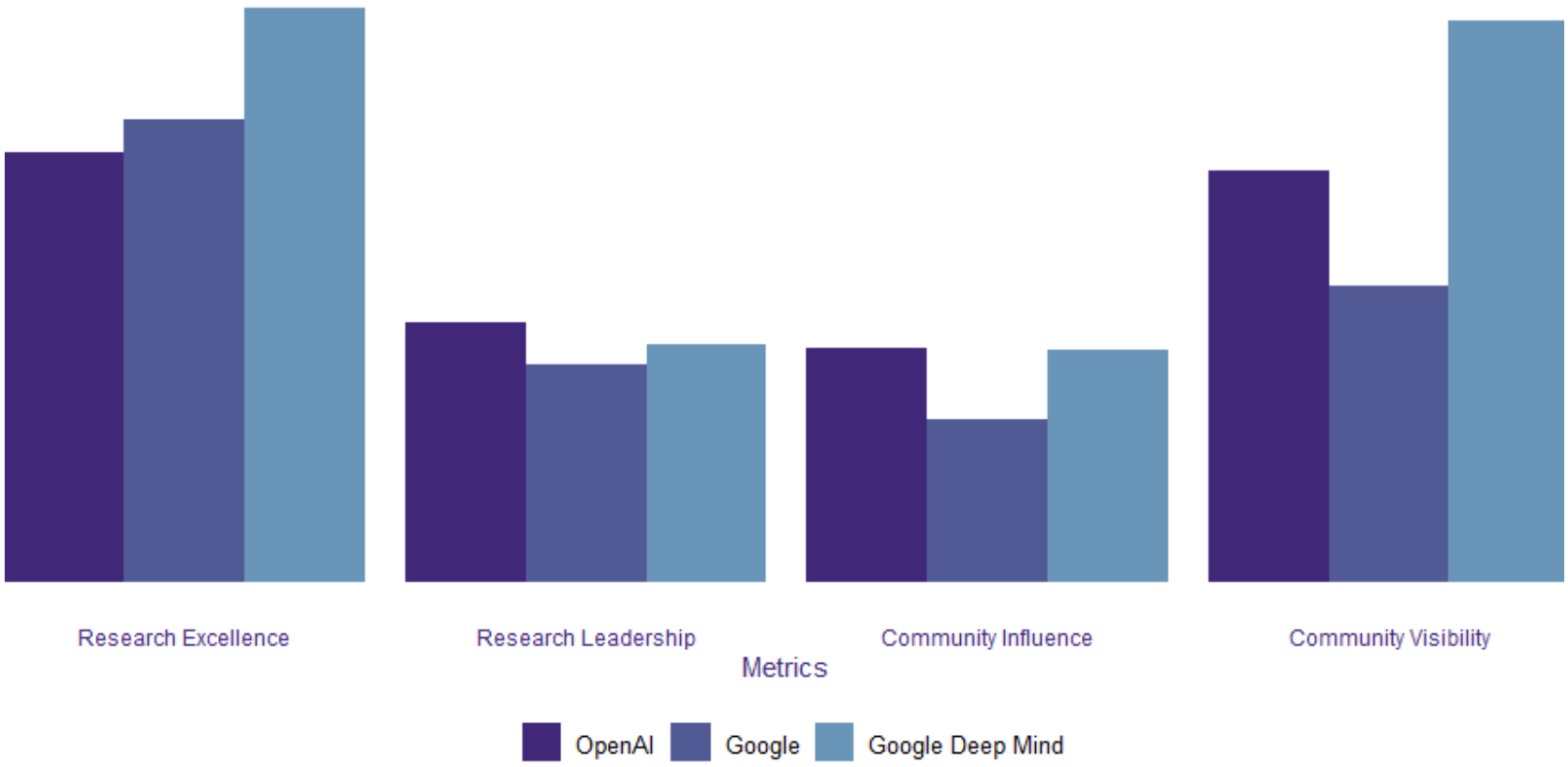
These factors make Google DeepMind highly attractive to top AI talent, allowing them to attract some of the highest talent in the field, predominantly from top UK universities.

Its merger with the Google Brain team is likely to bolster Google's efforts to concentrate its top AI talent as it seeks to create new applications for even more intelligent AI.

But OpenAI's talent is also of very high quality and highly respected, with higher community influence and community visibility scores on average compared to their Google counterparts.

Google DeepMind's top AI talent scores higher than both Google and OpenAI on Zeki's scores for research excellence and thought leadership in the research community.

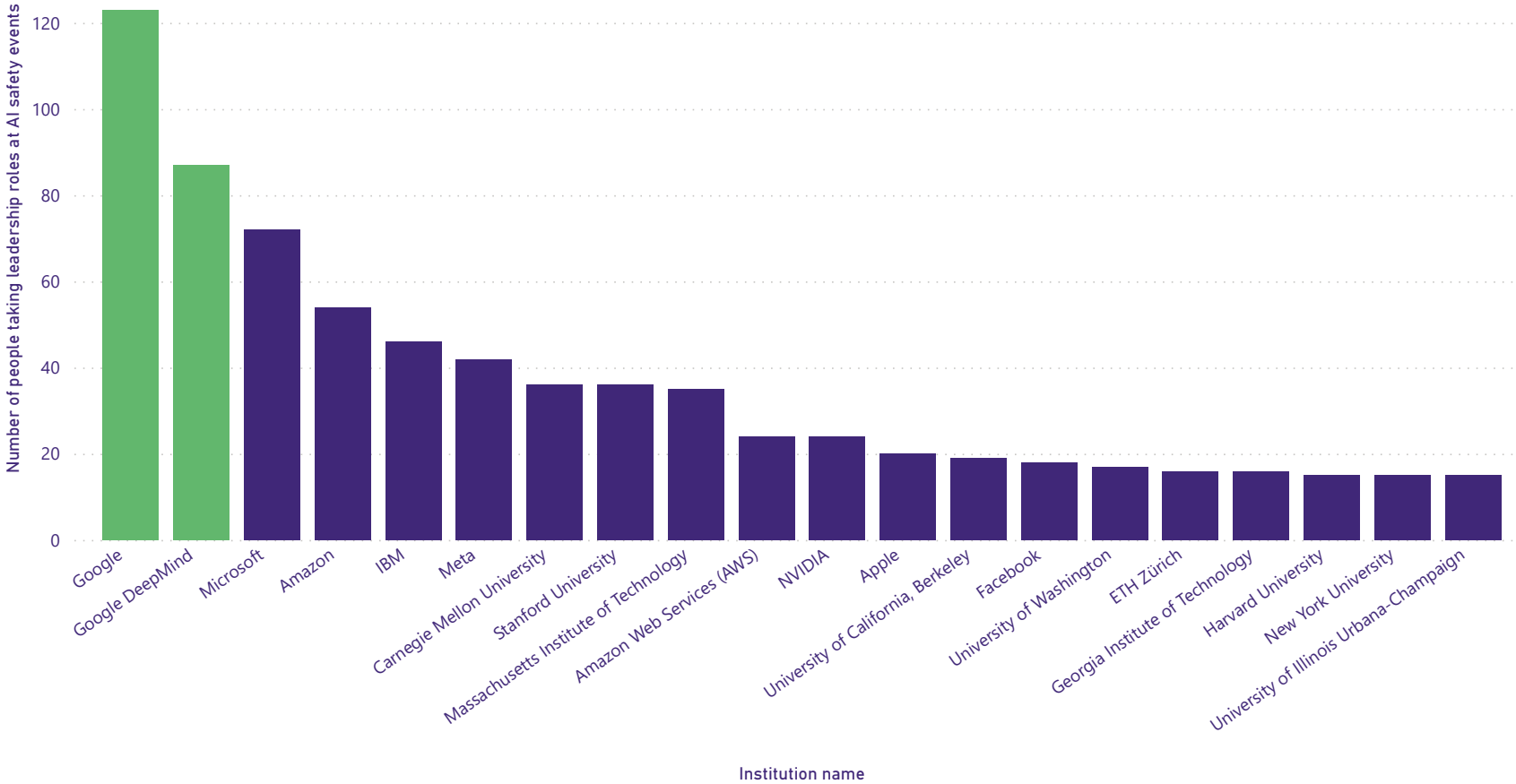
Average Zeki scores for OpenAI , Google and Google DeepMind talent



Google plays the main thought leadership role on AI safety within the AI community, alongside Google DeepMind.

Nearly twice as many people in these organisations, compared to Microsoft and Amazon, take on leadership roles, organise and speak at AI safety events held at top conferences in the last five years than people from Microsoft or Amazon. This gives Google greater visibility amongst top AI talent, for which this is an increasing area of focus. OpenAI is notable by its absence from the top 20 participant organisations at these AI safety workshops which are dominated by other US companies and universities.

Google and Google DeepMind are the main thought leaders in AI safety



Note: Company names correct at time of hiring.

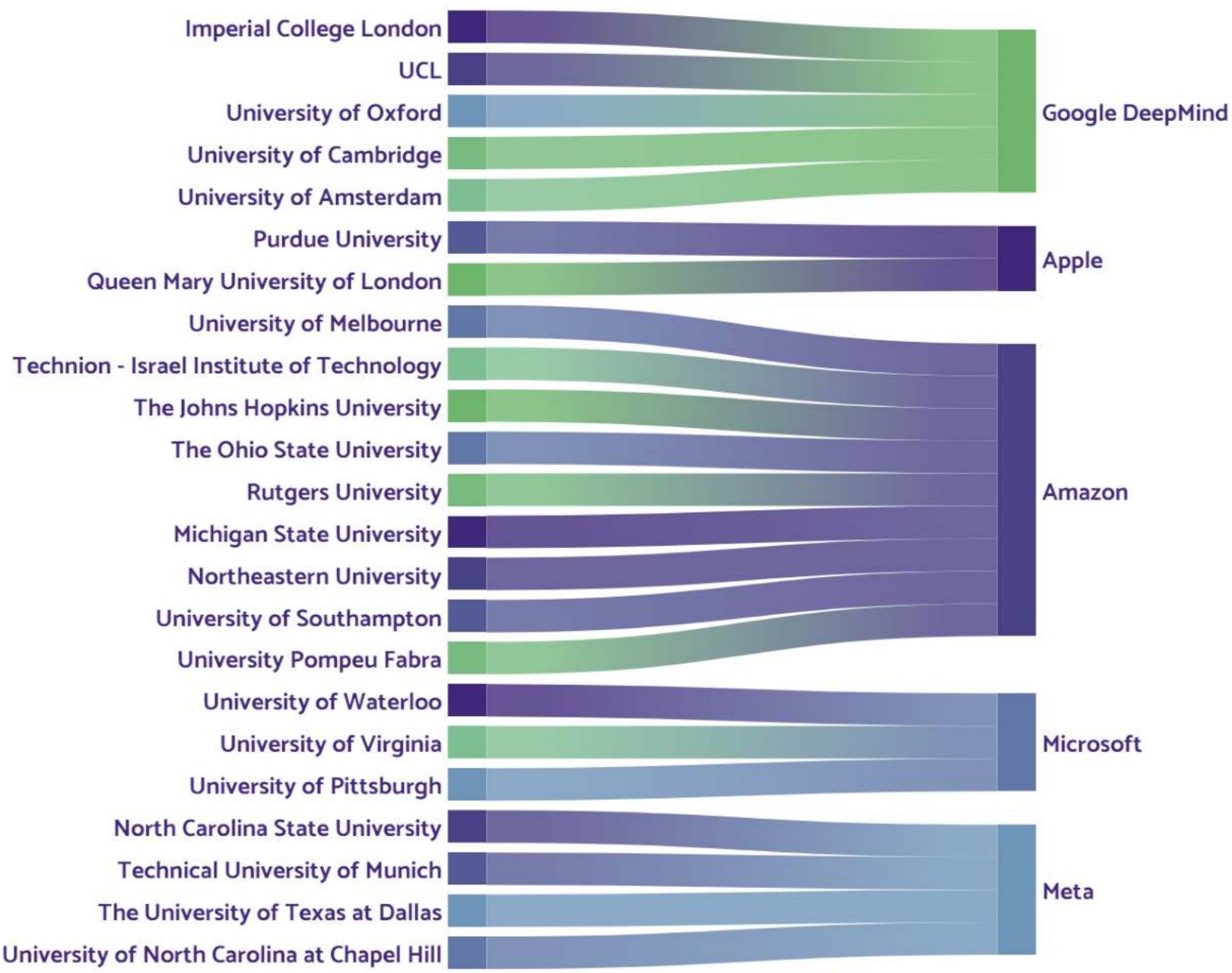
Google dominates as the prime recruiter of top AI scientists and engineers from top universities.

The table below shows 52 universities where Google is the prime recruiter of top AI talent. The next company, Amazon, has only nine.

University name	Country
Carnegie Mellon University	United States
Stanford University	United States
Massachusetts Institute of Technology	United States
University of California, Berkeley	United States
Georgia Institute of Technology	United States
KU Leuven	Belgium
Politecnico di Milano	Italy
University of Illinois Urbana-Champaign	United States
University of Southern California	United States
EPFL (École polytechnique fédérale de Lausanne)	Switzerland
University of Washington	United States
ETH Zürich	Switzerland
The University of Texas at Austin	United States
Cornell University	United States
The University of Edinburgh	United Kingdom
University of Toronto	Canada
University of Wisconsin-Madison	United States
Columbia University	United States
University of Maryland	United States
Princeton University	United States
New York University	United States
UCLA	United States
Arizona State University	United States
UC San Diego	United States
Harvard University	United States
Texas A&M University	United States
McGill University	Canada
University of Massachusetts Amherst	United States
University of Alberta	Canada
Duke University	United States
The University of British Columbia	Canada
Stony Brook University	United States
Penn State University	United States
University of Minnesota	United States
University of Pennsylvania	United States
Tel Aviv University	Israel
University of Michigan	United States
Virginia Tech	United States
Boston University	United States
UC Irvine	United States
Northwestern University	United States
Brown University	United States
UC Santa Barbara	United States
Rice University	United States
University of Chicago	United States
University of California, Davis	United States
Indiana University Bloomington	United States
Caltech	United States
The Hebrew University of Jerusalem	Israel
Rensselaer Polytechnic Institute	United States
University of Colorado Boulder	United States
University of Rochester	United States

A smaller number of universities act as prime suppliers to the Big Five and Google DeepMind.

Amazon, Apple, Google DeepMind, Microsoft and Meta are **prime hirers of top AI talent** from some universities - mainly in the USA but also Canada, UK, Germany, The Netherlands, Australia, Spain and Israel. But not to the same breadth as Google. All these companies have scholarship programmes for promising talent that give them **first mover advantage** when this talent comes out of AI labs at universities and into the workforce.

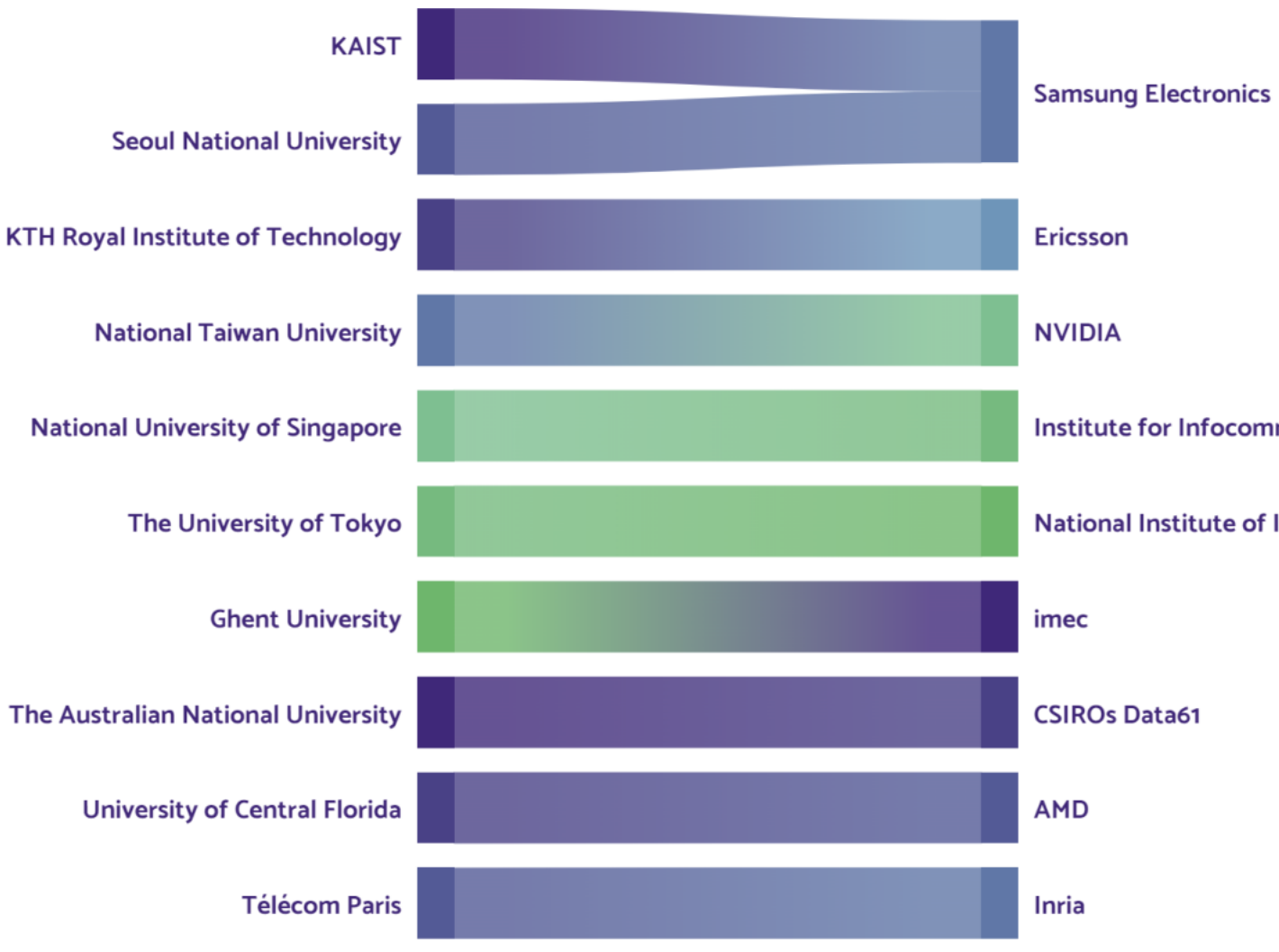


Some national champions also have prime access to universities, usually located in the same country.

Companies and research institutes outside the Big Five have also become prime hirers of talent from some universities, usually close to home.

For example, **AMD** offer an undergraduate research fellowship at the University of Central Florida. **Imec** has an inter-disciplinary research group with Ghent University, as does **Nvidia** with the National Taiwan University.

Top destinations from universities to national champions/institutes



As other sectors such as semiconductors, cloud computing, finance and health, outside the Big Five start to scale their acquisition of top AI talent, they will either have to address more directly their ability to compete with the Big Five or develop strategies that allow them to find untapped potential from the many universities which train brilliant talent but are outside the focus of the Big Five.

CHAPTER THREE

The deepening and diversification of the market

The ecosystem of companies hiring top AI talent has always been diverse given the myriad of use cases for the technology and funds available to back these ideas and bring them to market.

As new players enter the market and existing players scale their ambition, we expect the ecosystem to deepen and diversify, offering greater career opportunities for top AI talent.

KEY FINDINGS

LARGE BUSINESSES MAKE THE WEATHER IN THE GLOBAL MARKET

Large businesses already own 60 percent of the global market and will gain further market share as they increasingly take an AI-first approach to delivering their future products and processes. They are growing their talent slightly less than the Big Five but at much higher overall volumes.

THE SEMICONDUCTOR AND CLOUD COMPUTING COMPANIES ARE COMING

Nvidia and Amazon Web Services are growing their top AI talent at much faster rates than more established big US tech players like Intel and IBM. We expect a further acceleration in hiring from the semiconductor industry as major, US government-backed, funding comes into the sector to give the USA sovereign advantage in this technology.

KEY FINDINGS CONTINUED

NATIONAL AI CHAMPIONS ARE EMERGING OUTSIDE THE USA

National champions are playing an important role in anchoring talent and intellectual property at home. In Europe and Asia, these are industrial as well as tech champions, including Siemens, Nokia, Philips, Ericsson and Samsung Electronics.

NATIONAL AND PRIVATE RESEARCH INSTITUTES MAKE UP THE MIDDLE GROUND

There is little middle ground in AI – you are either large or small. National Research networks in Europe are in this middle ground. They act as amplifiers of research, hiring research-intensive talent out of academia, but we see little flow of this talent then into industry.

SMALL COMPANIES GET BIG OR BOUGHT OR LEAVE THE MARKET

Small companies hire more top AI talent than the Big Five and are highly diverse as they test the boundaries of new use cases for AI. The fact they can compete for this talent in large overall numbers indicates that new ideas and the agency to pursue them, not just salaries, are a key motivation for top AI talent. The health sector dominates with many companies in our data already acquired.

The tables show the number of companies who have hired top AI talent in the Zeki data and their number of hires by company size.

We describe companies with over 250 employees as large, 50-250 employees as medium and under 50 as small.

Number of companies by category in Zeki data

Company Category	Count
Big Five	5
Large businesses	8114
Medium businesses	5198
Small businesses	10246

There is **no middle ground between large and small businesses** with middle-sized businesses relatively small in overall numbers and total hires of top AI talent.

Number of hires by company category in Zeki data

Company Category	Number of Hires
Big Five	17069
Large businesses	89667
Medium businesses	18049
Small businesses	24890

Large companies have made **five times as many** top AI scientists and engineers hires as the Big Five.

Big businesses are the foundation of the top AI talent market hiring in much larger numbers than the Big Five.

Big businesses make up 60 percent of the total talent market, compared to 11.4 percent for the Big Five.

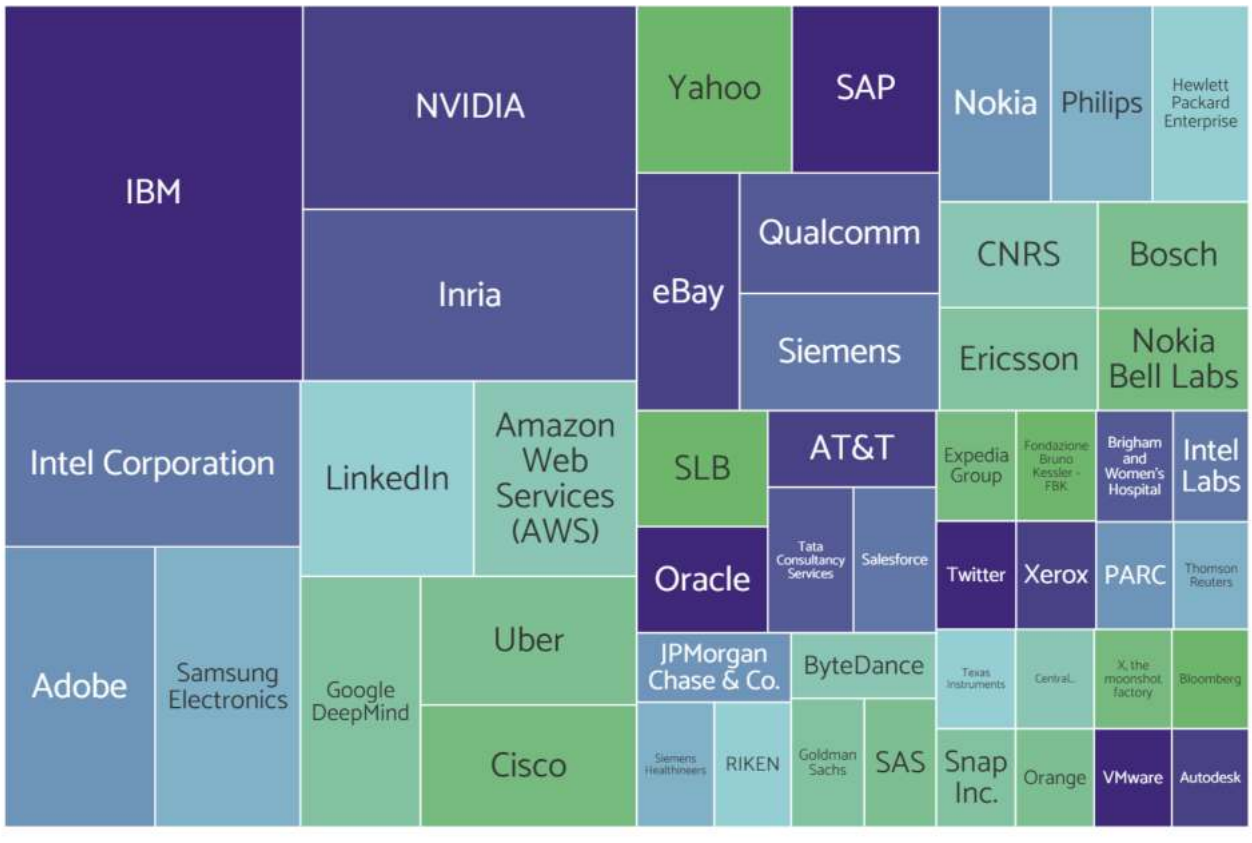
The top recruiters outside the Big Five include multi-national companies, many with research labs across the world. IBM has consistently hired top AI talent but its pace of hiring has levelled off with the prospect in coming years that Nvidia and Amazon Web Services will overtake IBM's pole position in the market.

National champions like Google DeepMind, Siemens, Nokia, Philips, Ericsson, Samsung Electronics and Tata Consultancy Services have emerged as major recruiters of top AI talent outside the US.

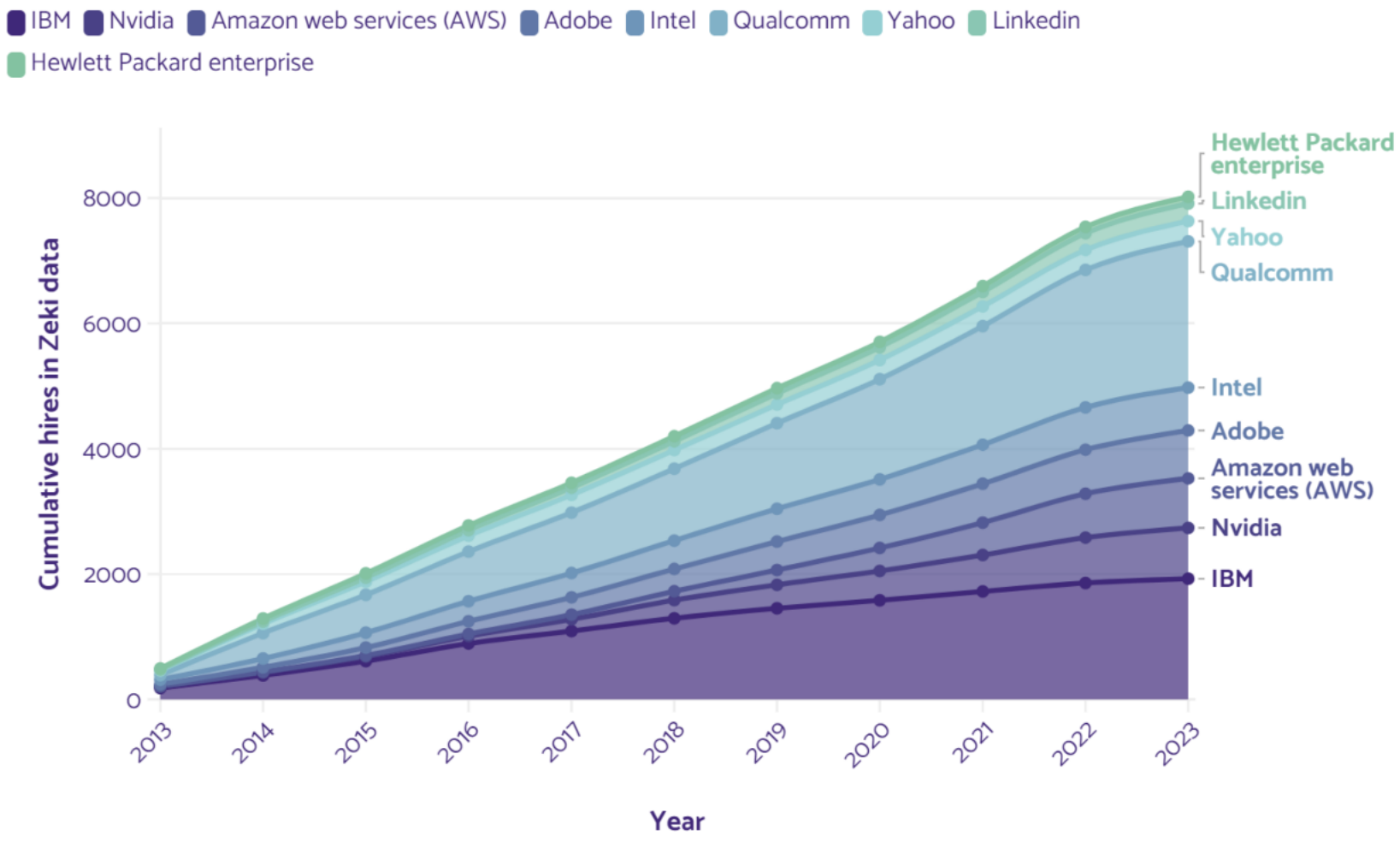
Big national research institutes act as amplifiers of research in countries but their top AI talent feeds through less into companies creating new products and technologies.

The big French national research networks, Inria and CNRS, are very large recruiters but we see little feed through of this talent into French industry. They are pure research centres with the employees who are more permanent and, in the case of CNRS, civil servants. However there are exceptions with some of the founders of the French Generative AI start up Mistral AI receiving their training at Inria.

Top 50 recruiters outside of the Big Five



Qualcomm outpaces other major companies in acquiring AI talent



Growth rate 2018-2023 = 90.95 percent

Large US technology companies continue to recruit but at diverging rates. Over the last five years, Amazon Web Services has increased its recruitment of top AI talent at an annual average of 50 percent, Nvidia by 28 percent, and IBM by 10 percent. Qualcomm has emerged as a major hirer of top AI scientists and engineers in volume at an annual growth rate of over 16 percent in the last five years.

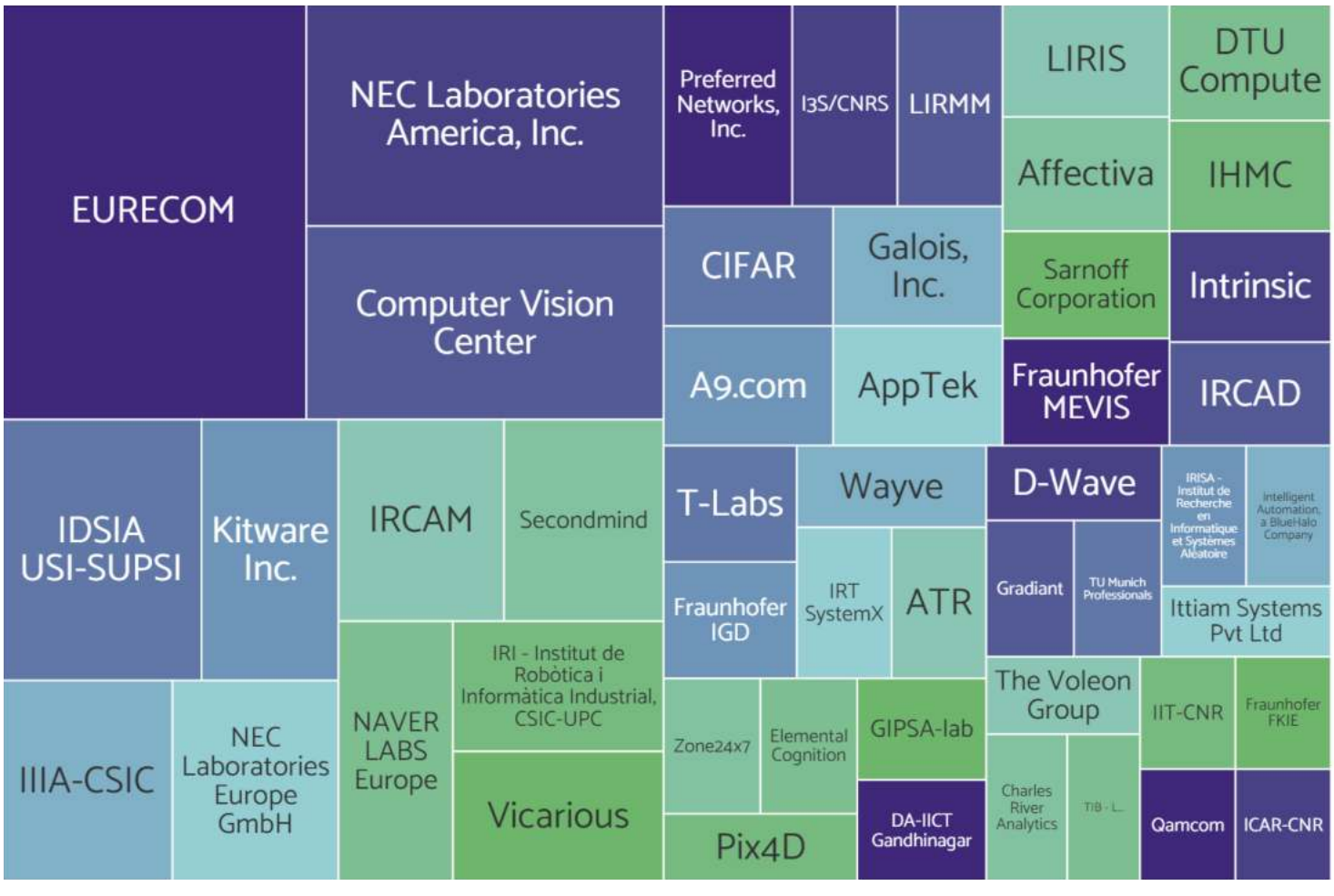
Middle-sized organisations are very much in the minority in an AI talent system dominated by large and small players; they make up only 16.6 percent of the total AI talent market.

The main hirers among middle-sized organisations are European national research institutes led by Eurecom in France; IDSIA USI-SUPSI, a Swiss-Italian research centre based in Italy; and IIIA-CSIC in Spain. IRCAM, a French national institute hires top AI talent for music and sound research. There is also CIFAR in Canada which has an international network of researchers and Fraunhofer MEVIS, an institute for digital medicine in Germany.

These institutes have close connections with industrial partners but we see little flow of talent from institutes into industry. They are more amplifiers of knowledge creation and dissemination within the research community and most likely attractive to talent that prefers to pursue a research intensive career but outside of academia.

NEC Laboratories has a global network of research labs working on a range of commercial projects including AI-powered drug development.

Top recruiters of AI talent amongst middle-sized organisations



Computer Vision Center in Spain and Kitware Inc in the USA both specialise in computer vision but not medical imaging which is more the domain of larger and smaller companies.

Second Mind in the UK uses machine learning to design faster, cleaner cars.

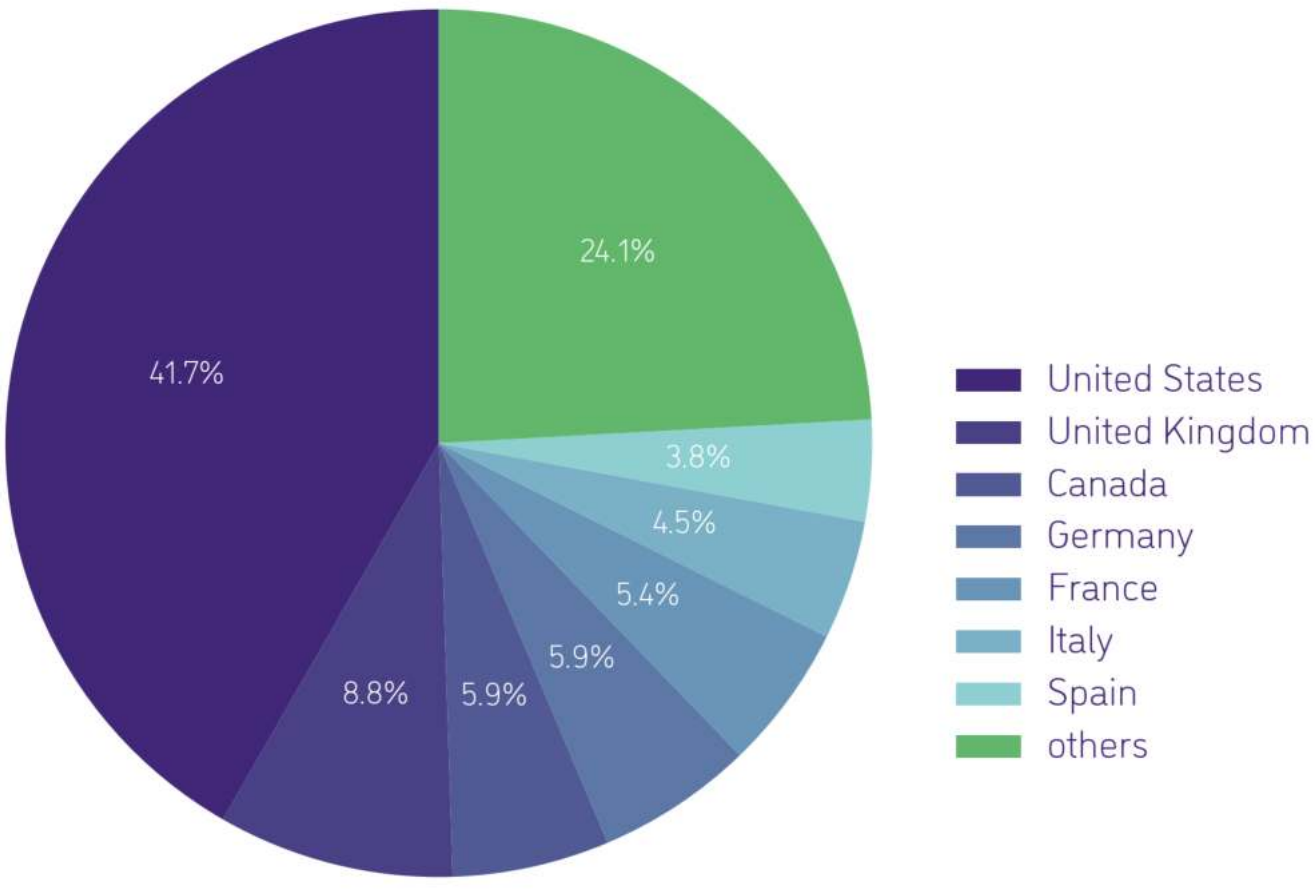
There is great diversity in approach amongst the middle-sized organisations that have so far hired less talent than the major national research institutes.

- **Galois, Inc.,** in the USA specialises in making hardware and software trustworthy.
- **D-Wave** in Canada is a quantum software company.
- **The Voleon Group** in the USA is a hedge fund pioneering AI-driven investments, founded by a former nuclear physicist.
- **AppTek** in the USA is a leader in automatic speech recognition.
- **Affectiva**, an Emotion AI company was acquired in 2021.
- Alphabet Inc. acquired **Vicarious** in 2022, a company that is building software to think and learn like a human.
- **Preferred Networks, Inc.,** in Japan focuses on deep learning for internet of things applications.
- **Sarnoff Corporation** in the USA merged with SRI, a nonprofit research institute with deep roots in Silicon Valley, supporting research and development projects for industry and government.
- **Intrinsic** in the USA is a robotics software and AI company at Alphabet.
- **Gradient AI** in the USA is a leading provider of AI solutions for the insurance industry, predicting underwriting and claims risks.

Small companies have a 12.1 percent market share of top AI talent with 10,246 companies who have hired top AI talent.

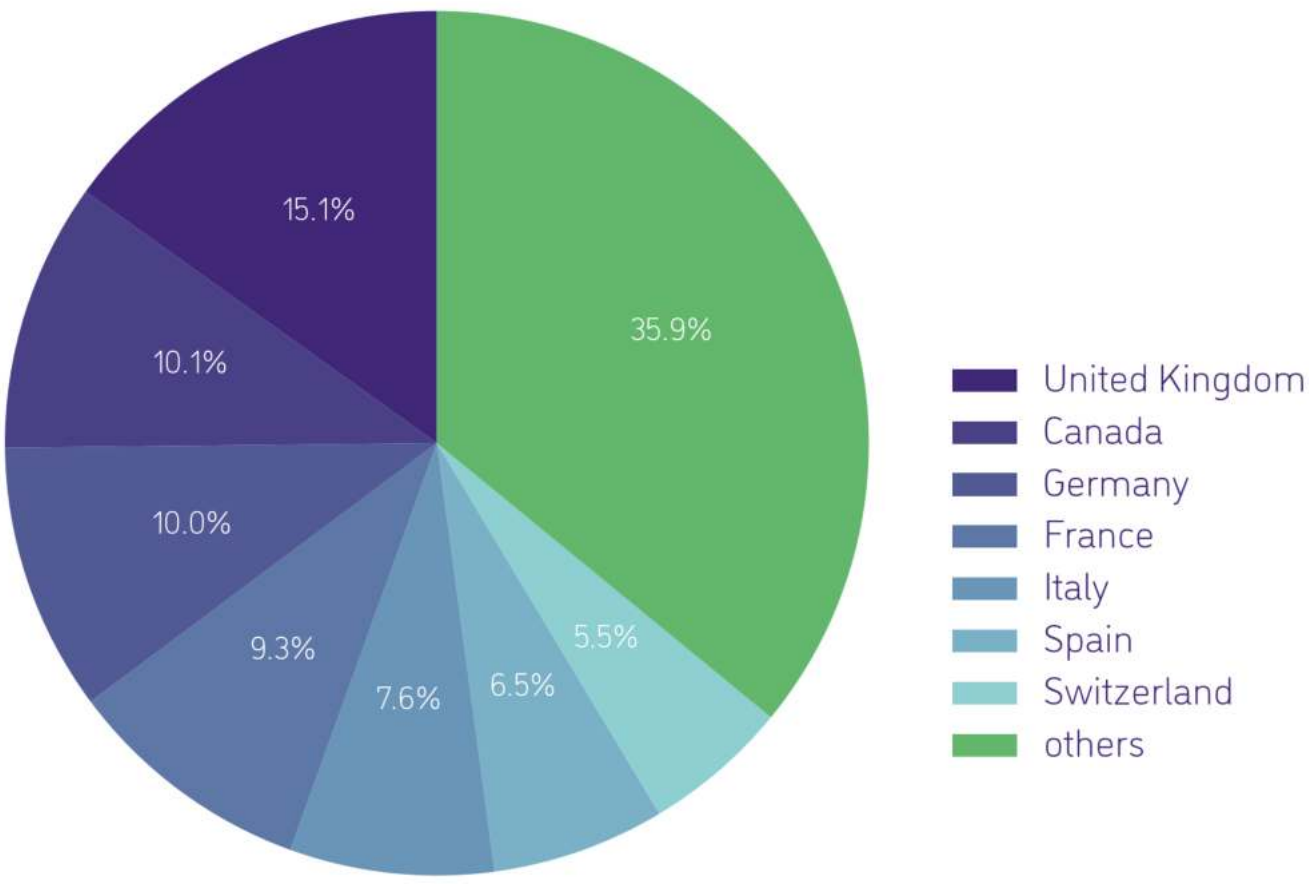
This is one area where US small companies are in a minority globally. Top recruiters include spin-outs from universities, demonstrating the value of companies being able to build products based on the intellectual property developed by young talent in university AI labs.

Geographic distribution of small businesses



The United Kingdom is well ahead of similar sized economies with 794 small companies hiring top AI talent compared to 521 in Canada, 510 in Germany, 457 in France, 390 in Italy and 338 in Spain.

Geographic distribution of small businesses excluding the USA



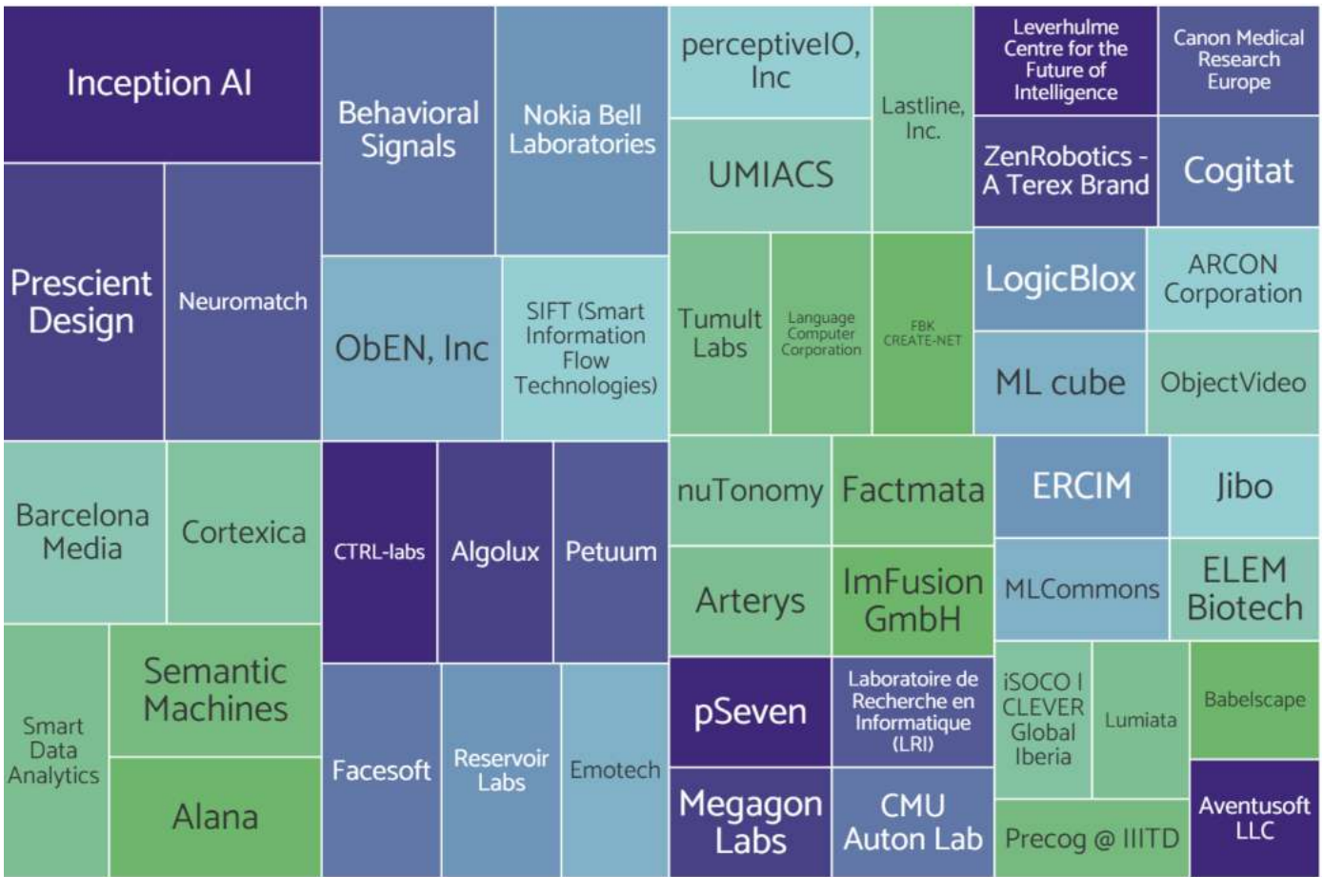
The ecosystem is home to a **large number of companies developing new health solutions**.

Alana AI in the UK, a Heriot-Watt University spin-off, streamlines knowledge discovery from large amounts of data for medical practitioners. Prescient Design in the USA, now part of Genentech, works on drug discovery. ELEM Biotech, a spin-off from Barcelona Supercomputing Center, creates virtual humans which can be used for any phase of a medical process from pharmacological to medical device evaluations.

But the sector is **highly diverse**, attracting top scientists and engineers seeking to try out new ideas even though their skills can command higher salaries in large companies.

- **Neuromatch** in the USA is building an online community of computational neuroscientists.
- **ZenRobotics** in Finland supplies robots able to sort through waste automatically.
- **Behavioral Signals** in the USA is building emotion and behavioural cognition software to help predict humans.
- **ObEN, Inc** creates virtual identities for consumers and celebrities.
- **Petuum** builds state-of-the-art generative AI focussed on transparency.

Top recruiters of AI talent in small organisations



CHAPTER FOUR

The sectors to watch

AI is **driving innovation well beyond the realm of technology companies** as it offers the opportunity to transform businesses and create new markets. Some sectors are **adopting AI faster** than others. Five sectors in particular, **Health, Automotive, Defence, Finance and Consulting**, are showing high ambition to increase their share of the top AI talent market. In health and defence, European companies are more often ahead of their US counterparts in hiring top AI talent.

KEY FINDINGS

THE HEALTH SECTOR IS ATTRACTING TOP AI TALENT AT AN EXPONENTIAL RATE

There has been a twenty-fold increase in the acquisition of top AI talent by the key players in the health sector, indicating that this is a highly attractive destination for top AI talent. Siemens Healthineers is the top recruiter but with small companies dominating the market, led by European startups.

AUTOMOTIVE COMPANIES ARE HIRING AS THEY CONNECT CARS TO THE INTERNET

Big automotive companies are growing their top AI talent at an annual rate of around 10 percent but with Waymo growing at 44 percent per annum. They are forming partnerships with talent at Big Tech companies. Small companies are few but are attracting top AI scientists and engineers to build smarter, faster vehicles and connect them to the internet.

KEY FINDINGS CONTINUED

DEFENCE COMPANIES ARE MAKING INROADS INTO THE TOP AI TALENT MARKET AS THEY FOCUS ON SOFTWARE

Defence companies, in particular in Europe, are hiring top AI talent, as they make the transition from hardware to software products. Aselsan, a Turkish company is the major recruiter in the sector. Helsing AI is making fast in-roads in the market as a rare AI-first defence company.

BANKS DIFFER IN THEIR AMBITION

Big US and Canadian banks are showing more traction in being able to attract top AI talent than their European counterparts. The tendency in the sector is to adopt existing technology rather than create it. But this may change as banks raise their ambition and set up their own AI labs. Brazilian banks and fintech companies dominate recruitment of top AI scientists and engineers domestically.

CONSULTING COMPANIES SCALE RECRUITMENT TO MEET CLIENT DEMAND

Consulting companies are accelerating their talent growth and forming partnerships with Big Tech companies to enable their clients to exploit generative AI. Accenture is leading the way with high ambition to grow its top AI talent.

KEY FINDINGS CONTINUED

BUT CYBER AND ENERGY COMPANIES ARE NOTABLE BY THEIR ABSENCE

There is a disconnect between top AI talent and cyber security and energy companies. For the former, this reflects a systemic disconnect between fundamental research on privacy and security in academia and software products developed and put into the market by industry. The defence establishment is also not attracting top AI scientists and engineers, though the US military have shown it is possible to compete for this talent.

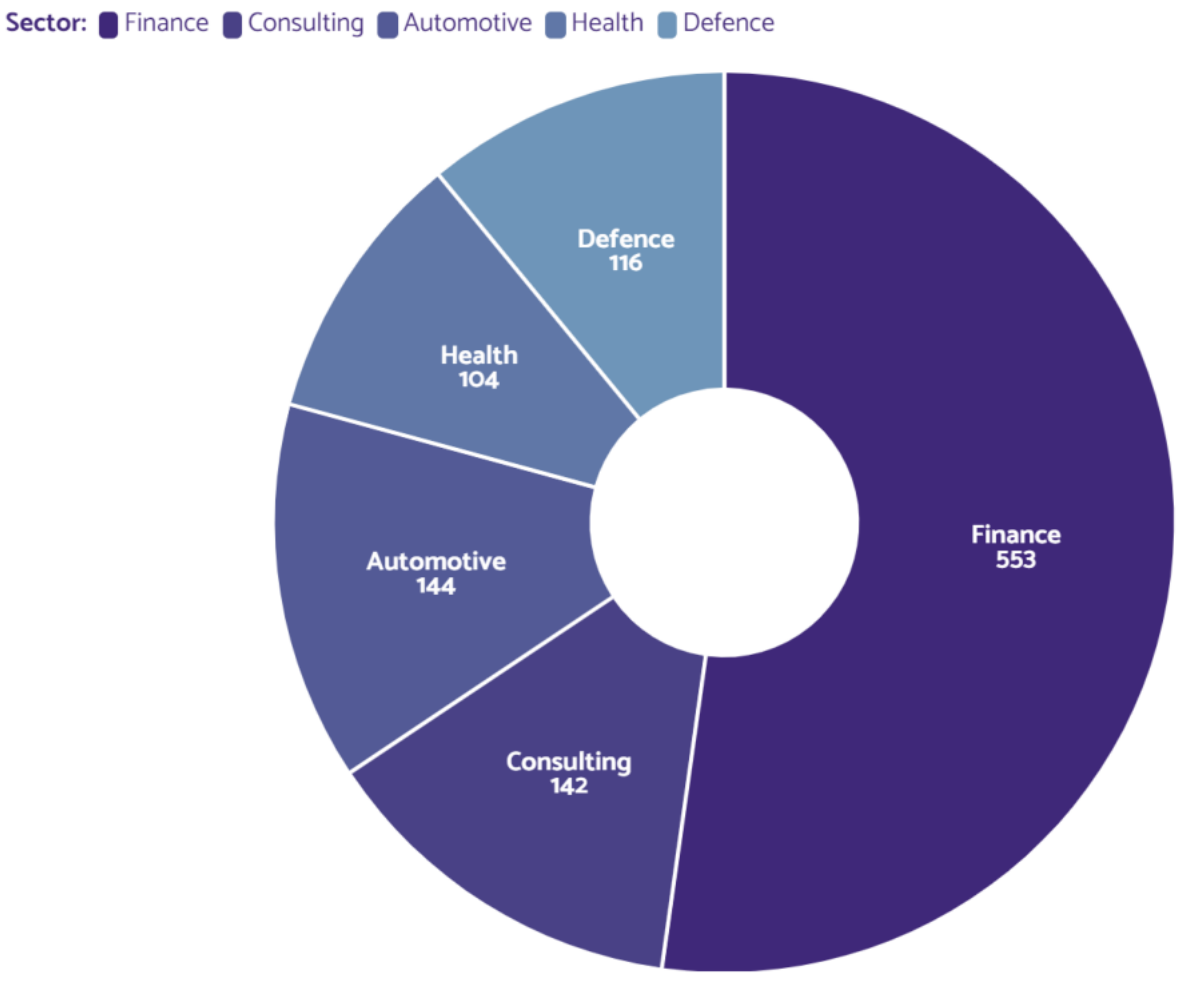
REGULATED SECTORS SHOULD HAVE MORE VOICE AND SUPPORT AROUND AI REGULATION

Governments are now investing in teams and plans to regulate AI. Their focus has mainly been around interaction with big technology companies. But the sectors described above are building their own AI expertise and have deep experience of best practice on regulation given the heavy oversight of their industries. We believe they can bring great value to the formation of regulation, in fact. They have great incentives to do so, not least to unlock the ability of their customers and employees to benefit from AI-led products and services.

Each sector has different characteristics and challenges as they build AI into their established operations.

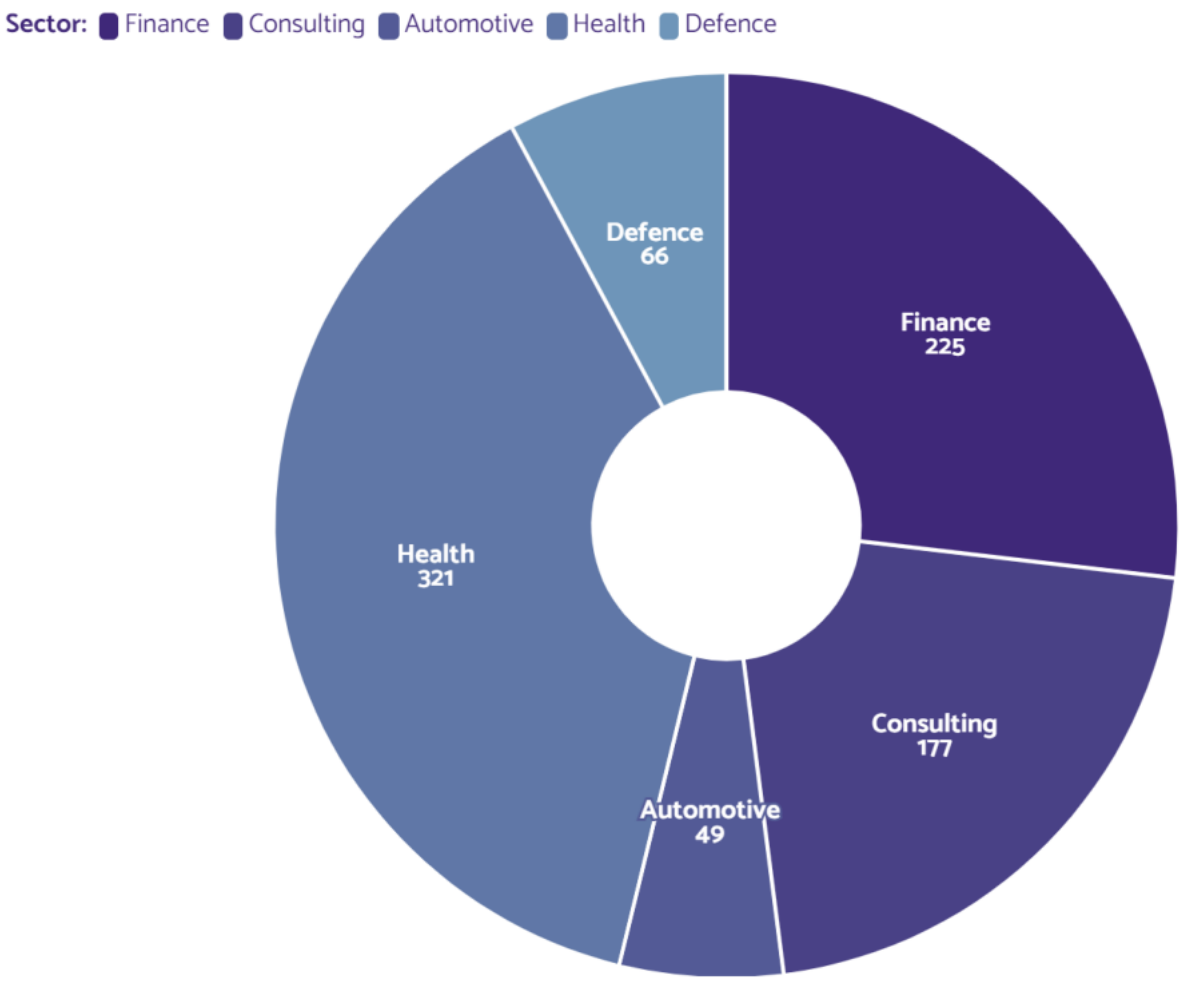
But they are also all sectors where there are high levels of regulation and oversight because of their very high impact on society. As these sectors invest more in AI expertise in their own right, governments can draw on their long experience of how to meld best practice regulation to new products in the market.

Distribution of large companies by sector



The finance sector has the greatest diffusion of large companies hiring top AI scientists and engineers but they are doing so in small numbers so far compared to large companies in the health sector.

Distribution of small companies by sector



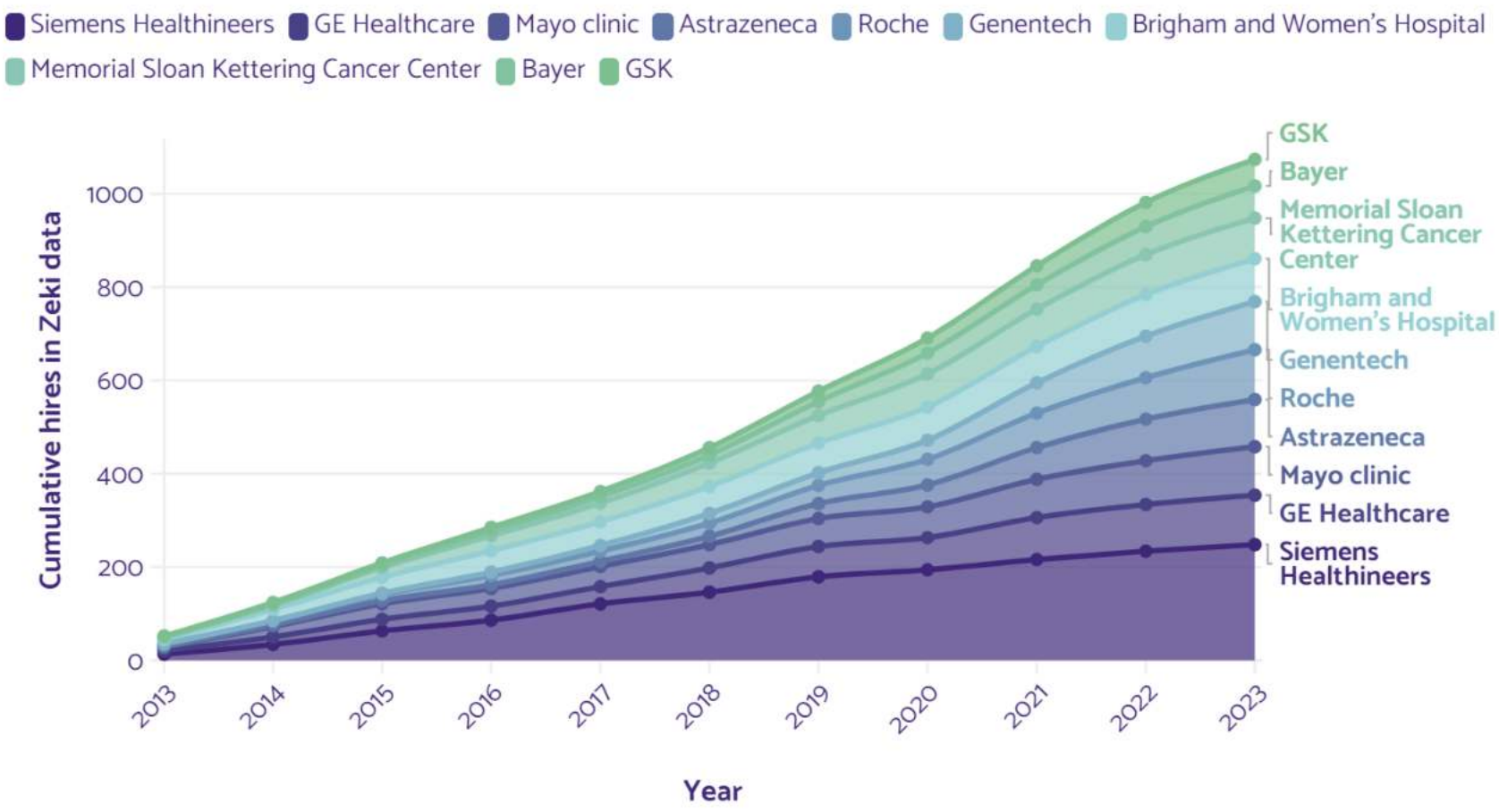
The health sector has a deep and diverse ecosystem of small companies seeking to bring a very wide range of use cases for AI into the health industry. The very small numbers of small AI companies hiring top AI scientists and engineers in the Defence and Automotive Sectors, relative to large, indicates that there is less breadth of AI-led innovation in these sectors.

Health Sector

The opportunities for AI to improve health are very significant. The Harvard School of Public Health has concluded that **using AI to make diagnoses may reduce treatment costs by up to 50 percent** and **improve health outcomes by 40 percent**. The sector has taken a cautious approach to the use of AI, given regulatory concerns, data bias, lack of transparency in models and concerns around potential job replacement.

But companies are hiring top AI talent at the **fastest rate of any sector** whilst simultaneously forming partnerships with AI-first health companies.

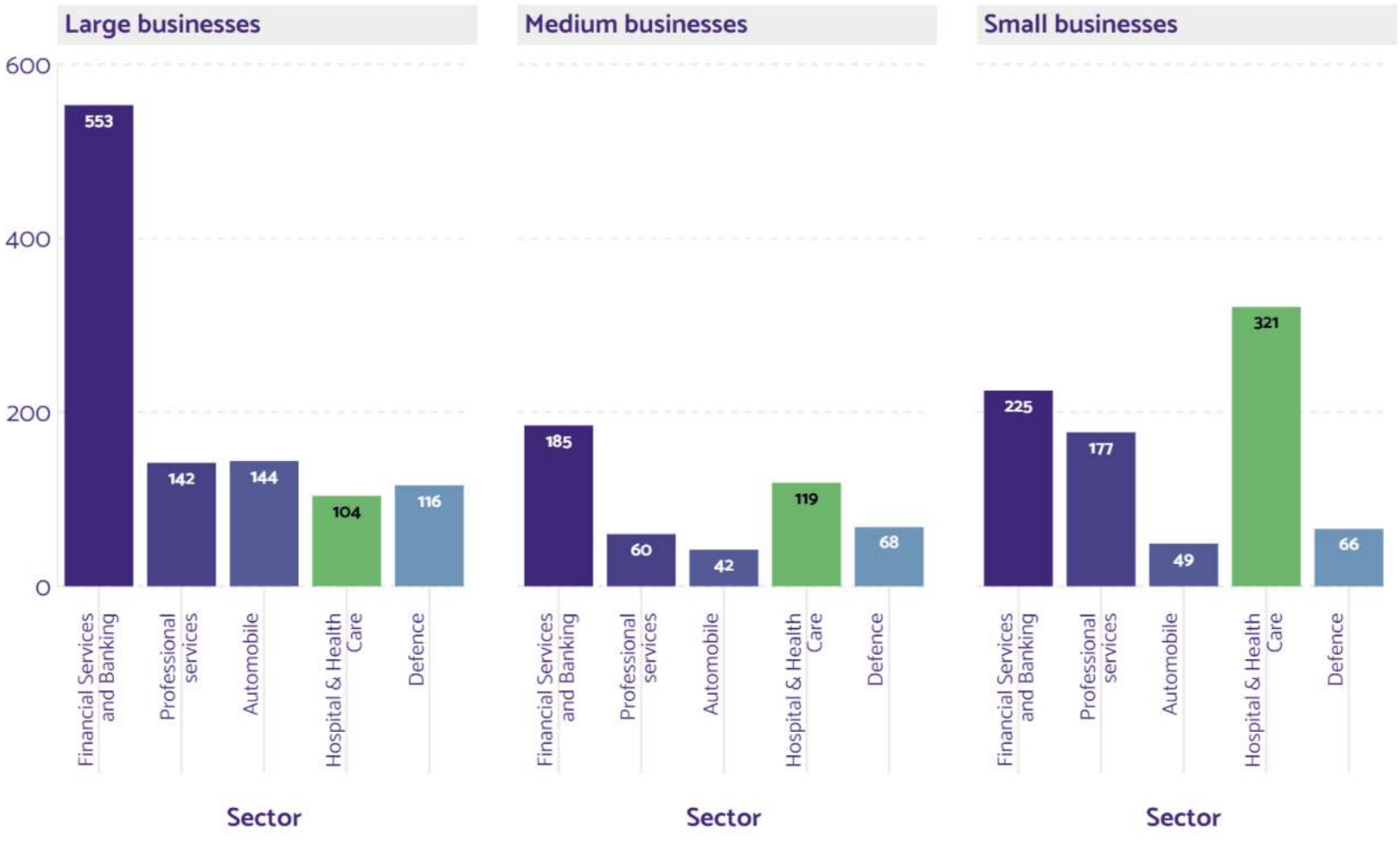
The cumulative hiring of AI talent in the health sector has increased 20-fold over the last 10 years



Siemens Healthineers runs **1200 AI experiments a day** and **markets over 65 different AI applications.** GE Healthcare has 42 medical devices that use AI to create workflow efficiencies. AstraZeneca has formed partnerships with Benevolent AI in the UK and Absci, a US AI biologics company. Genentech and Roche have also formed a partnership to use AI to accelerate drug discovery.

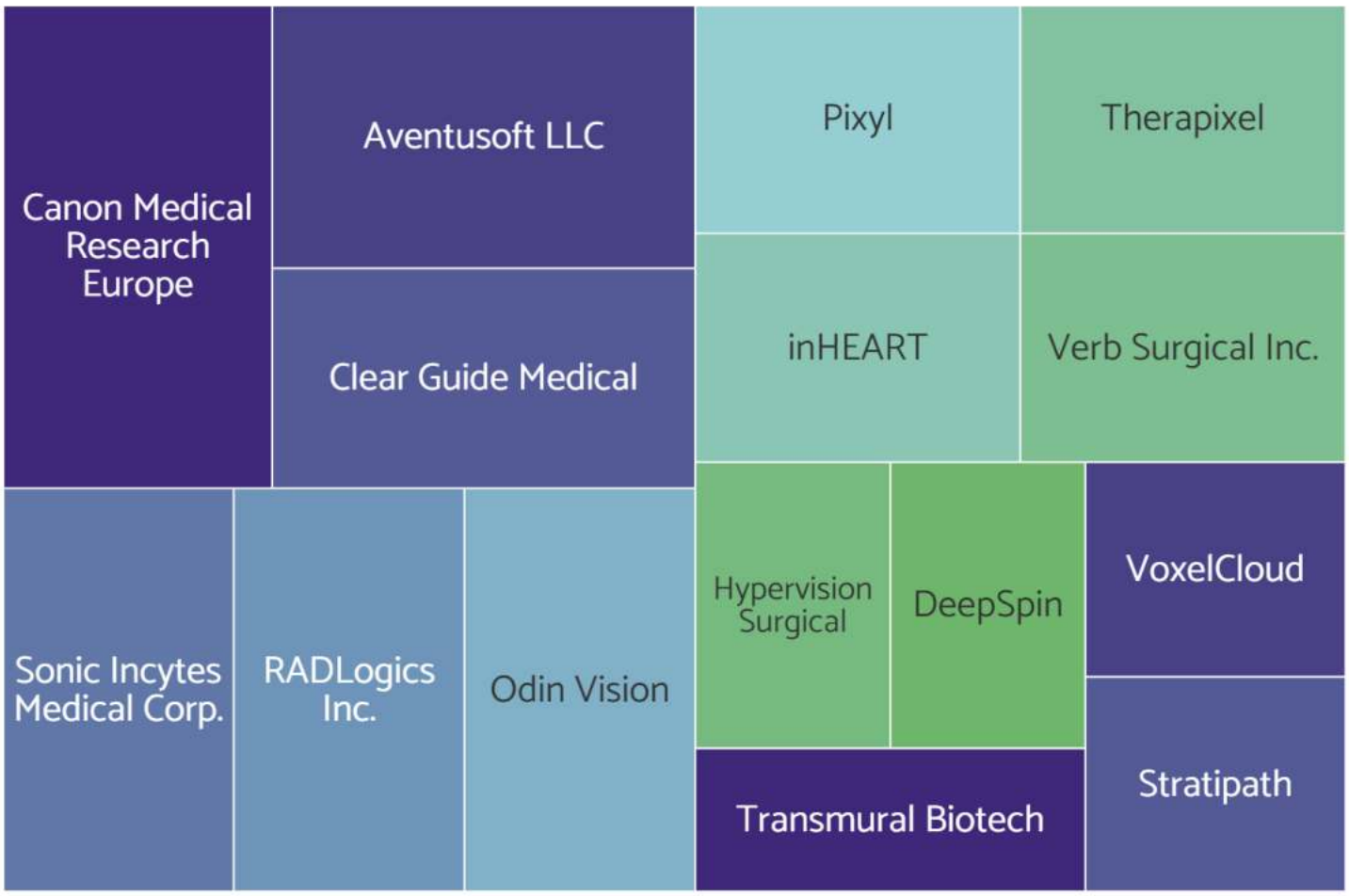
Siemens Healthineers has increased recruitment of top AI talent at an average annual increase of 13 percent over the last 5 years, GE Healthcare at 20 percent, GSK at 32 percent and AstraZeneca at 46 percent.

Diffusion of AI talent by number of companies



Small companies dominate both in numbers of companies and numbers of top AI talent hired. Small companies hire 47 percent of top AI talent in the sector compared to 34 percent for large companies and 19 percent for middle-sized companies.

Small companies in the health sector



European small companies dominate as the top recruiters of AI talent.

French companies Therapixel, an INRIA spin-off, and Pixyl, partnering with GE Healthcare, specialise in medical imaging. Odin Vision in the UK is a cloud AI endoscopy company. inHEART in France makes digital twins of the heart. The first product of Transmural Biotech, a spin-out from the Hospital Clinic of Barcelona, is a fetal lung maturity test. DeepSpin, a German company and graduate of the Entrepreneur First company build programme, is building a next-generation MRI machine.

Aventusoft, a US company funded by DARPA, was originally started with the aim of overcoming internal bleeding on the battlefield, and is now focused on leveraging its technology to aid the cardiac health crisis.

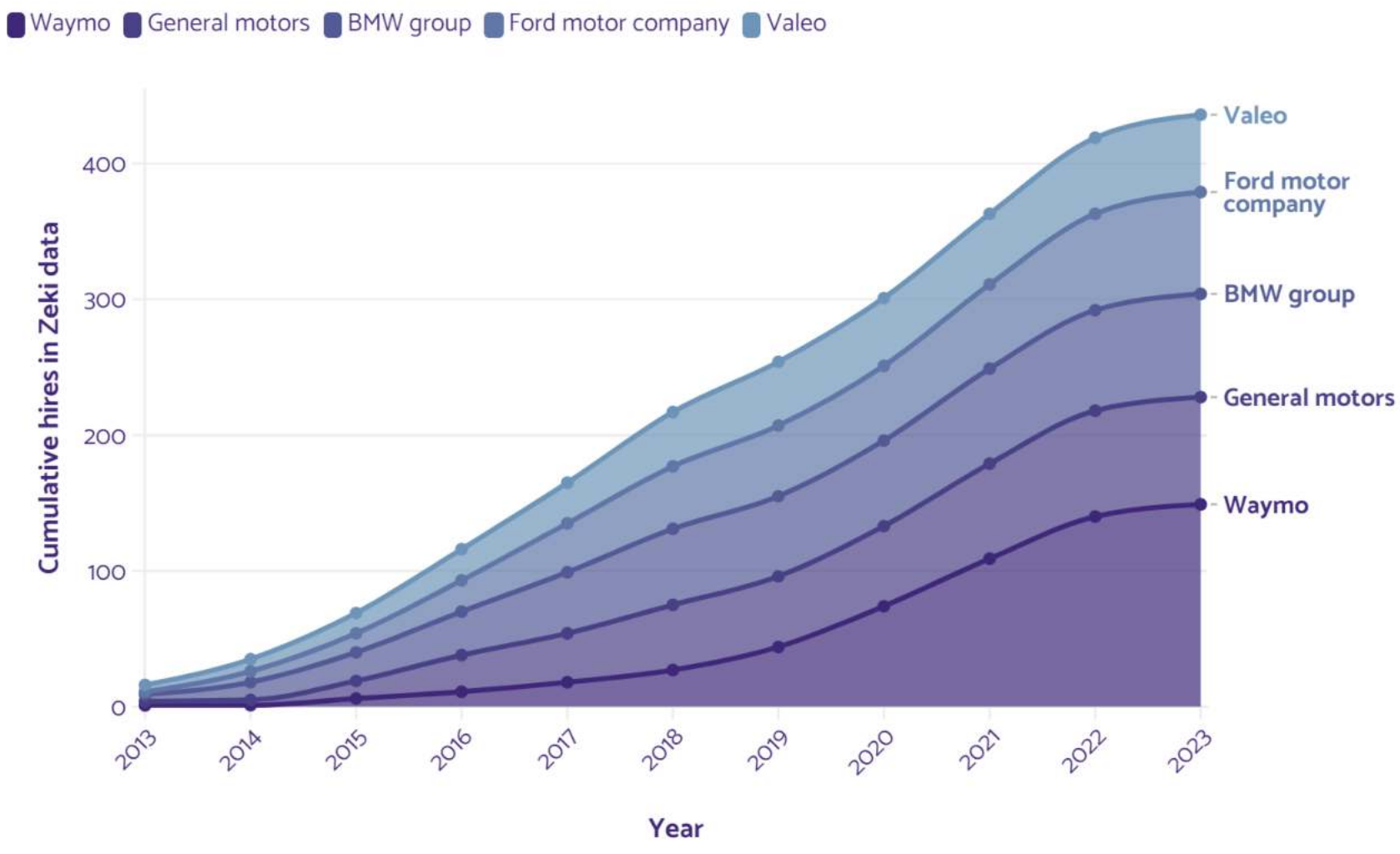
Automotive Sector

AI has many uses in the automotive sector, beyond mastering autonomous driving.

AI has the **potential to drive efficiencies in design and production** as well as transform car makers into 'mobility service' companies, partnering with the Big Five companies to transform the customer experience.

The sector has been through a period of **intensive experimentation** and **consolidation** with sustained but not explosive growth in the acquisition of top AI talent.

Major growth in hiring in the automotive sector occurred in 2020

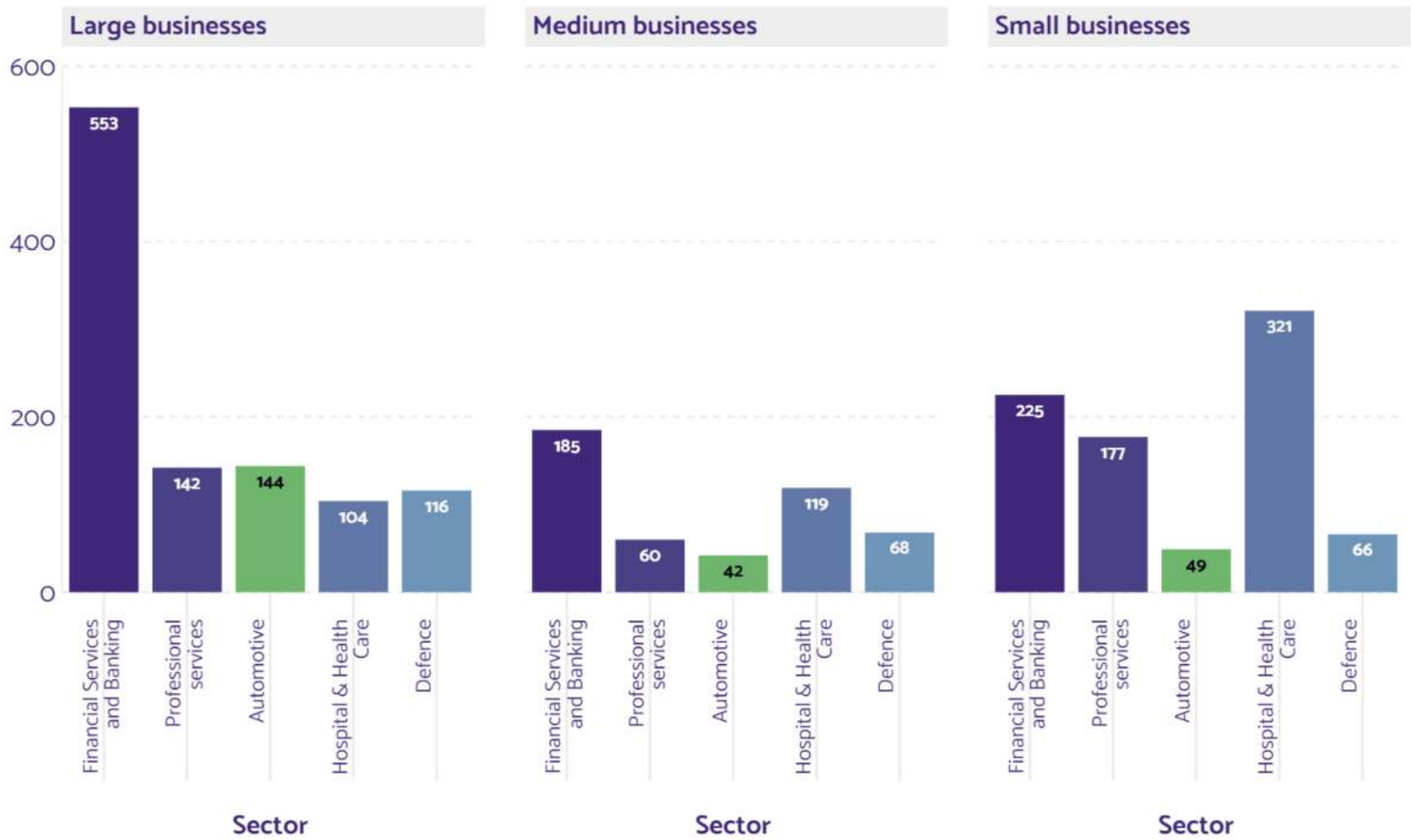


Waymo remains the **largest hirer of top AI talent** drawing on its origins as the Google Self-Driving Car Project. In 2023, Ford Motor Company launched Latitude AI, a wholly owned subsidiary of 550 staff specialising in machine learning, robotics and sensors.

Ford and General Motors are partnering with Google and BMW with Nvidia to enhance their ability to master the power of AI.

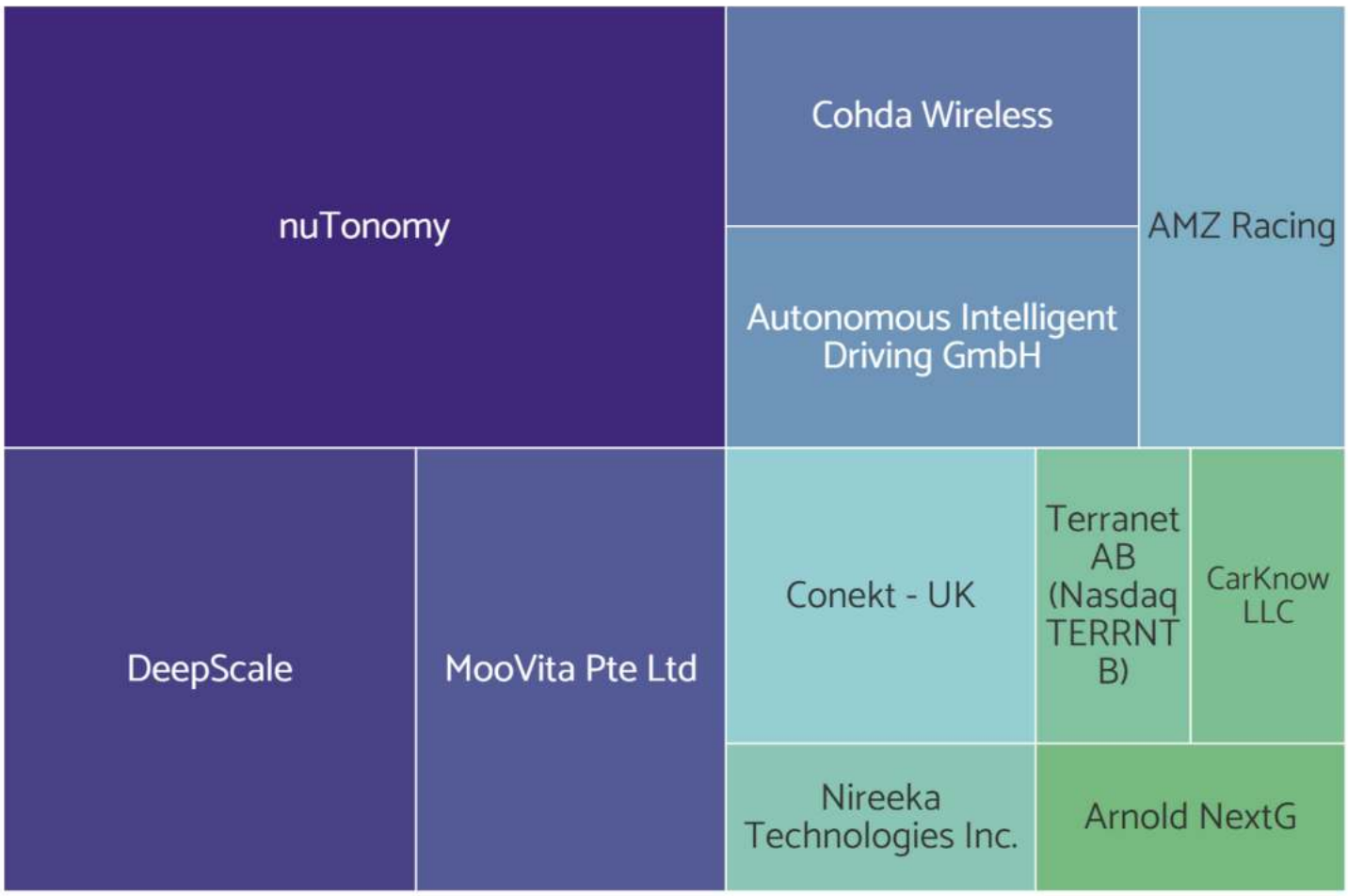
Waymo has increased its recruitment of top AI talent at an annual average increase of 44 percent in the last five years, General Motors at 14 percent, Ford Motor Company 13 percent, Valeo 12 percent and BMW group 9 percent.

Diffusion of AI talent by number of companies



The diffusion of top AI talent is very **top heavy in the sector** with large organisations employing **87 percent of the talent,** and only **5 percent** and **8 percent** in medium and small companies respectively.

Small companies in the automotive sector



Small companies are helping build smarter vehicles and are connecting them to the internet.

nuTonomy, an MIT spin-off and now a part of Hyundai Motor group, builds self-driving cars; whilst UK-based DeepScale builds deep neural systems which have been integrated into Tesla's self-driving cars. CarKnow LLC in the USA, mirrors a user's car in the cloud.

AMZ Racing in Switzerland optimises race cars with the use of AI. Conekt in the UK is part of ZF Race Engineering that develops driveline and chassis technology, in particular for racing cars.

Nireeka, in Canada builds technologically-advanced bikes.

Asia-pacific companies also feature amongst the top recruiters of AI talent. Singpore-based Moovita delivers smart-driving solutions and Cohda Wireless in Australia enables vehicles to connect with other vehicles.

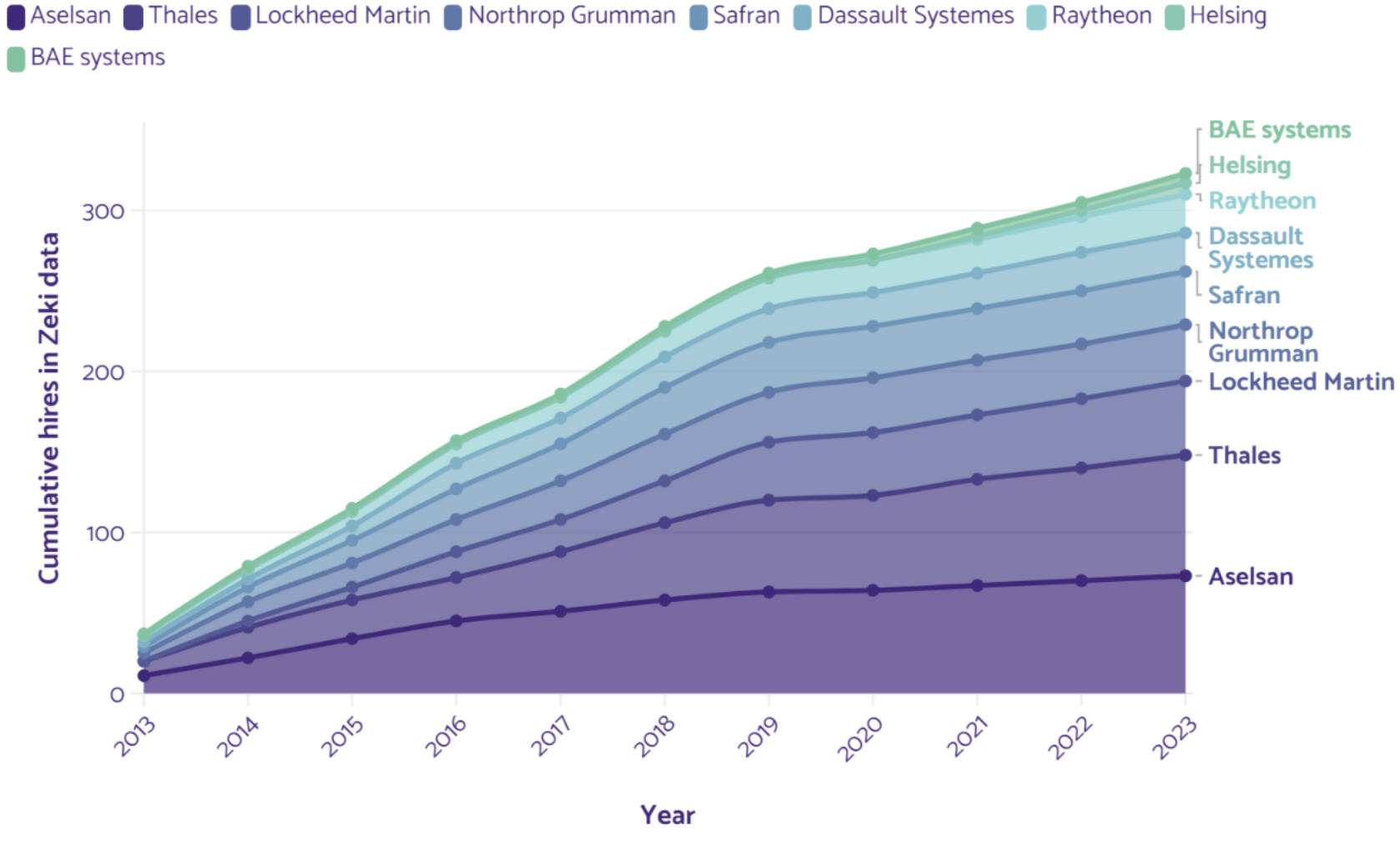
Defence Sector

The Defence sector is **making the shift** from modern defence being about hardware to being about software.

Big Defence primes have not so far attracted top AI talent in large numbers to meet the challenge.

This leaves open the opportunity for small AI-first defence companies to capitalise but many have so far not succeeded.

AI hiring in the defence sector has increased by 83 percent on average per year

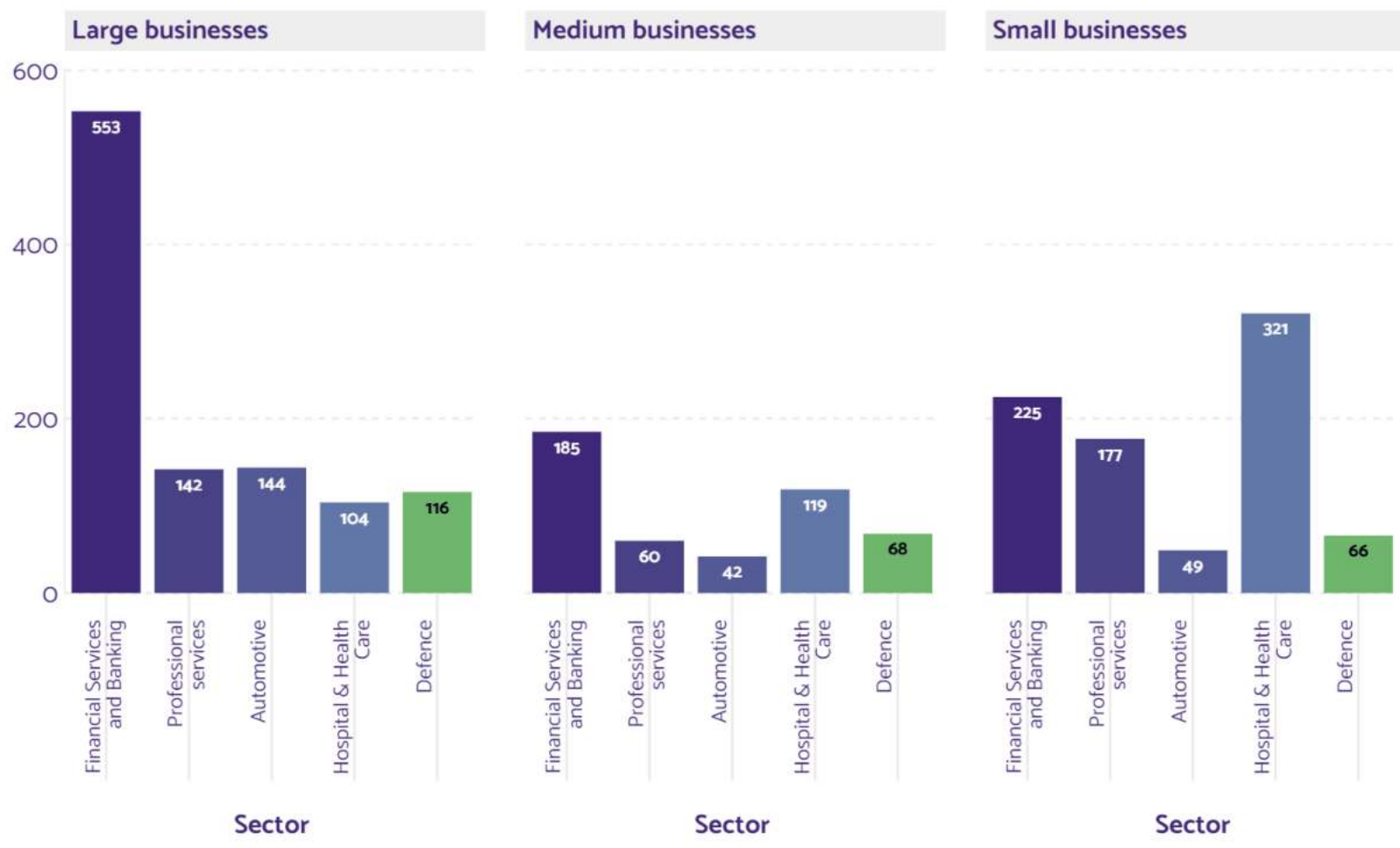


European defence companies are **hiring more top AI talent than their US competitors**. Aselsan, a Turkish advanced manufacturing company that develops modern electronics for military and industrial customers, is the top recruiter.

Helsing AI, an AI-first defence company based in Germany, is recruiting the fastest in the sector from a low base. Helsing AI recently completed a funding round to help develop its software, with the Swedish defence group, Saab, taking a five percent stake in this new defence tech unicorn.

Aselsan has grown its recruitment of top AI talent by 26 percent over the last five years, Thales by 56 percent, Lockheed Martin by 77 percent and Helsing AI by 350 percent from a very low base.

Diffusion of AI talent by number of companies



Big players dominate the acquisition of top AI talent in the sector, **employing 76 percent of the talent**, leaving middle sized firms with 13 percent and small companies, 11 percent.

Small companies in the defence sector

Small defence companies are maximising the ability of data and AI to locate targets.

CHAOS industries recently closed a Series A funding round and has multiple products in development around sensors and radar detection. The Greek company, Planetek Hellas specialises in geoinformation solutions and services and is supporting INTERPOL's counterterrorism unit. Trabus Technologies in the USA builds disruptive wireless technologies and predicitive intelligence. Geospatial Alpha in the USA builds location tracking products.

Inovor Technologies is a defence and space research company in the USA.

Microflown AVISA in Australia develops acoustic battlefield technology and Whitefox in the USA delivers drone-detection solutions.

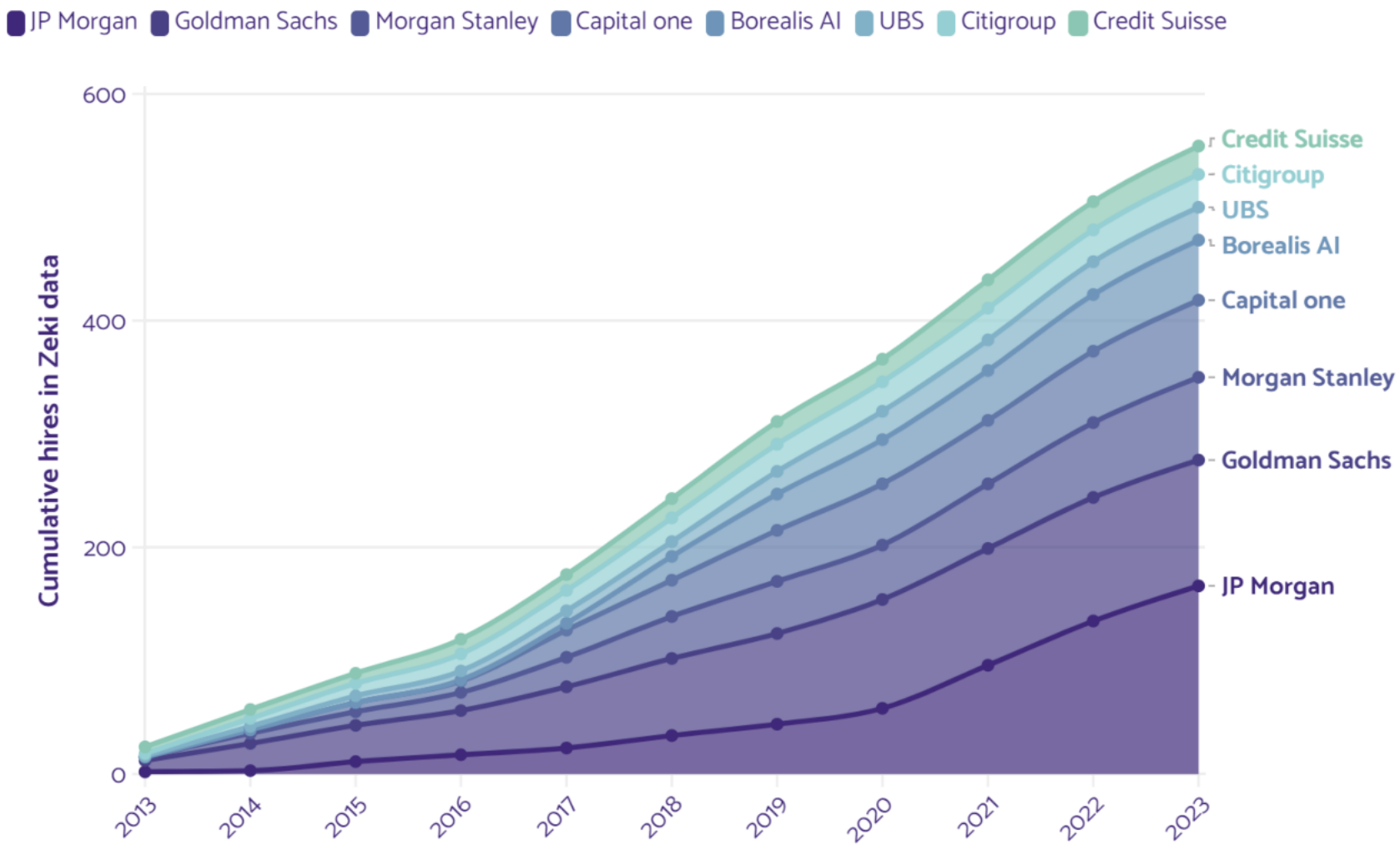
Finance Sector

The finance sector recognises the enormous potential AI offers in delivering value to customers, trading and risk management systems.

As a highly regulated sector, their approach so far has been incremental, exploring the very large number of use cases for AI.

However, multi-national banks that do not adopt AI will **struggle to remain relevant** given the pace of competition in the sector.

J.P. Morgan outpaces its peers in acquiring top talent



Over the last five years, J.P. Morgan has increased its hiring of top AI talent in Zeki data at an average annual increase of 40 percent, Borealis AI at 59 percent and Capital One at 20 percent.

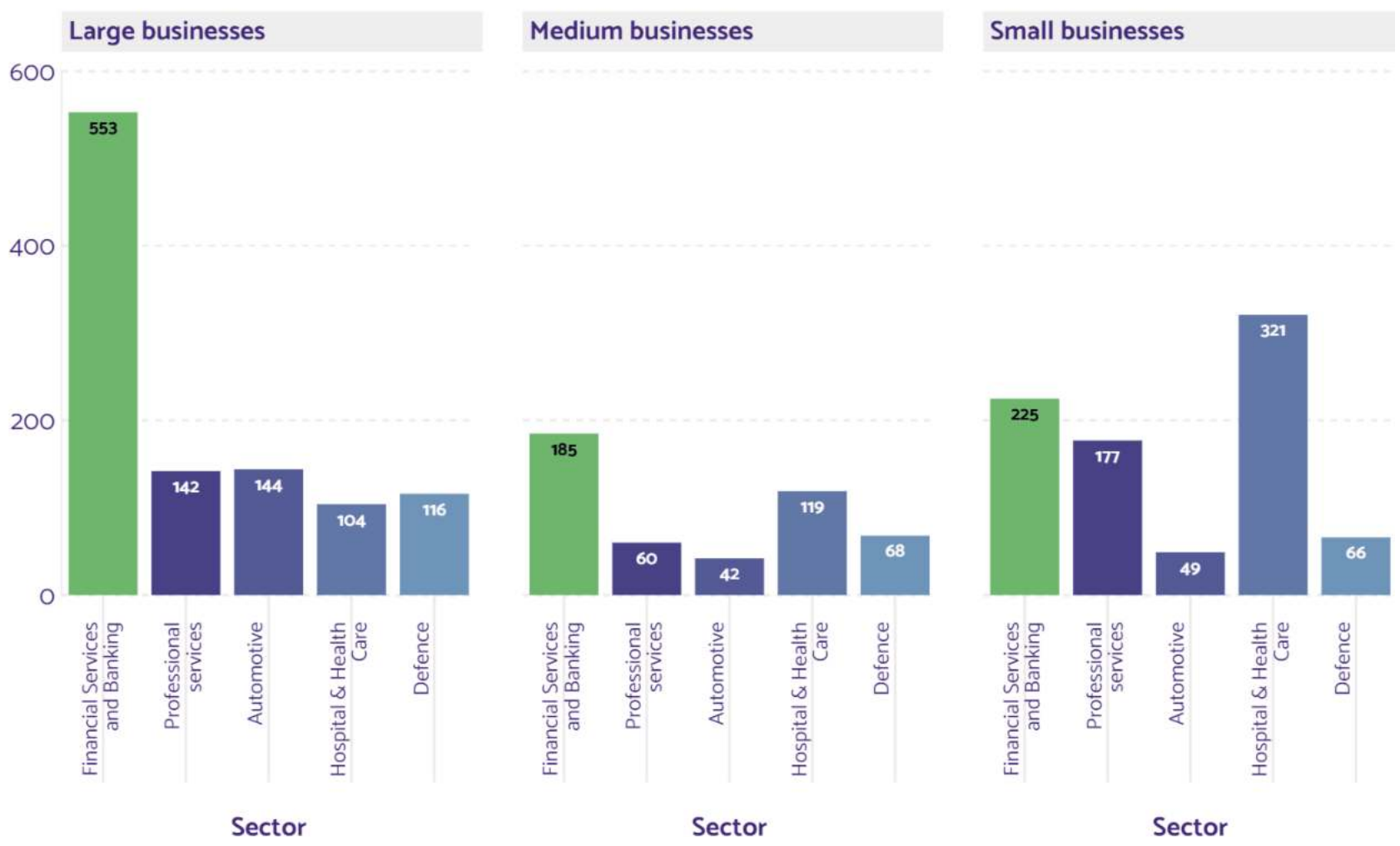
Big banks rarely appear in the top recruiters of top AI talent in any major economy. Compared to other sectors, big banks have only hired a small number of top AI talent so far. The sector is mainly characterised by the outsourcing of AI-enabling tasks to India and the poaching of staff from other banks. But this is likely to change if more banks set up in-house AI labs as is happening in other sectors.

However, J.P. Morgan, a bank that states it is spending $12 billion a year on technology, has a proven track record for competing for the best AI talent. This is because it has built strong networks in the academic sector by funding PhDs and puts significant research into the community as well as being an active sponsor of AI events.

Canadian banks Capital One and Royal Bank of Canada, through Borealis AI, are also aggressively recruiting but from a low base compared to US banks.

Brazilian banks and fintech companies, with dominant positions in Latin America, are top recruiters domestically of top AI scientists and engineers.

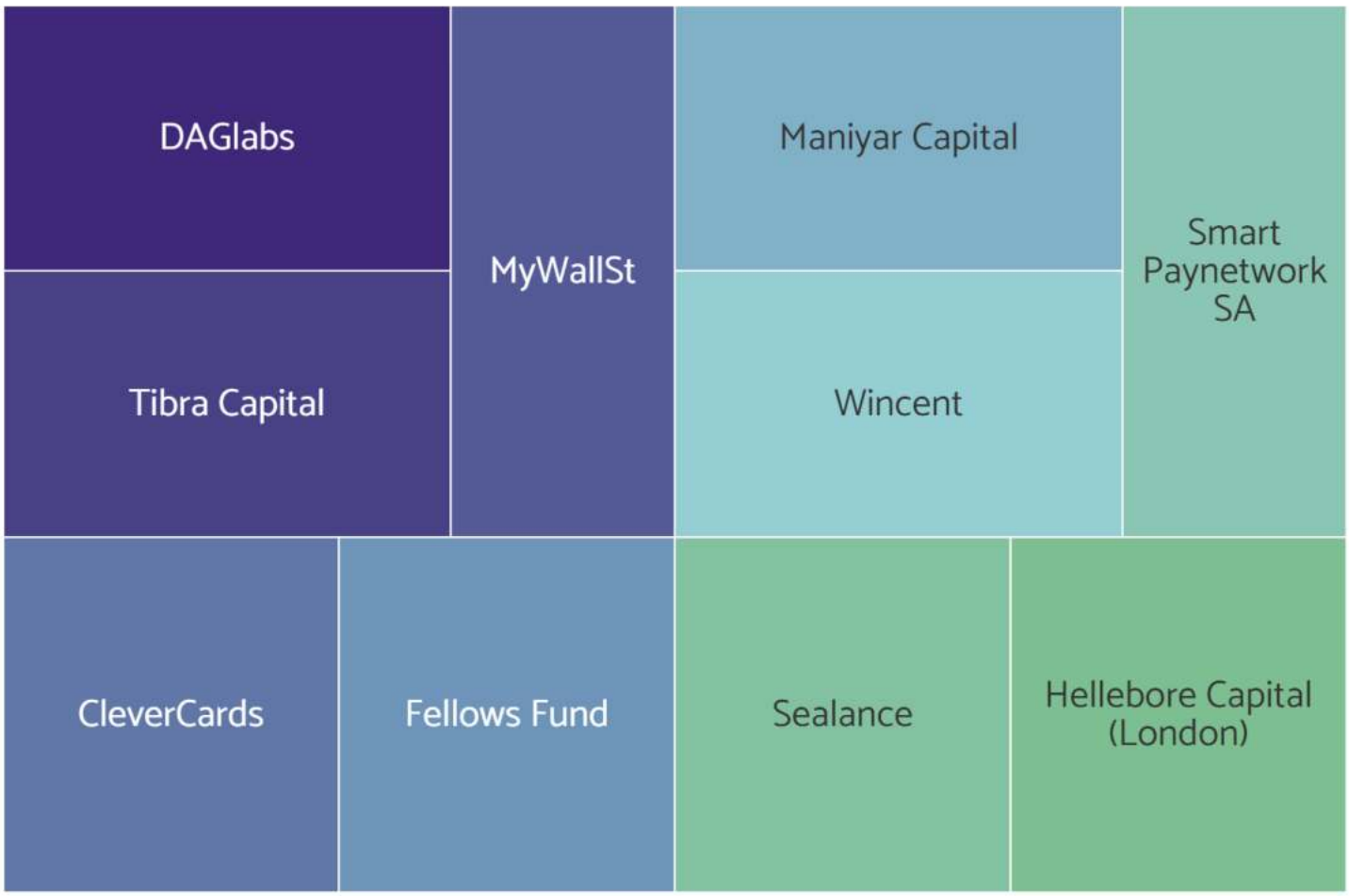
Diffusion of AI talent by number of companies



Large banks and financial institutions **employ 80 percent of top AI talent**, with the remaining 20 percent evenly split between small and medium firms.

This top heavy diffusion indicates that **smaller companies are looking for more specialised skills.**

Small companies in financial sector



Small finance companies are exploring and trading techniques with AI and building cryptocurrency platforms.

Small companies in the financial and banking sector are not hiring top AI talent in large numbers.

Wincent in Gibraltar develops software for algorithmic trading. Australian firm, Tibra Capital, is a proprietary trading firm which has teamed up with Auckland University of Technology. MyWallSt is an Ireland-based company which has an AI-powered stock-picking solution. US-based Fellows Fund is a venture capital company with a focus on AI and Web3.

Small companies which hire top AI talent in our data include Crypto trading companies. DAGlabs, an Israel-based company, uses AI to scale its crypto platforms. Sealance in the USA is a blockchain-based platform of trust for cryptocurrencies.

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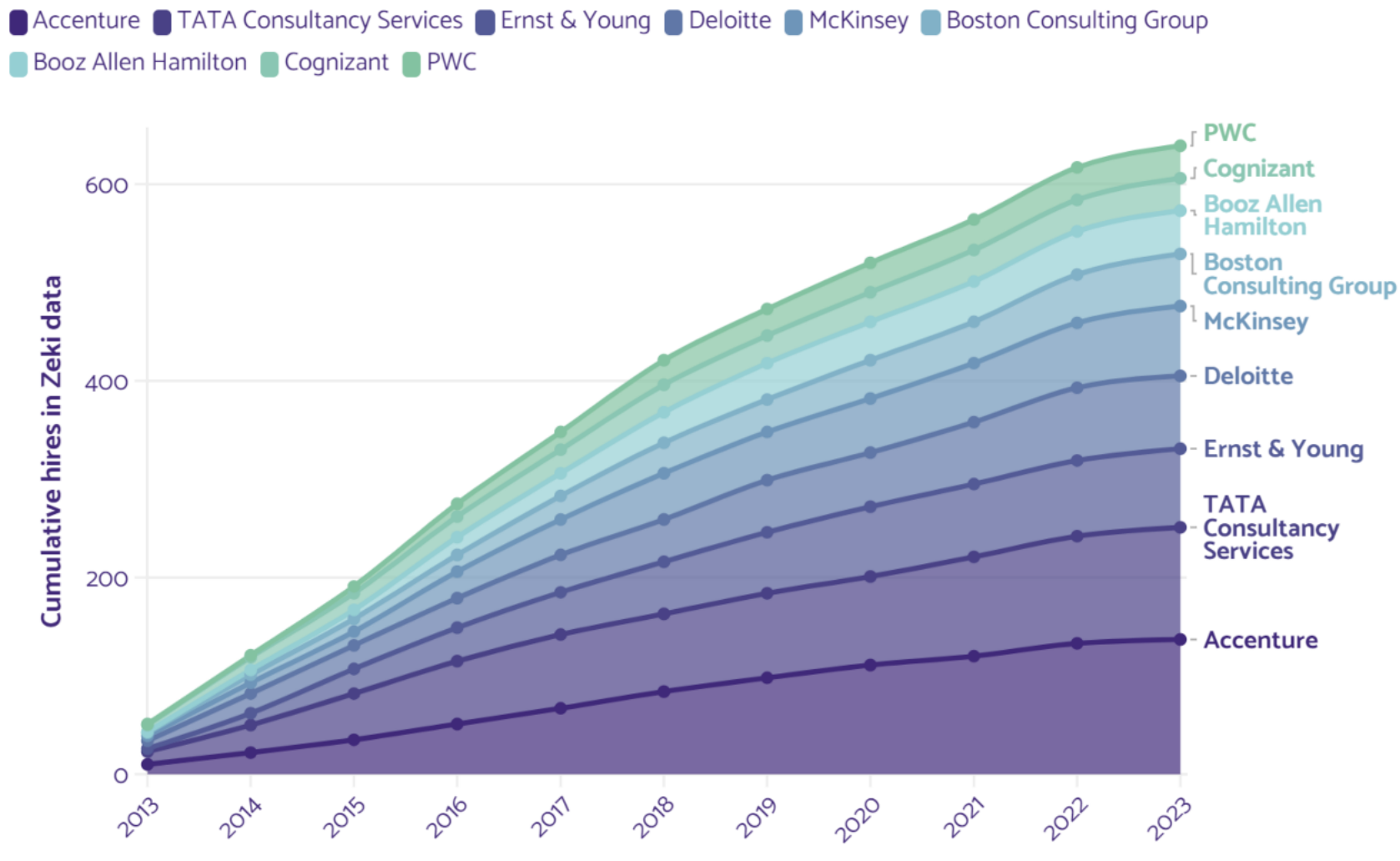
Consultancy Sector

Consultancy companies have stated their **high ambition to invest in AI** and are translating this into hiring top AI talent to underpin their offer to clients.

AI will enable them to deliver more **accurate, faster insights** to customers at reduced costs.

Some are seeking partnerships with AI companies to accelerate their progress.

Trajectory of hiring in the consultancy sector

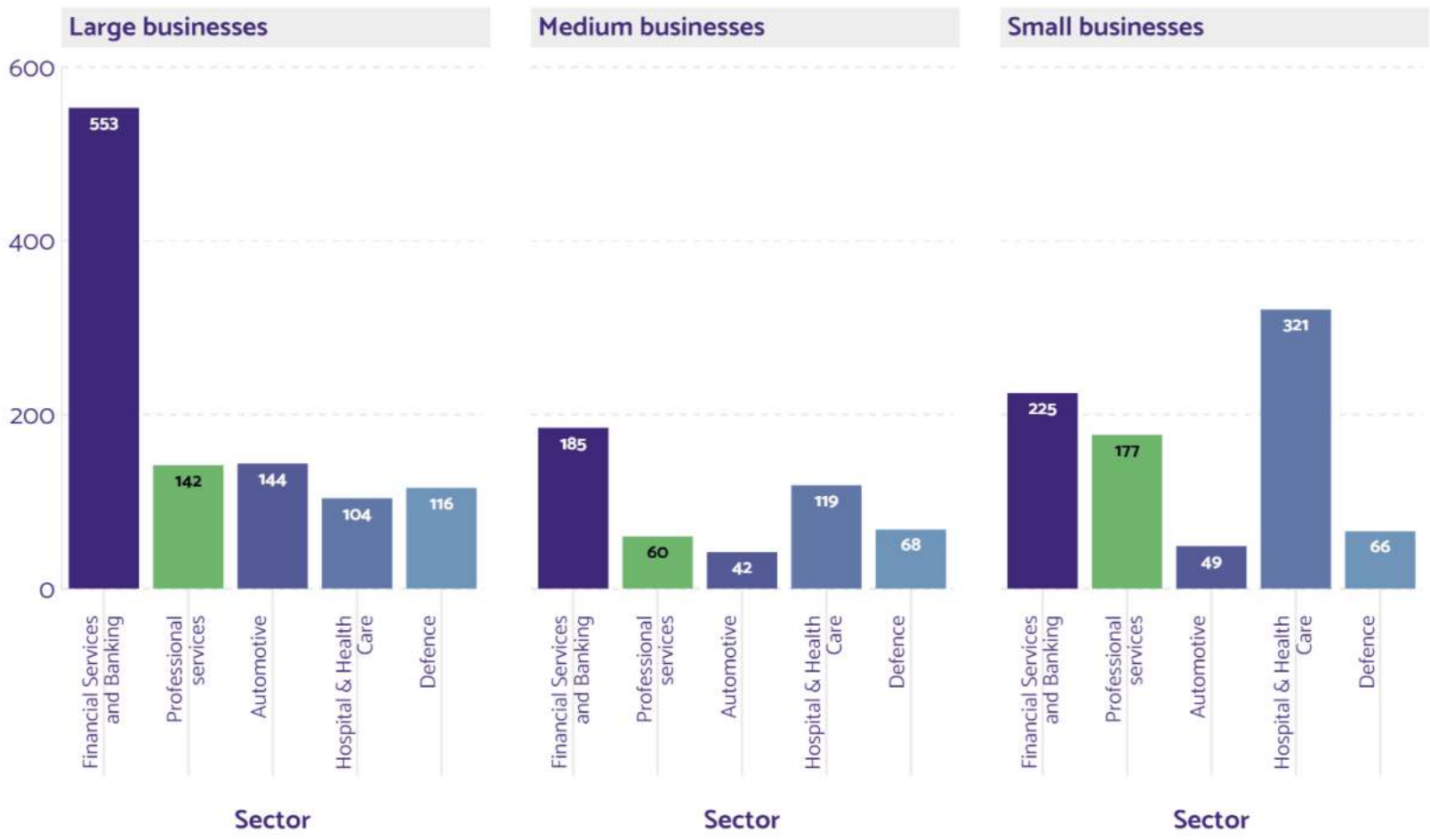


Consultancy companies have **accelerated their investment in top AI talent to meet client needs**, especially with the introduction of generative AI to the market.

Accenture announced in 2023 a $3 billion investment in Data and AI over three years for 80,000 employees to be working in this area. **Mckinsey** announced a generative AI collaboration between SAP business AI and Quantum Black: AI by Mckinsey. **Booz Allen Hamilton** is reported to be the largest supplier of AI-related services to the US government with over 200 active projects. **Cognizant** has launched a NeuroAI product to help its customers master generative AI.

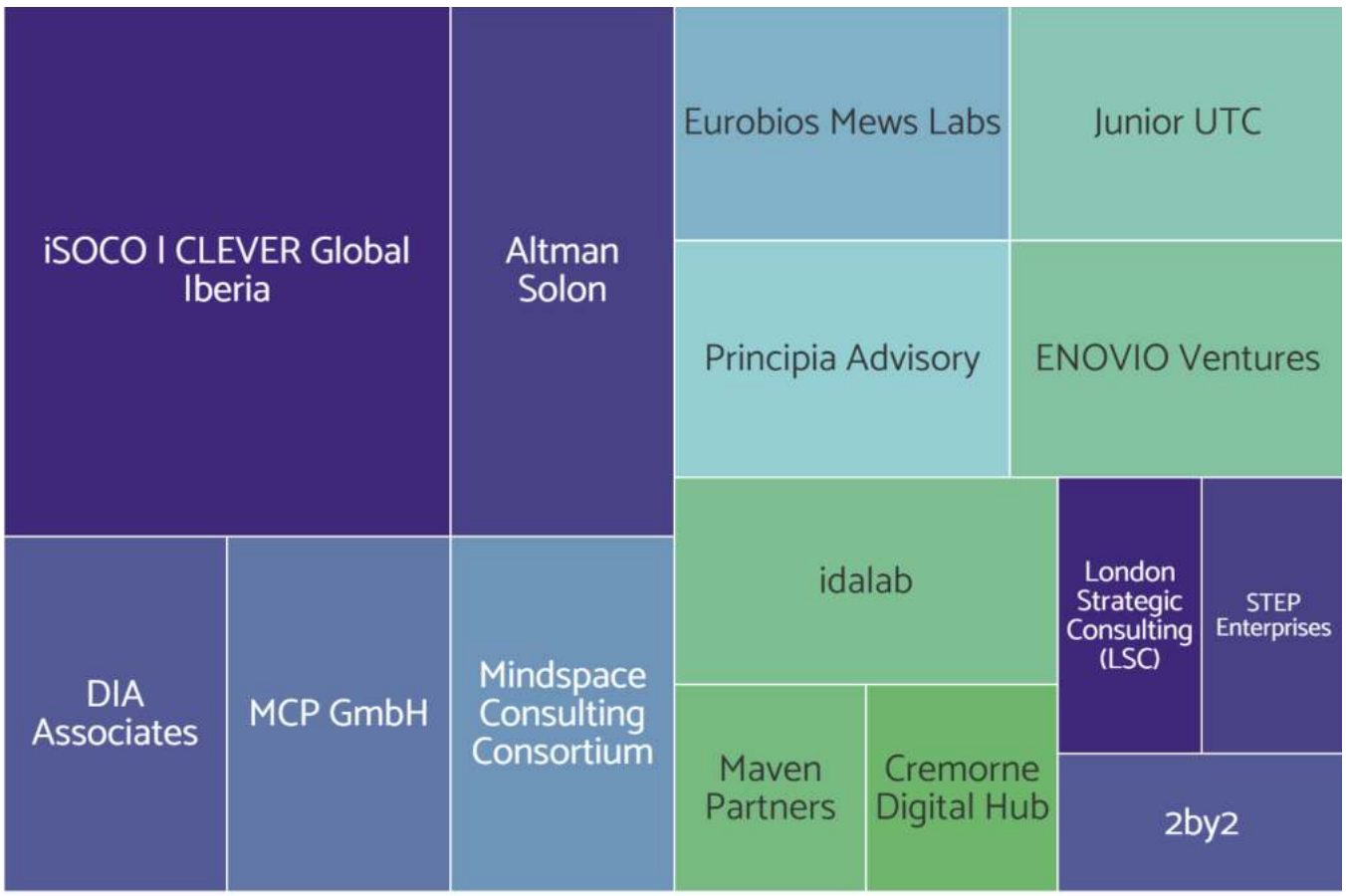
Accenture and Tata Consultancy Services are the main recruiters of top AI talent, hiring at an average annual increase of 13 percent and 7 percent over the last 10 years, respectively. Boston Consulting Group has hired at an average annual increase of 14 percent, but from a lower base.

Diffusion of AI talent by number of companies



There are **few middle-sized companies** hiring top AI talent in this sector. **Large companies hire 79 percent** of the top AI talent.

Small companies in the consultancy sector



Small consultancy services are looking to bridge the gap between AI and traditional industries to make breakthroughs in efficiencies.

Small companies hiring top AI talent in the professional services sector **provide advice on how to optimise production or supply chain processes**, for example ISOCO I CLEVER in Spain and MCP Gmbh in Austria.

Altman Solon in the USA offers consultancy services in telecommunications, media and technology.

Idalab in Germany is an AI consulting firm for life sciences and healthcare.

Cremorne Digital Hub in Australia helps companies develop digital capabilities.

Not all arrows are pointing up in the race to hire top AI talent.

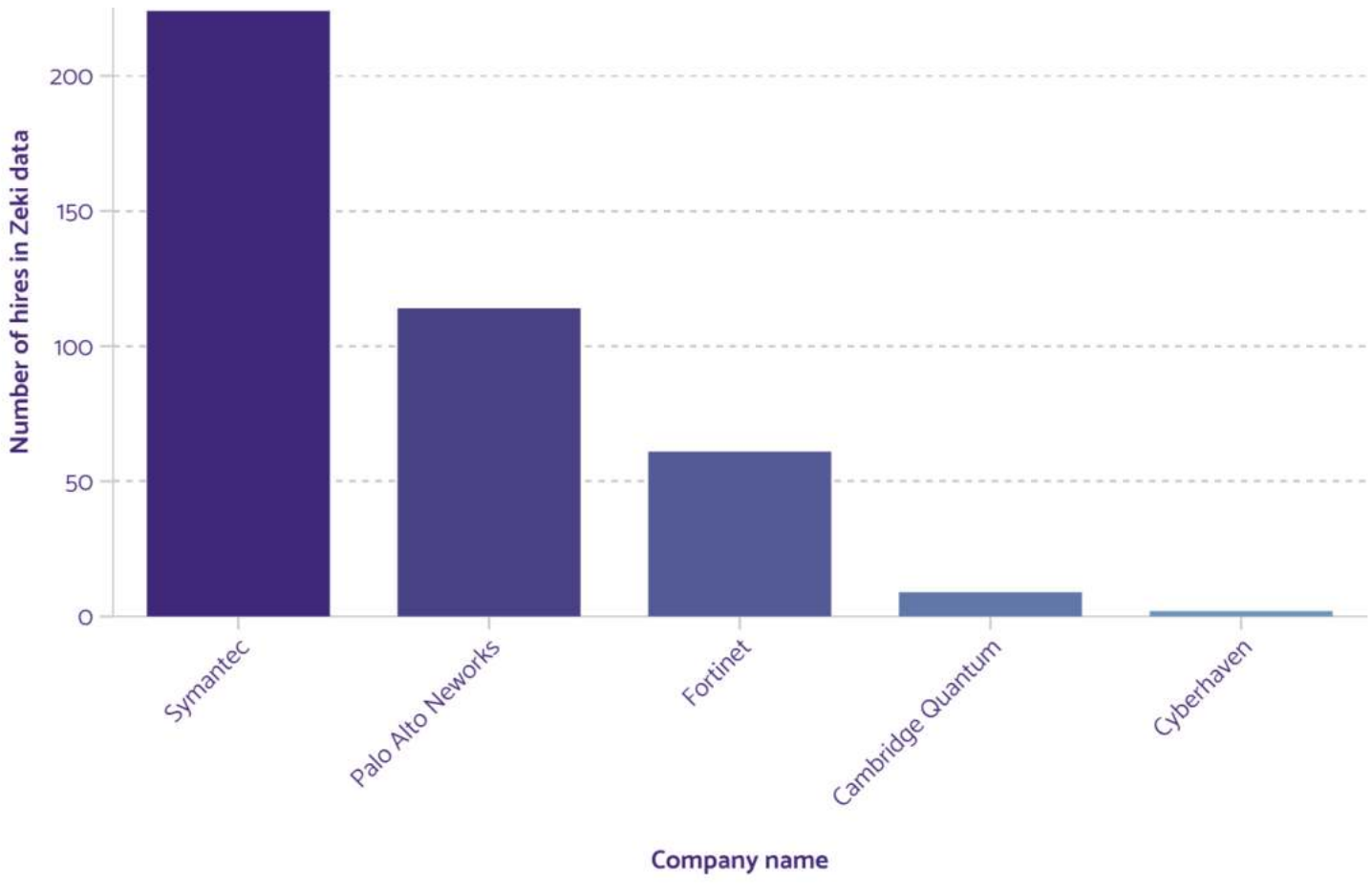
Three sectors, each valued at a trillion dollars, are not represented in the report, reflecting a disconnect between the business models of these sectors and top AI talent.

There is a historic disconnect between the research done on privacy and security in academia and the software products cyber security companies put into the market. Unlike other sectors, the cyber security industry isn't capitalising on academic research as effectively as it could.

The exceptions are the main tech companies who own data centres and cloud service providers. They are investing in top AI talent with expertise in security and secure communications. Cybersecurity companies who do not invest in top AI talent risk falling behind in their ability to keep ahead of the pace of innovation in AI malware, developed by state actors or criminal gangs.

Symantec and Palo Alto Networks are top hirers of AI talent in cyber companies investing in top AI talent with expertise in security and secure communications.

Symantec and Palo Alto Networks are top hirers of AI talent in cyber companies

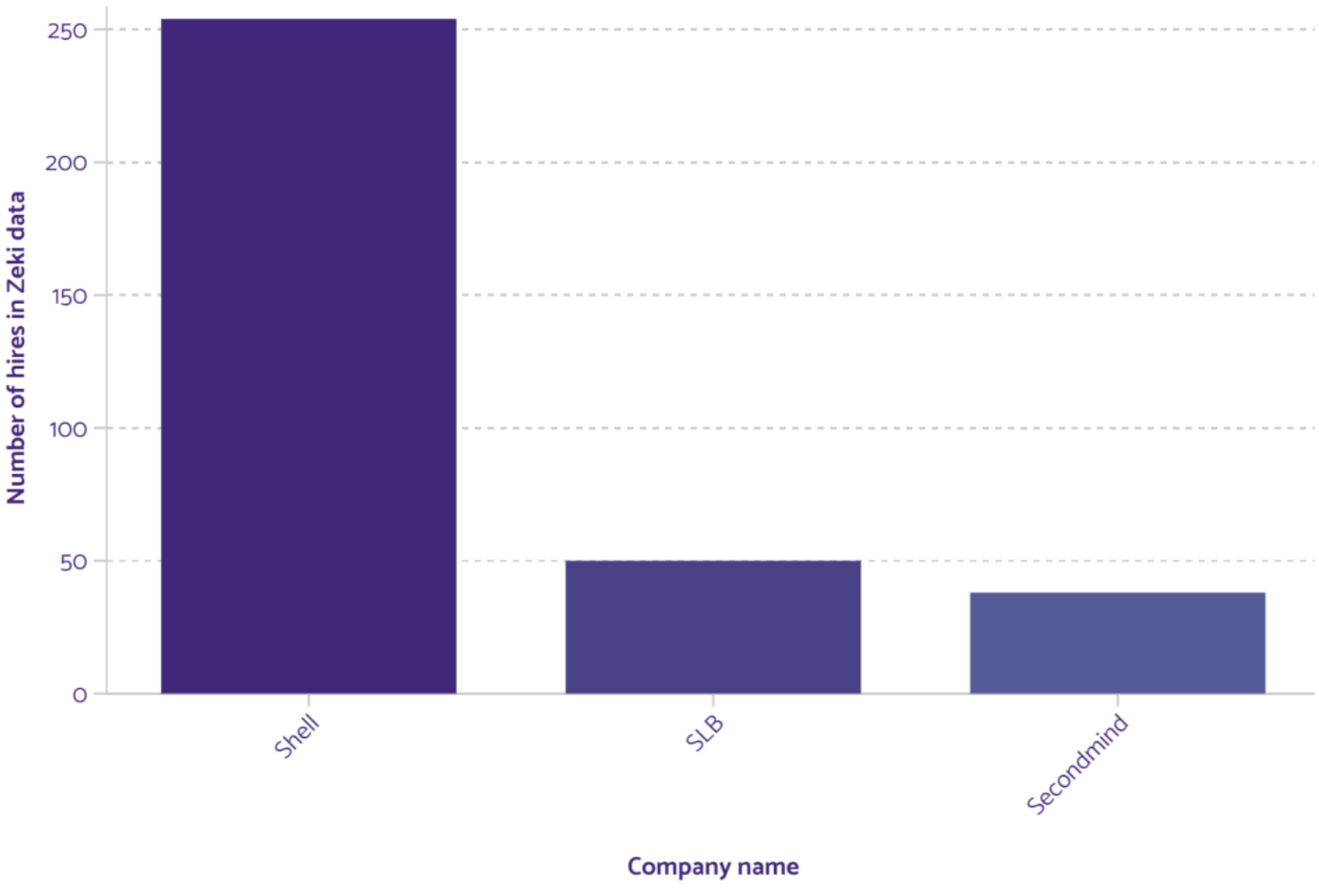


Among the major energy companies, only Shell has hired notable numbers of top AI talent. It has set up an AI residency program, designed for students to work on projects across Shell's business.

Schlumberger (SLB) in the USA, is the second highest recruiter of top AI talent in Zeki data followed by Second Mind, a UK company which designs faster, cleaner engines. Many talented people who seek to solve climate issues with AI, attend workshops on this topic at major AI conferences.

But we see no signals that the major oil companies are talent spotting from this pool or that this talent sees roles in major oil as attractive.

Shell outpaces other energy companies with hiring top AI talent

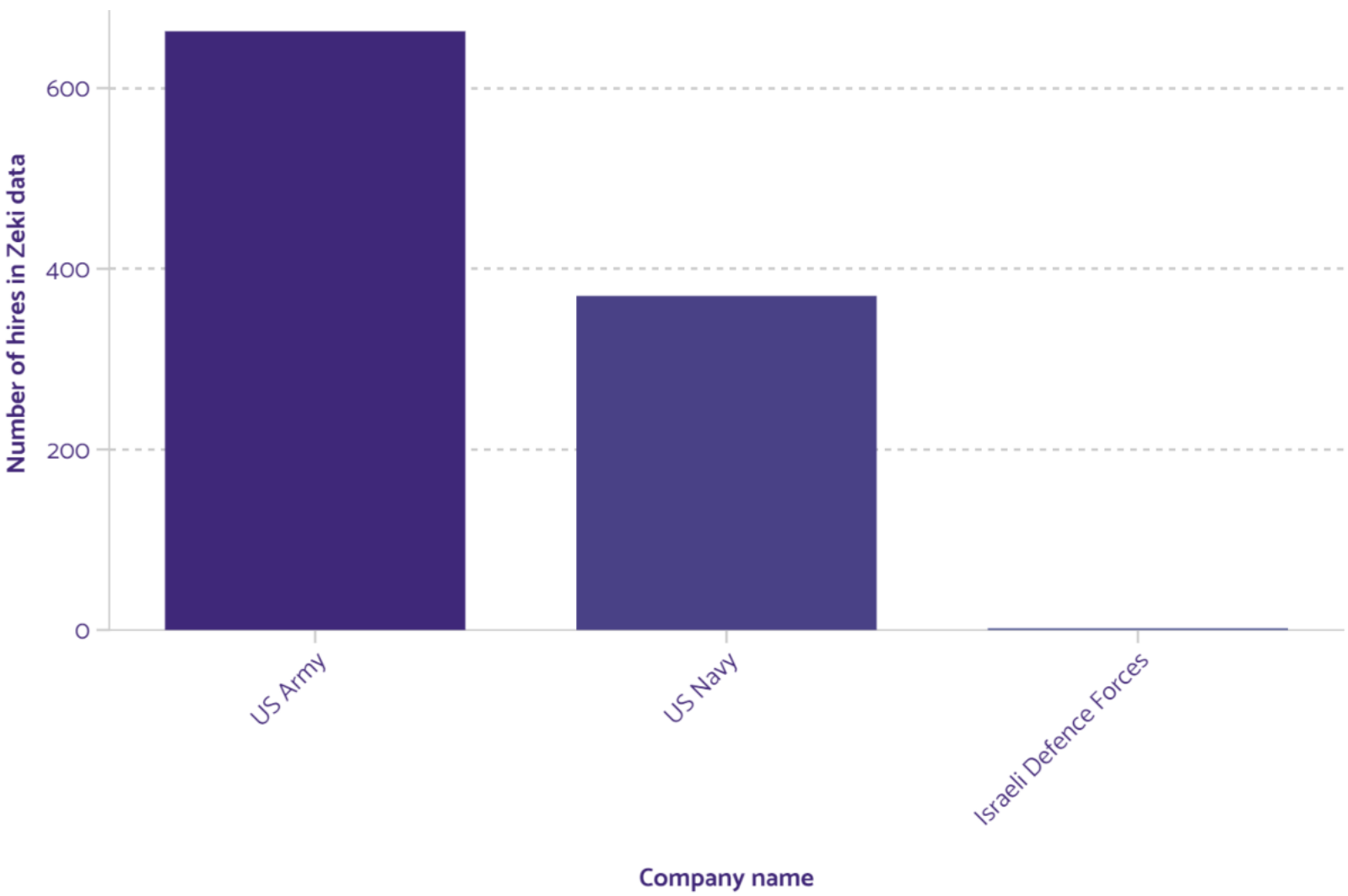


The US military has a consistent track record of hiring top AI talent, supported by its scholarship schemes for this talent.

Apart from the Israeli Defence Forces (IDF), we see no signal that other military forces are hiring top AI talent despite the pressing risks of AI to defence and national security.

In the case of the IDF, Israel has built an ecosystem of companies in cybersecurity, quantum and AI, founded by individuals who worked and trained together on technology projects whilst doing their military service in specialised IDF units.

Number of top AI talent hired by the US and Israel military



CHAPTER FIVE

AI talent ecosystems by region and by country

In Chapter One, we showed **major imbalances in supply and demand** in the global market for top AI talent.

We covered the USA in the previous chapter because of the massive influence it has on attracting talent from all other countries. We explain here **country-by country** the effect of the **surge in demand** from the USA and how countries are responding. The landscape is highly varied.

KEY FINDINGS

THE STAKES FOR COUNTRIES ARE HIGH

Sharp sustained net outflows of talent pose high risks for countries when they lose their top AI scientists and engineers whom they have funded or trained to create intellectual property - the driving force of innovation and national prosperity. Net outflows also indicate that top AI talent lacks opportunity at home and looks overseas. Sheer persuasion will not change their mind. Countries will have to rewire their AI ecosystems to create opportunities. This will take time and may not always be possible.

SOME MAJOR EUROPEAN COUNTRIES ARE NOW RETAINING TOP AI TALENT THEY USED TO LOSE

The United Kingdom and Germany have now joined The Netherlands, Switzerland and the Nordic countries in retaining talent they used to lose. These countries all have national champions now anchoring talent at home and deep and diverse ecosystems of small companies. The UK has one disadvantage; the main recruiters of top AI talent in the UK are foreign-owned subsidiaries, meaning the intellectual property generated by these top AI scientists and engineers is not owned by the UK.

KEY FINDINGS CONTINUED

BUT THERE IS A SECOND TIER OF EUROPEAN COUNTRIES WHICH ARE FALLING BEHIND

France, Italy and Spain, alongside Canada, are now falling behind other major advanced economies. They have national research institutes rather than companies as their main recruiters of top AI talent and less deep ecosystems of small companies.

TALENT FROM INDIA AND ISRAEL IS HIGHLY SOUGHT AFTER BY US BIG TECH COMPANIES

US Big Tech companies target Israeli and Indian universities for recruitment causing very high outflows of talent from these countries to the USA. Israel compensates a little by having a thriving but small ecosystem of AI companies. India does not. India's large companies show low ambition to hire top AI scientists and engineers in large numbers.

TALENT FROM EAST AND SOUTH EAST ASIAN COUNTRIES FLOWS TO THE USA ONLY

Talent from East and Southeast Asian countries heads to the USA to gain an advanced degree of education and then return home, most likely to join a large national champion as they dominate the hiring of top AI scientists and engineers. There are no significant flows of talent within the region.

AFRICA IS GROWING ITS TALENT

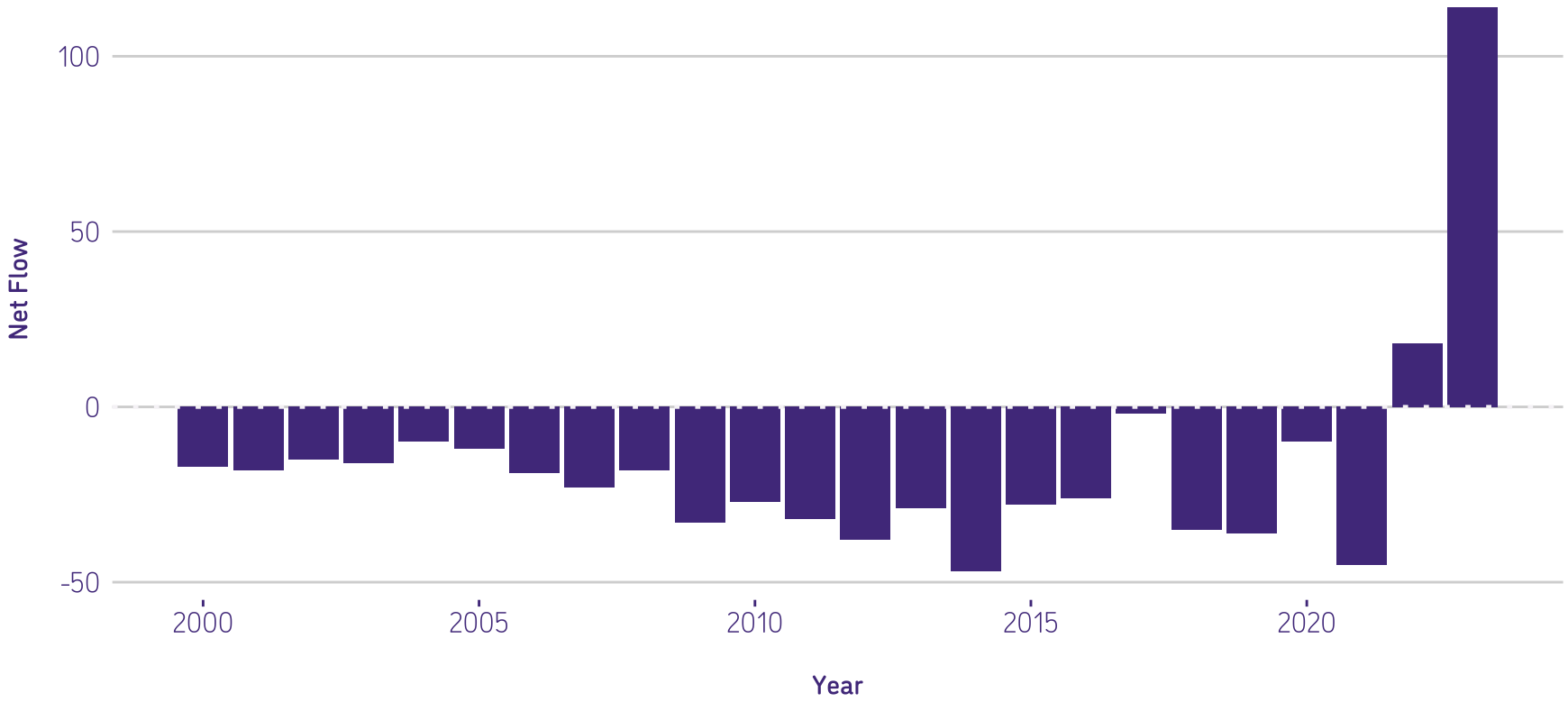
The brain drain of top AI talent from Africa is a myth. Top AI scientists and engineers on the continent are growing at just under 25 percent annually but are mainly concentrated in the North African countries of Egypt, Algeria, Tunisia and Morocco.

COUNTRIES COVERED IN THIS CHAPTER

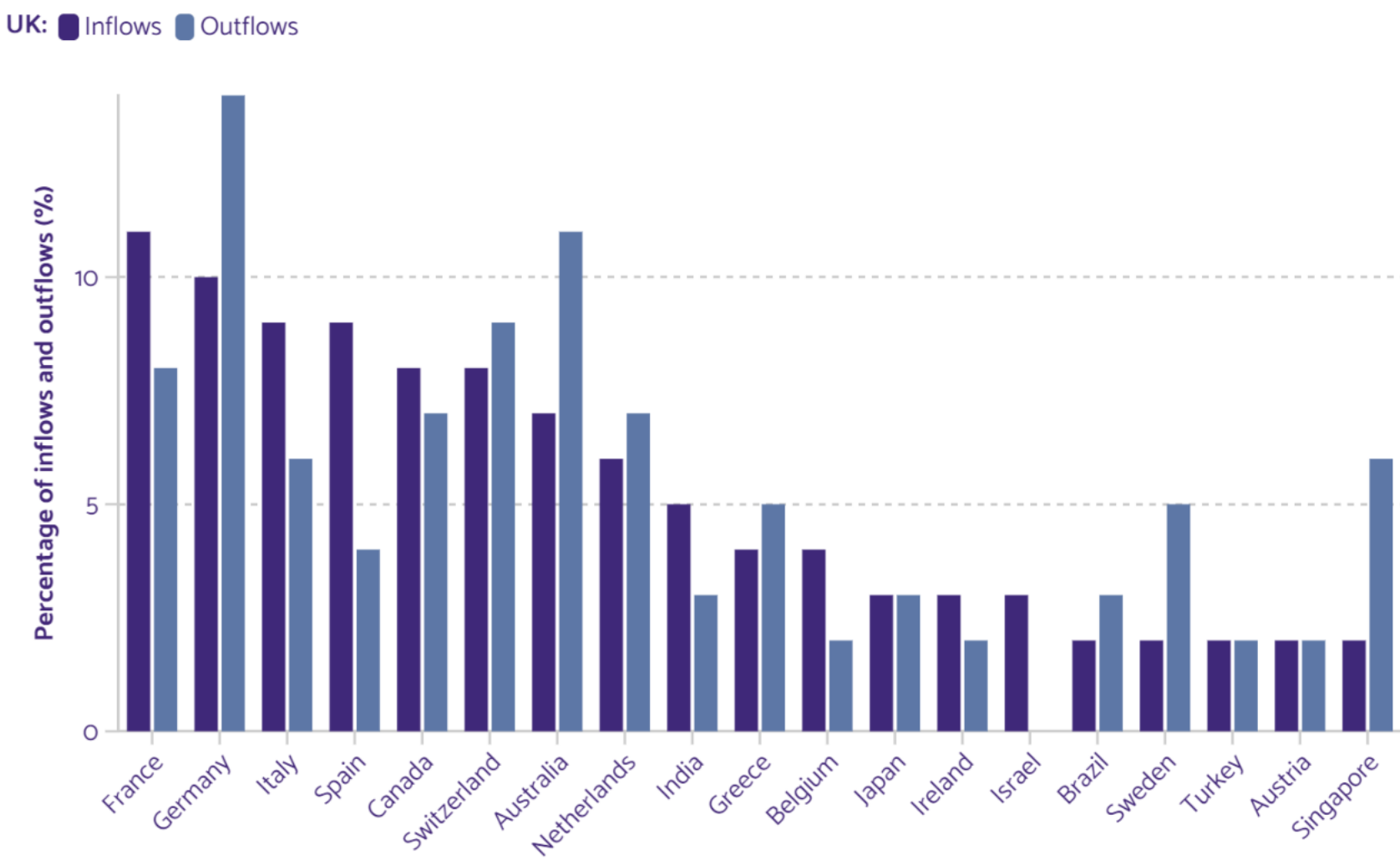
United Kingdom

The United Kingdom has started to dramatically turn around a sustained outflow of talent, that dates back two decades. It has a very diverse AI ecosystem with 10 universities in Zeki's top AI educators. But the main recruiters of top AI talent are foreign-owned entities registered in the UK, who ultimately own the intellectual property they generate.

United Kingdom - Net flow of AI talent over time



Inflows and outflows of talent to and from the UK



The United Kingdom experiences high outflows to the USA like most other countries. The graphic shows significant outflows of talent to Germany - but also significant positive inflows from France, Spain and Italy.

Outflows to Singapore and Australia are dominated most likely by Australians and Singaporeans returning home after completing their advanced education in the UK.

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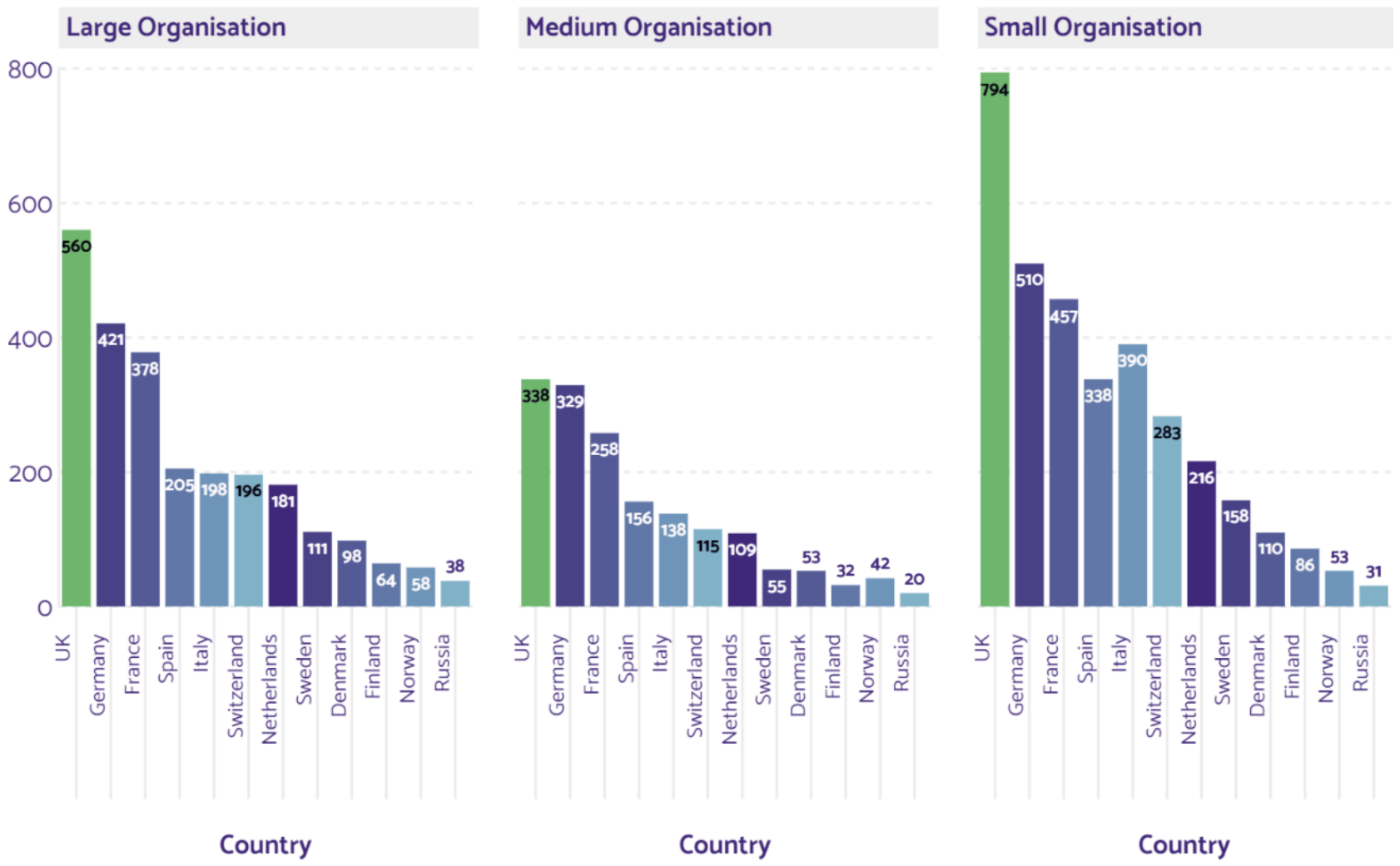
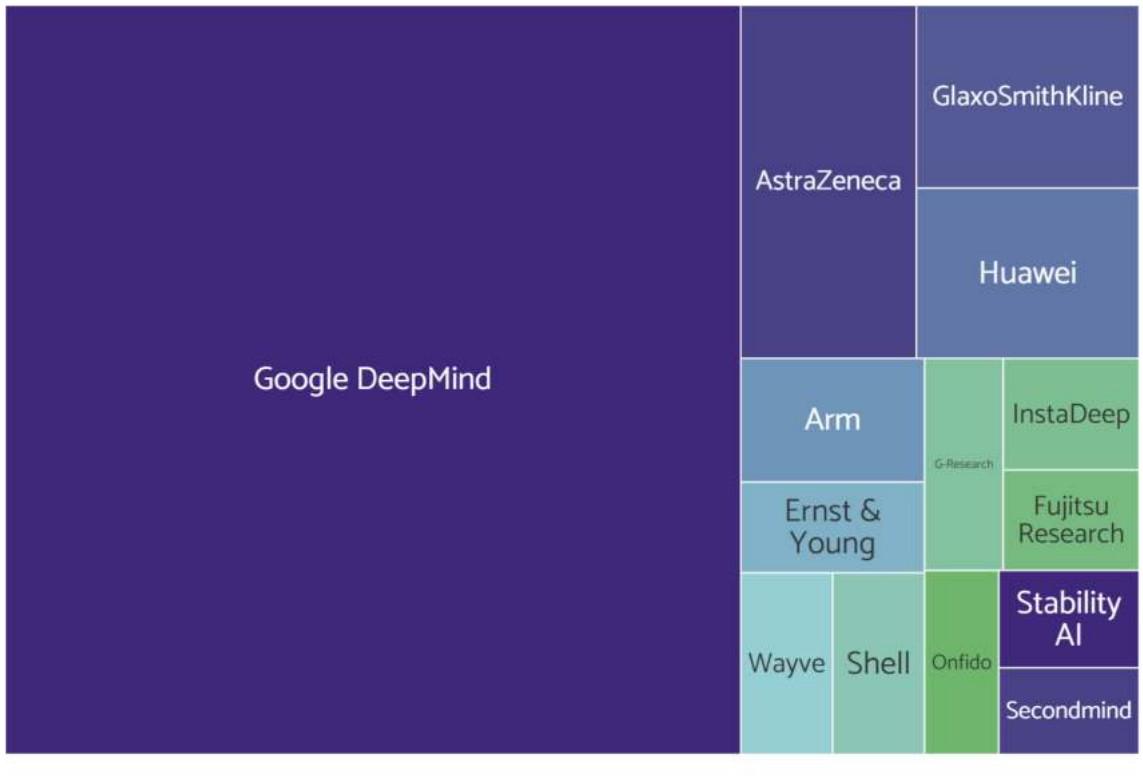
Diffusion of AI talent by number of companies



The United Kingdom has the highest number of companies recruiting AI talent in Europe. They make up 8.5 percent of the companies that were recruiting top AI talent.

There are 794 small UK companies that employ 29 percent of the country's top AI talent, indicating the very diverse and deep UK AI ecosystem. Large companies employ 56 percent of top AI talent in the UK.

Top recruiters of AI talent in the UK



The United Kingdom's national champion is **Google DeepMind** with **GlaxoSmithKline** and **AstraZeneca** also increasing their recruitment.

Major AI labs of foreign companies see the value of UK talent and have set up in the UK. The Big Five have also built a large research presence in the UK. Absent from top recruiters are the UK's financial sector, the powerhouse of the economy.

Top UK educators of AI talent in Zeki data

10 UK universities are in the Zeki top 100 global educators of top AI talent. The second highest of any country.

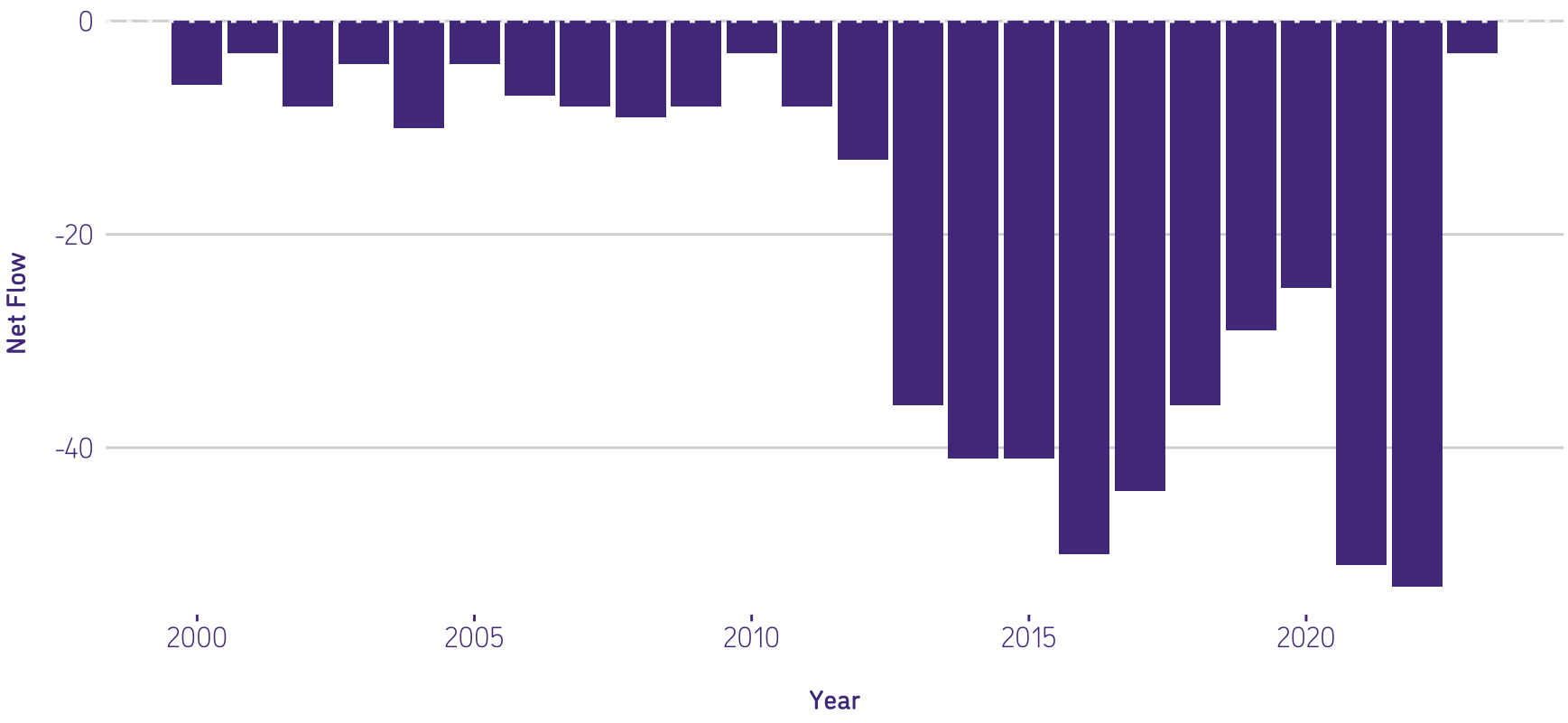
Imperial College, Oxford University, UCL and Cambridge are prime suppliers of talent to Google DeepMind; whilst Queen Mary is a prime supplier to Apple; Edinburgh to Google.

France

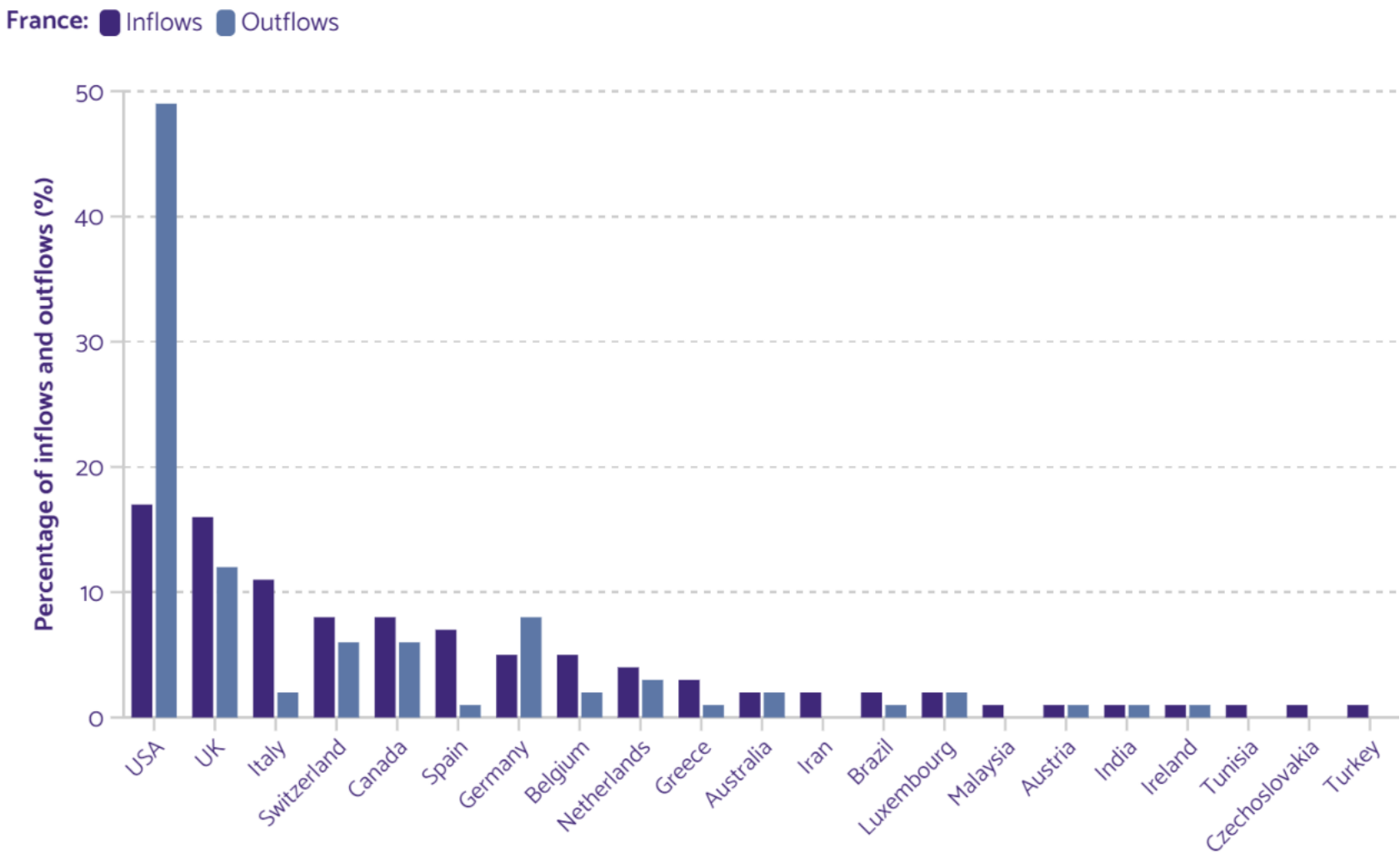
France has an AI ecosystem dominated by its large national research networks. **These networks are most likely able to retain top AI talent interested in research intensive careers.** However, the picture is mixed for those seeking roles outside academia.

Big national companies are not hiring in large numbers. This is most likely encouraging talent to move to the USA creating a significant, sustained net outflow of top AI talent.

France - Net flow of AI talent over time

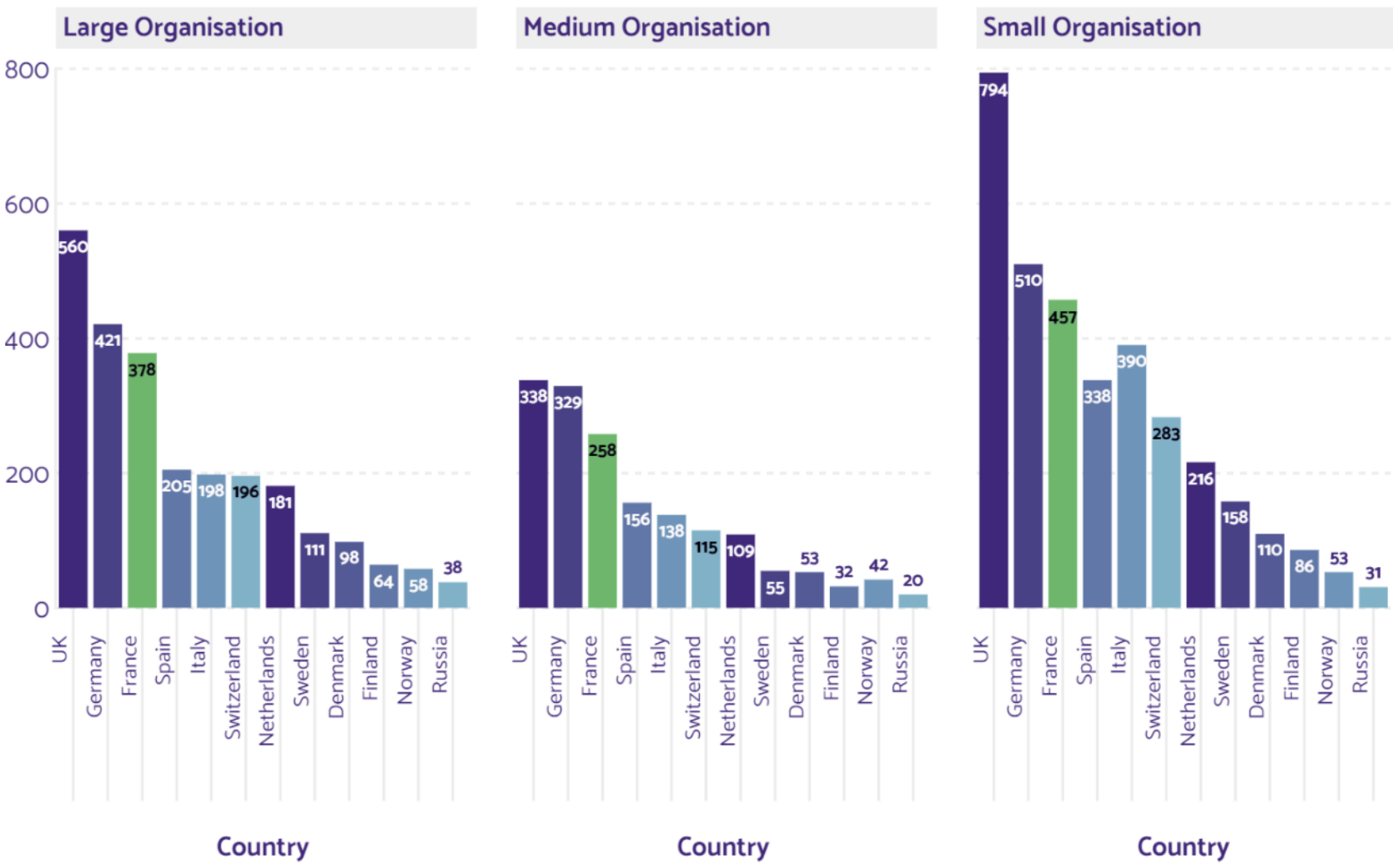


Inflows and outflows of talent to and from France



France **receives significant net inflows of top AI talent from Italy and Belgium** but these do not counter the major net outflows to the USA.

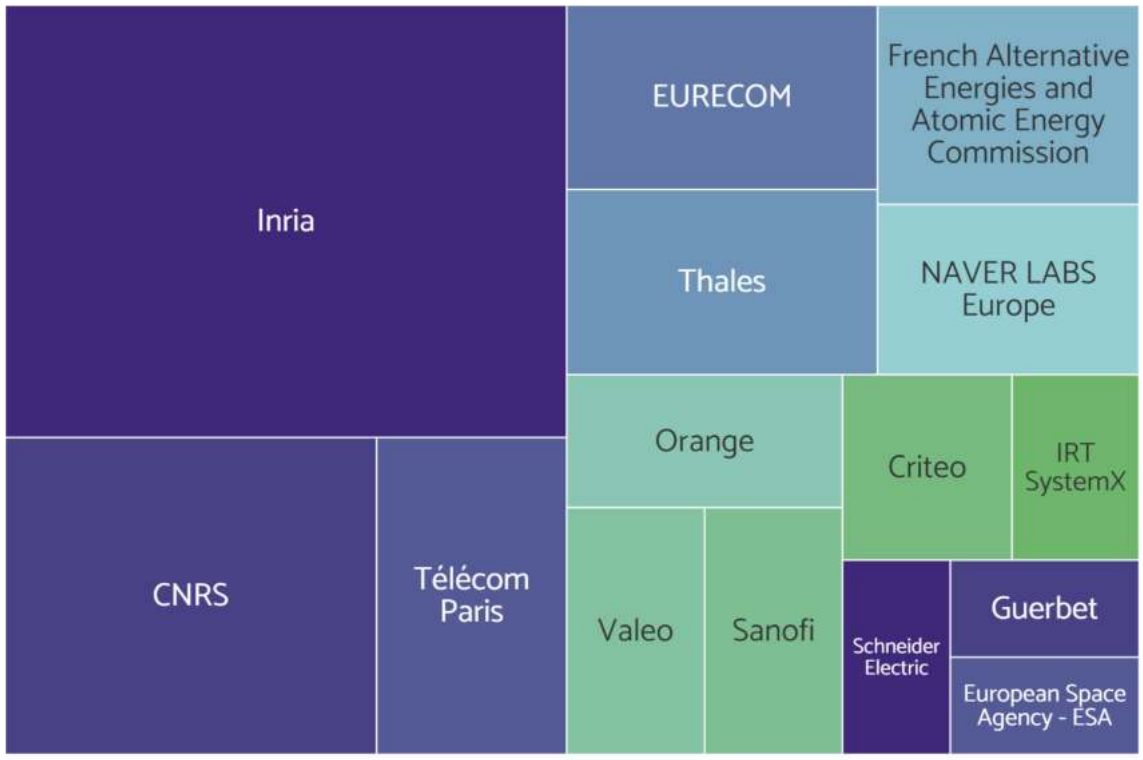
Diffusion of AI talent by number of companies



French companies **make up 5.5 percent of all companies hiring top AI talent in our data**, including 457 small companies.

Large organisations account for 67 percent of hires, hiring in big numbers compared to their counterparts in the UK, but the same as Germany. This is mainly driven by the hiring done by France's very large national research networks rather than by French industrial or technology companies.

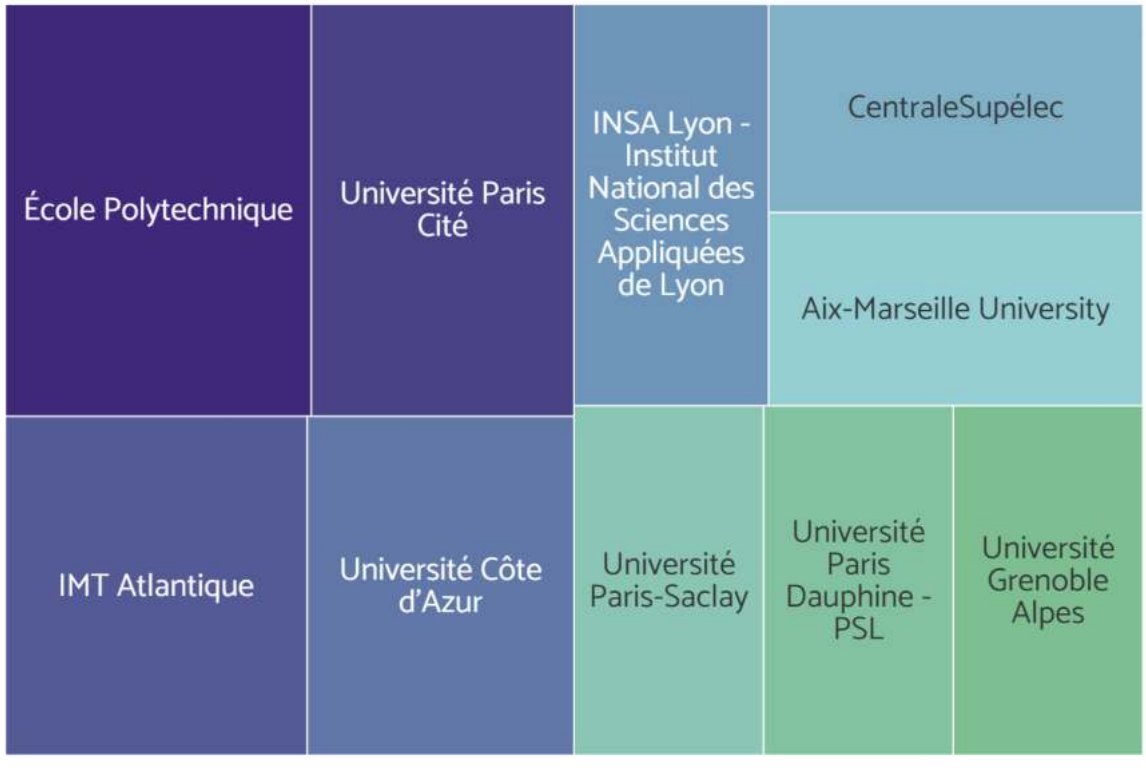
Top recruiters of AI talent in France



Inria and **CNRS** are very large national research networks that excel in research and collaborate with industry. We see little crossover of top AI talent between them and their industry partners.

Criteo provides online display advertisements and has an office in Silicon Valley. Absent are major French oil companies and banks.

Top French educators of AI talent in Zeki data



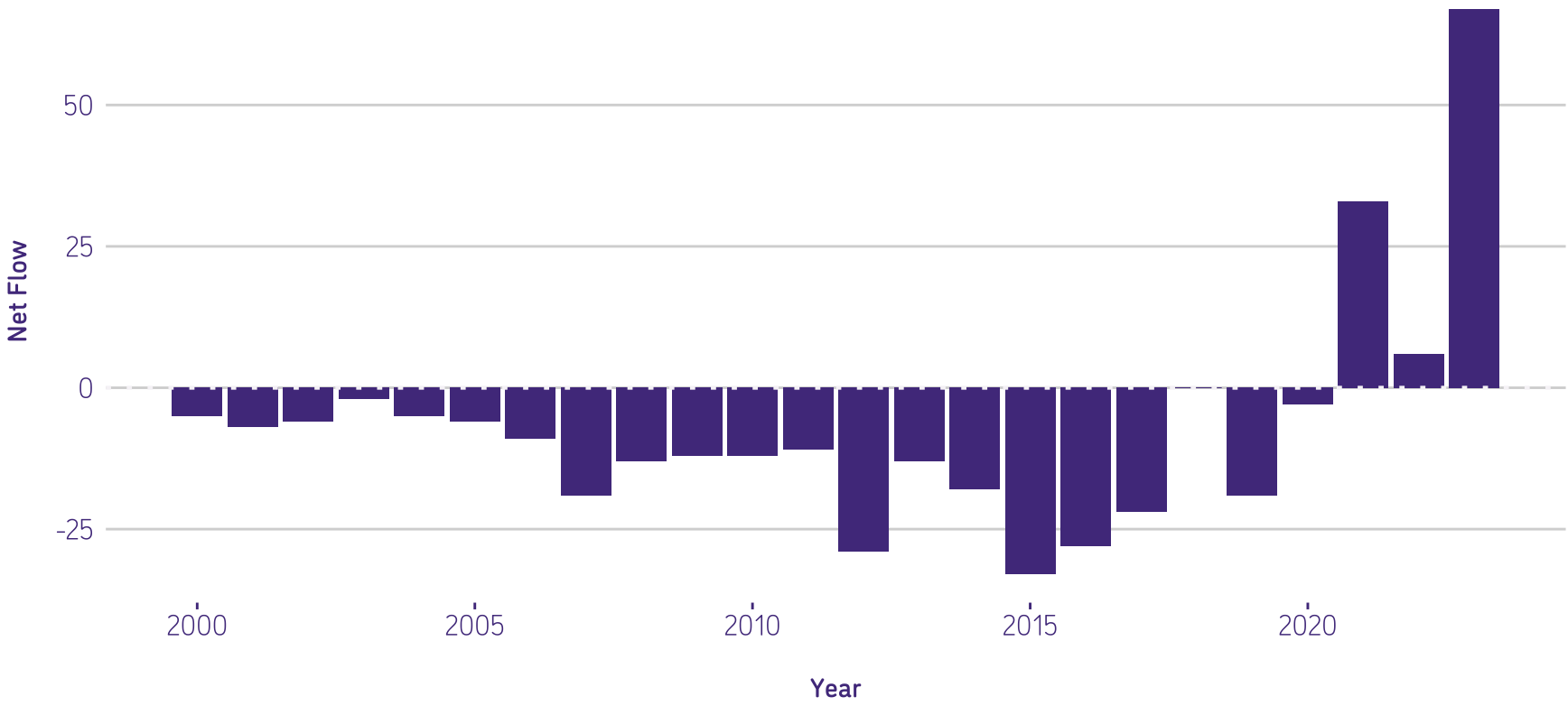
No French universities are in Zeki's top educators of AI despite France placing fifth globally by the quantity of talent it produces, indicating a diffuse network of universities educating top talent but in small numbers.

No French university is a prime supplier to major companies.

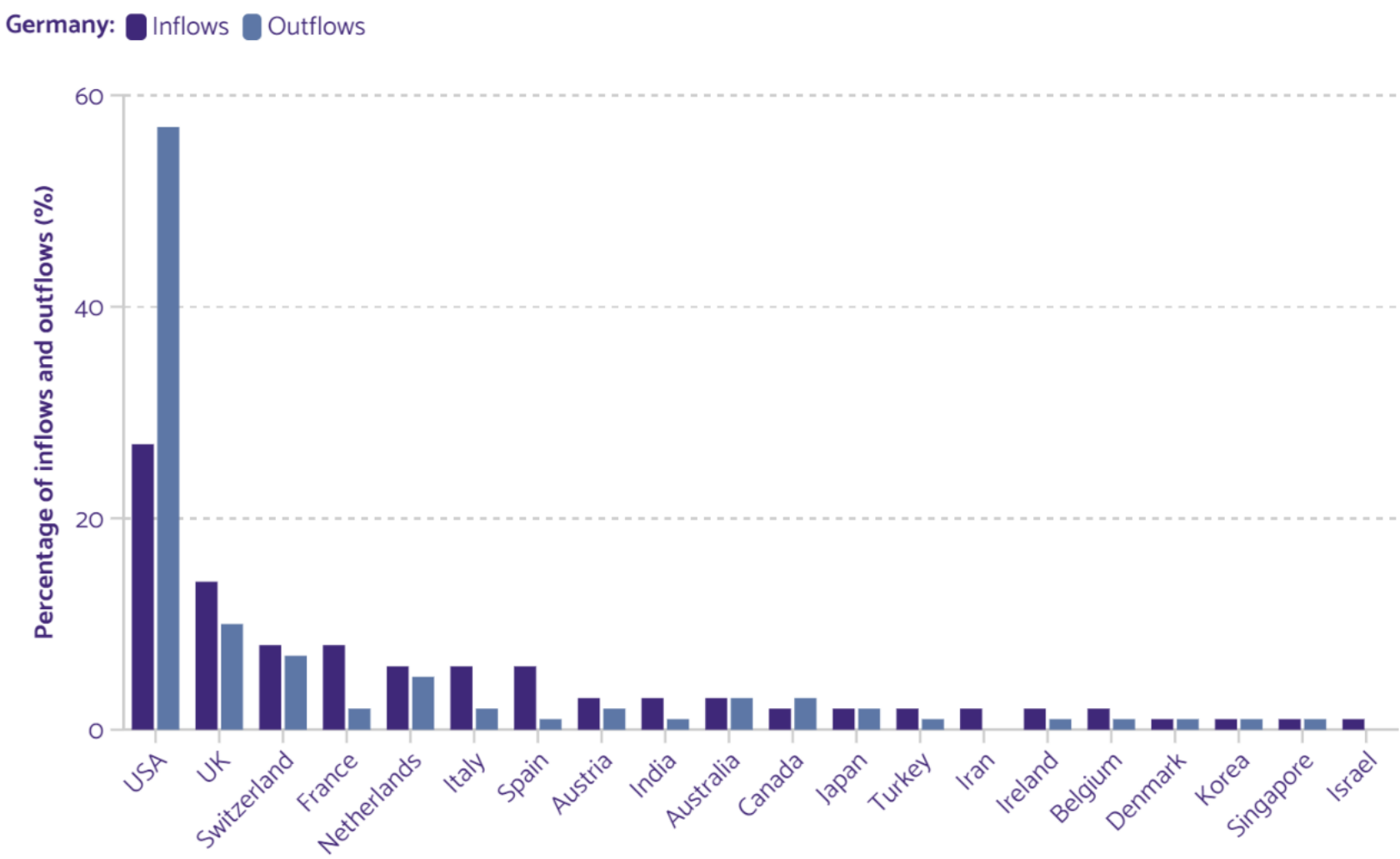
Germany

Germany is experiencing a **sharp positive turnaround in attracting and retaining talent**. A broad set of universities educate large numbers of top AI talent. Unlike the UK, its top talent is concentrated within Germany's major industrial companies, as they prioritise AI-led product innovation and industrial efficiencies.

Germany - Net flow of AI talent over time



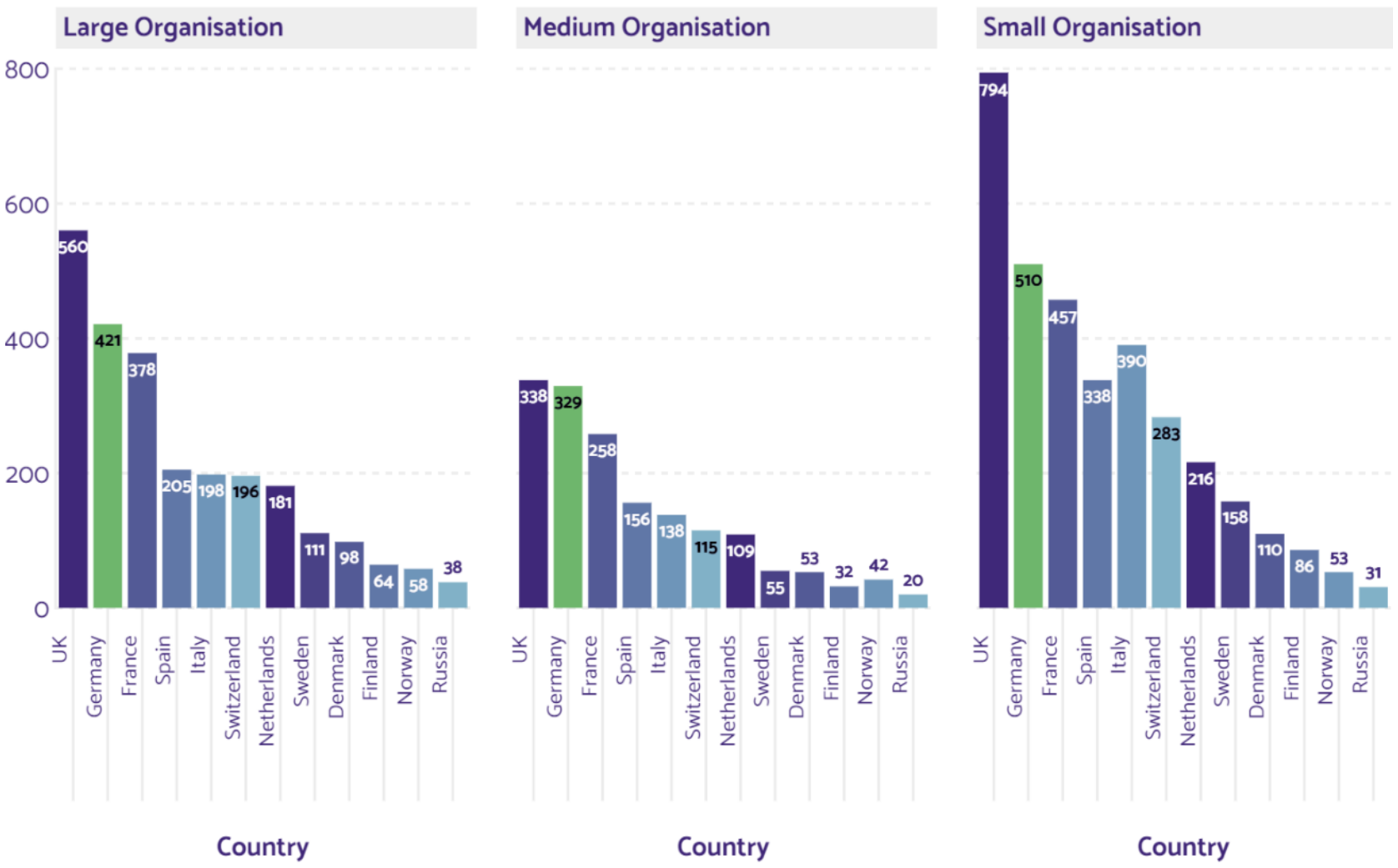
Inflows and outflows of talent to and from Germany



Germany has i**nflows of talent from across Europe in particular from France, Italy and Spain** and a major increase in inflows from India.

This has been historically counter-balanced by major outflows to the USA.

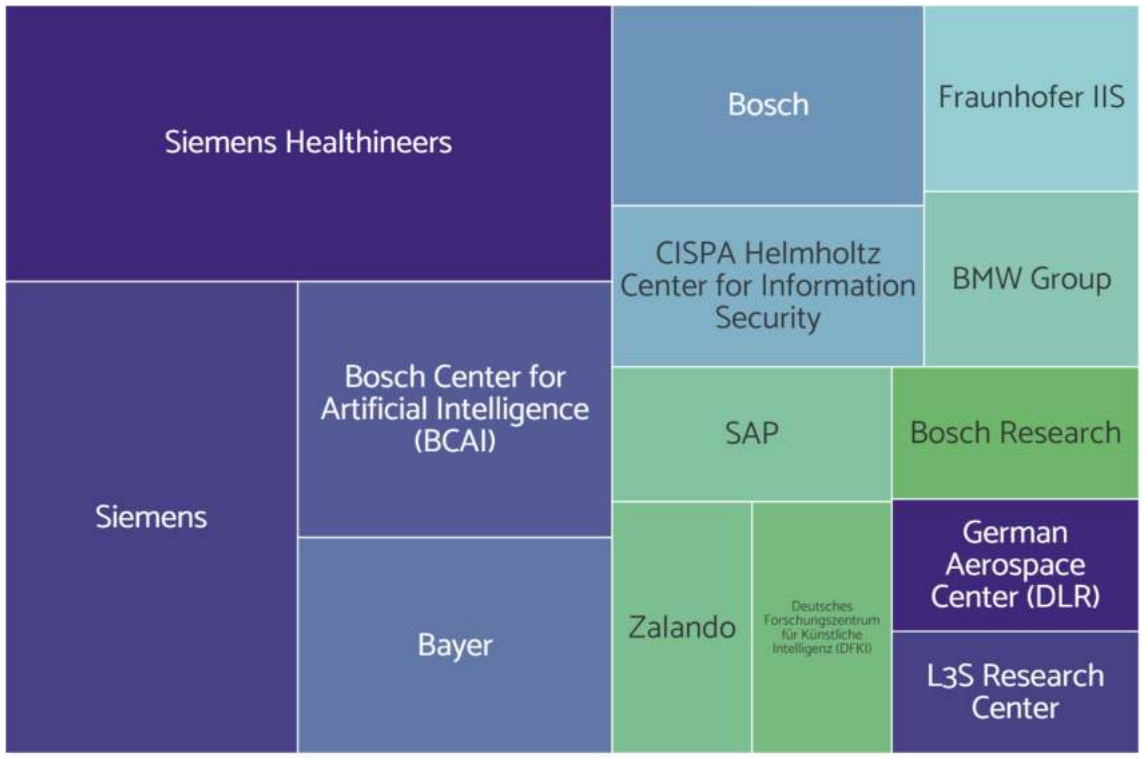
Diffusion of AI talent by number of companies



Large businesses recruit 66 percent of top AI talent in Germany, a high number relative to other European AI ecosystems.

Germany also has 510 small companies hiring top AI talent - a high number compared to the average in Europe but much fewer than the UK.

Top recruiters of AI talent in Germany

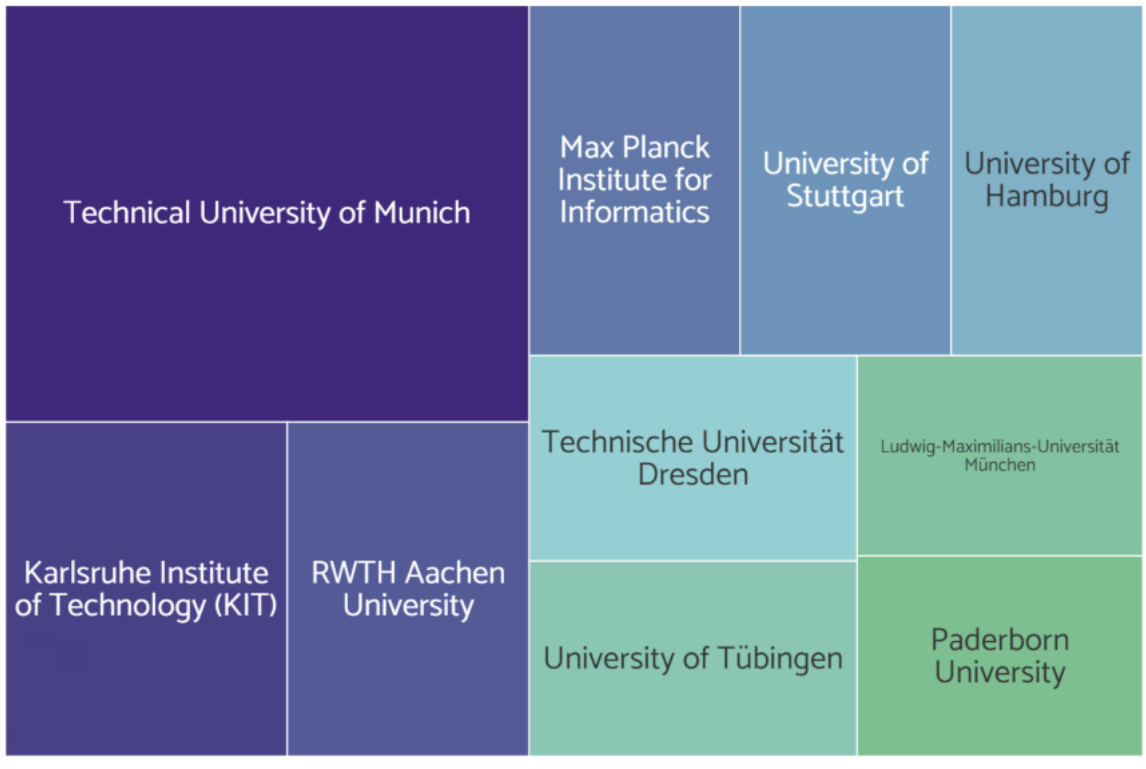


The **high density of talent in large companies** reflects the active approach of major industry leaders in prioritising AI-led product innovation and industrial efficiencies.

Bosch set up its AI lab in 2017 and **Siemens** spun off Siemens Healthineers in 2016 to act as a parent company for several medical imaging companies.

SAP does not recruit as much top AI talent as others but scores highly in the research excellence of its talent. SAP's customers generate 87 percent of total global commerce.

Top German educators of AI talent in Zeki data



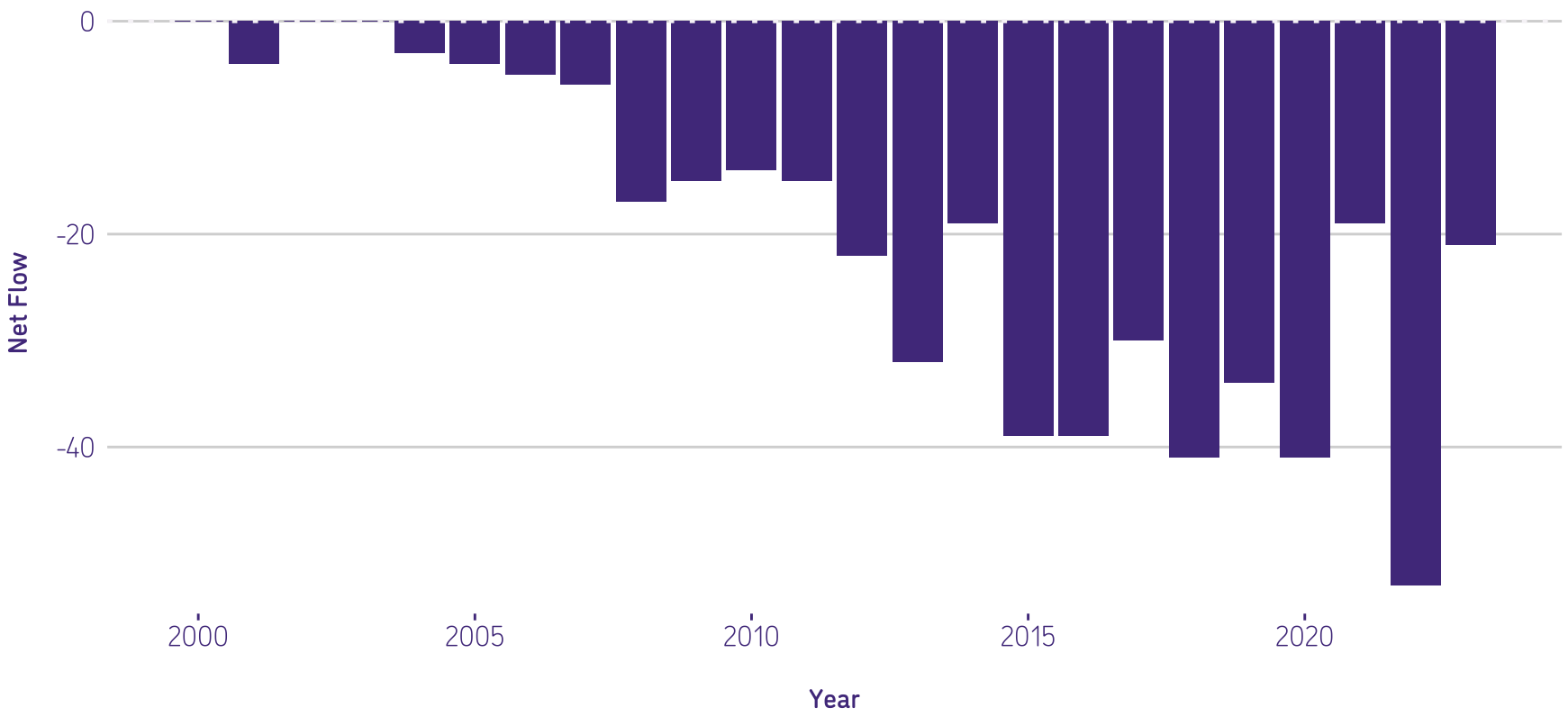
Three German technical universities: **Munich, Berlin** and **Darmstadt**, are in the Zeki top 100 educators of top AI talent. The Technical University of Munich is a **prime supplier of talent to Meta.**

Italy

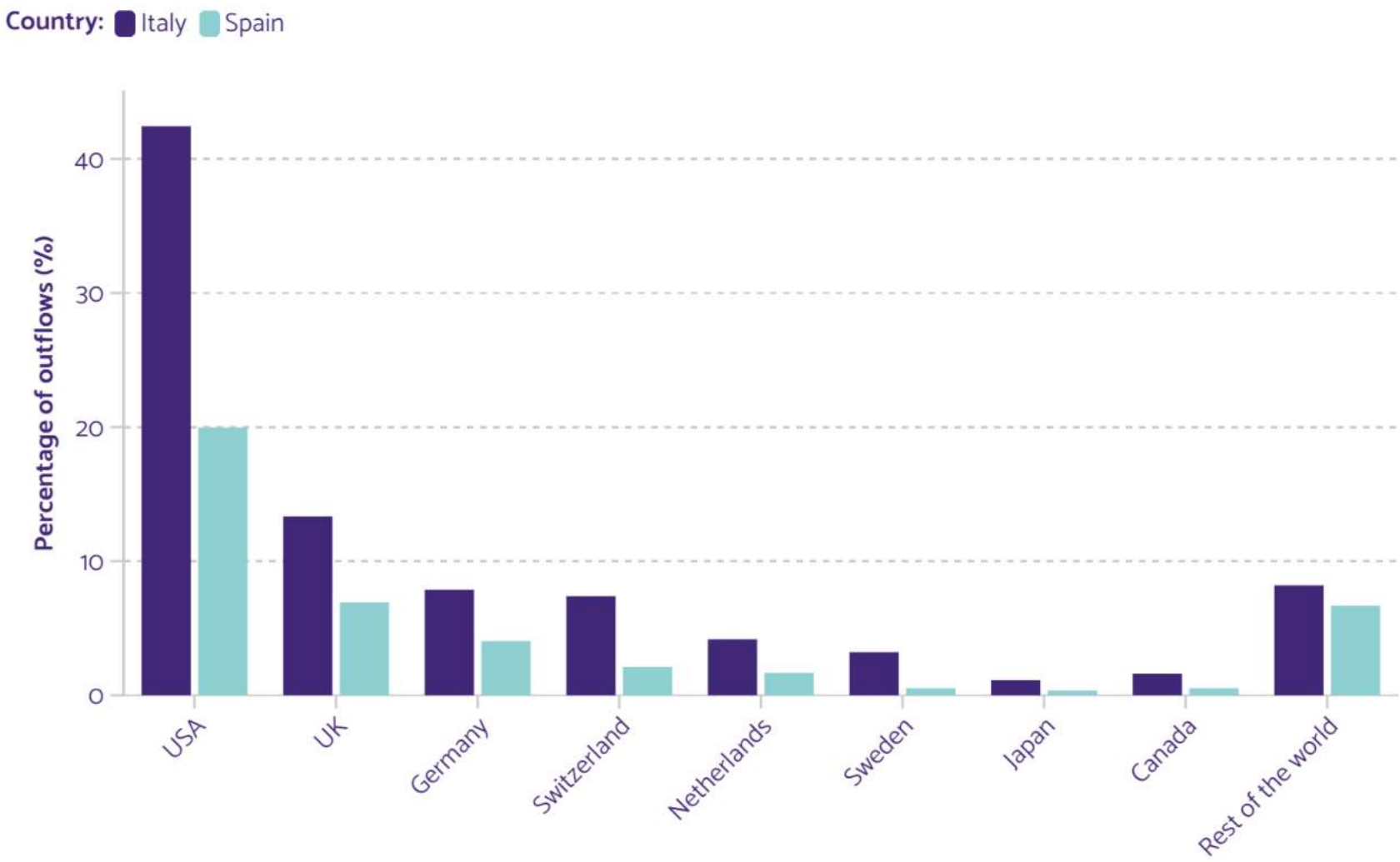
Italy is experiencing a **sustained very high outflow of talent.** It lacks an obvious national champion in industry to anchor talent at home.

Its very large number of small and medium companies hiring top AI talent are **not hiring in sufficient numbers** to counterbalance the flow of talent out of the country, with its main university a prime supplier of talent to Google.

Italy - Net flow of AI talent over time



Outflows of talent to and from Italy and Spain



Italy's outflows are extremely high to the USA, even compared to Spain which is experiencing the same levels of net outflows overall as Italy.

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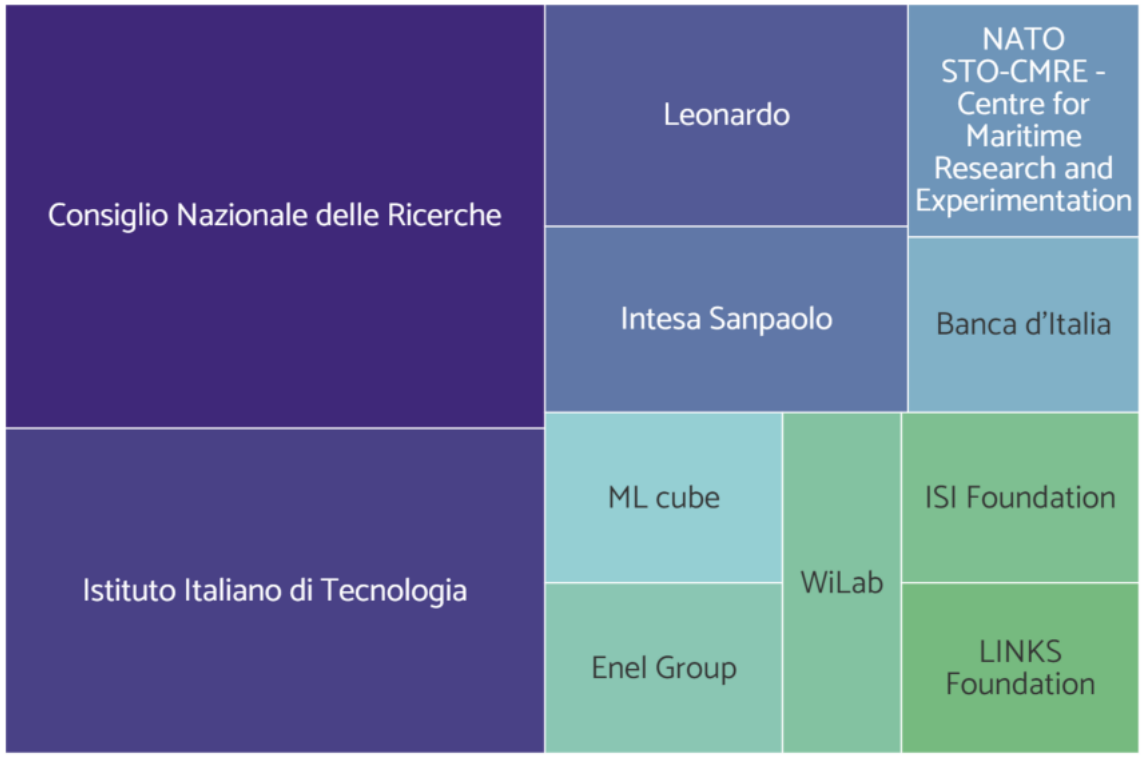
Diffusion of AI talent by number of companies

Compared to the rest of Europe, **Italy has the second highest share** of its talent in small and medium companies - **48 percent**, including 390 small companies hiring top AI talent.

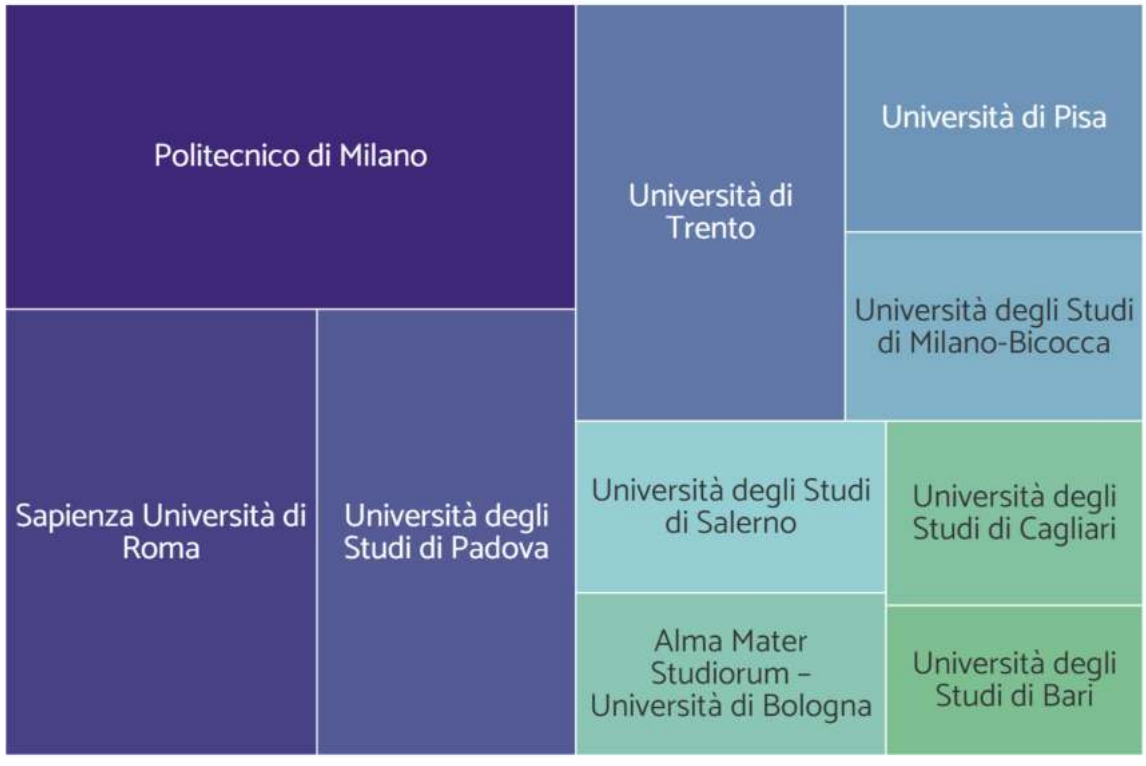
Top recruiters of AI talent in Italy



Italy's **main national research institutes** are the primary recruiters of top AI talent with banks **Intesa Sanpaolo** and **Banca d'Italia** also hiring.

Leonardo, a major defence and aerospace company has 12,000 employees working in R and D and a goal to build 11 labs. **ML cube** is a spin off from Politecnico di Milano, specialising in machine learning consulting.

Top Italian educators of AI talent in Zeki data



Politecnico di Milano, Universita di Trento and **Sapienza Universita di Roma** feature in the Zeki top 100 AI educators of top AI talent.

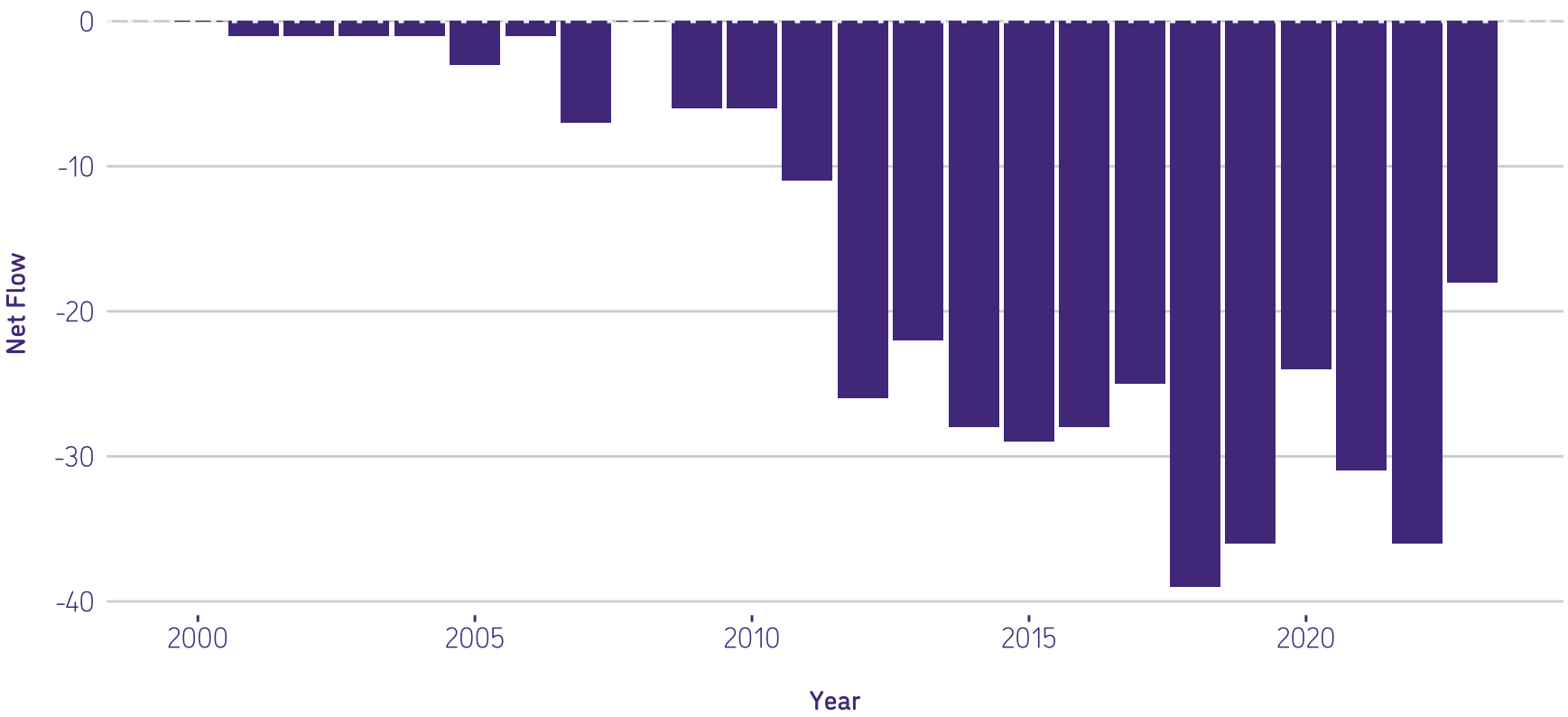
Politecnico di Milano is a prime supplier of talent to Google.

Spain

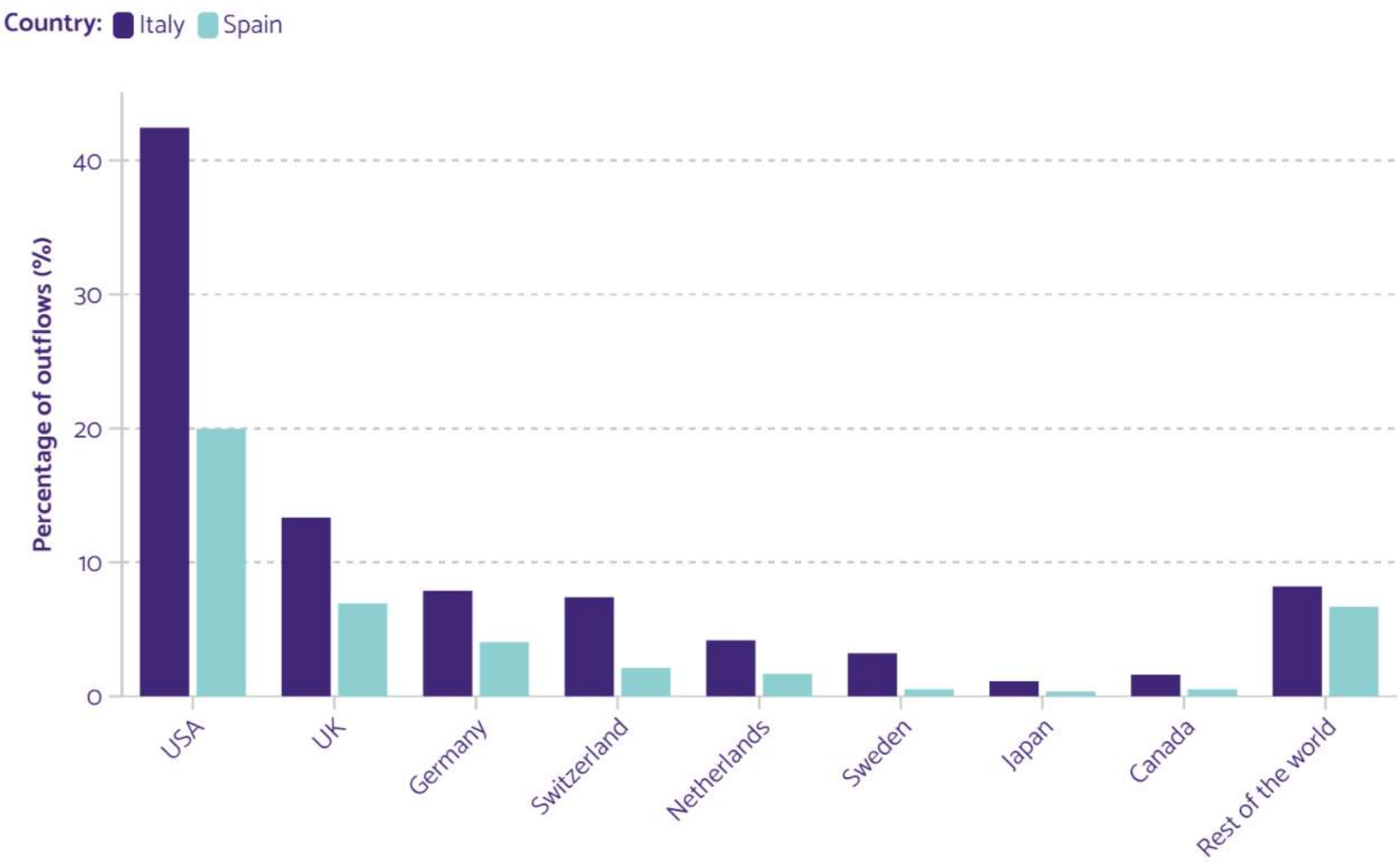
Spain continues to **suffer a sustained loss of its top AI talent.**

Spain benefits from having many small companies hiring top AI talent as well as large companies. But this **domestic demand is not high enough** to start reducing net outflows.

Spain - Net flow of AI talent over time



Outflows of talent to and from Italy and Spain



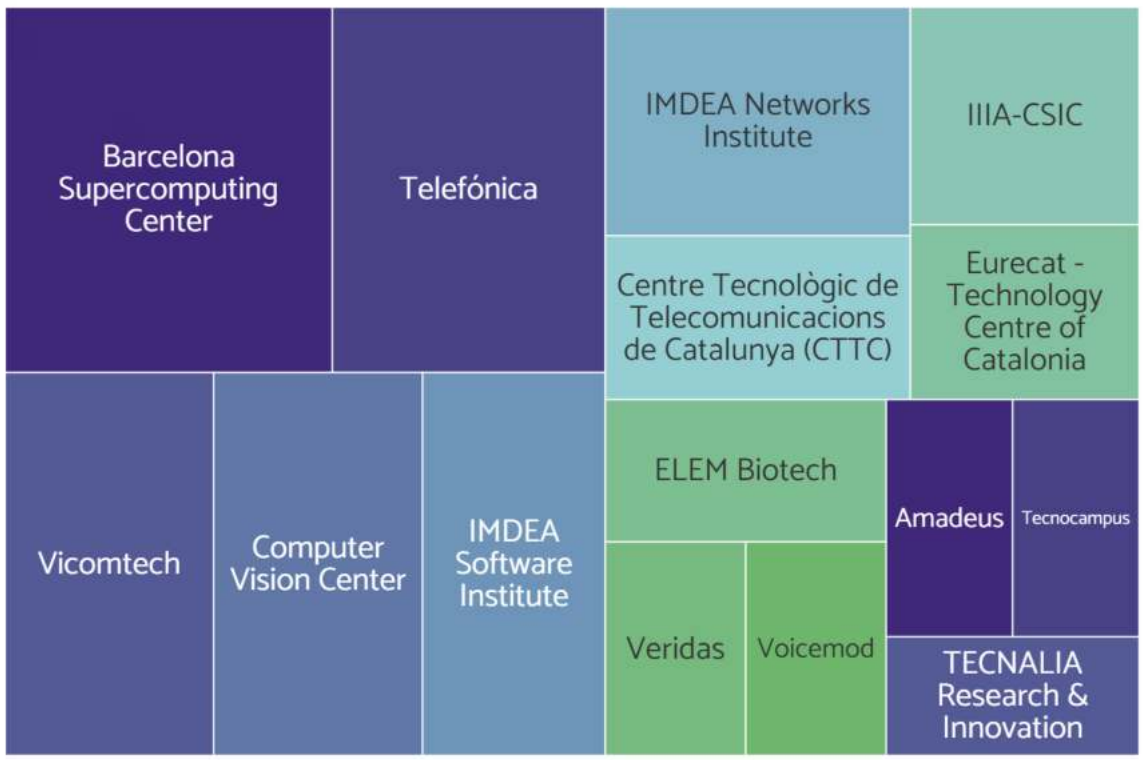
Spain experiences **outflows predominantly to the USA** but not at the same scale as Italy.

Diffusion of AI talent by number of companies

Spain has the **highest diffusion of top AI talent of any country.**

Spanish companies **make up 3.5 percent of the companies in our data.** More than 50 percent of top AI talent in Spain is employed by small and middle-sized firms. This means that major Spanish companies are not hiring in the same volume as their European counterparts, leading to an overall outflow of talent to USA and other European countries.

Top recruiters of AI talent in Spain



Spain has **no national champion** but a diverse mix of top recruiters. The **Barcelona Supercomputing Center** hosts the most powerful supercomputer in Spain and **ELEM Biotech** is a biomedical simulation spin off from the Center.

Vicomtech and the **Computer Vision Center** specialise in computer vision whilst **Veridas** focuses on digital identity verification. Absent are the major Spanish banks and energy companies.

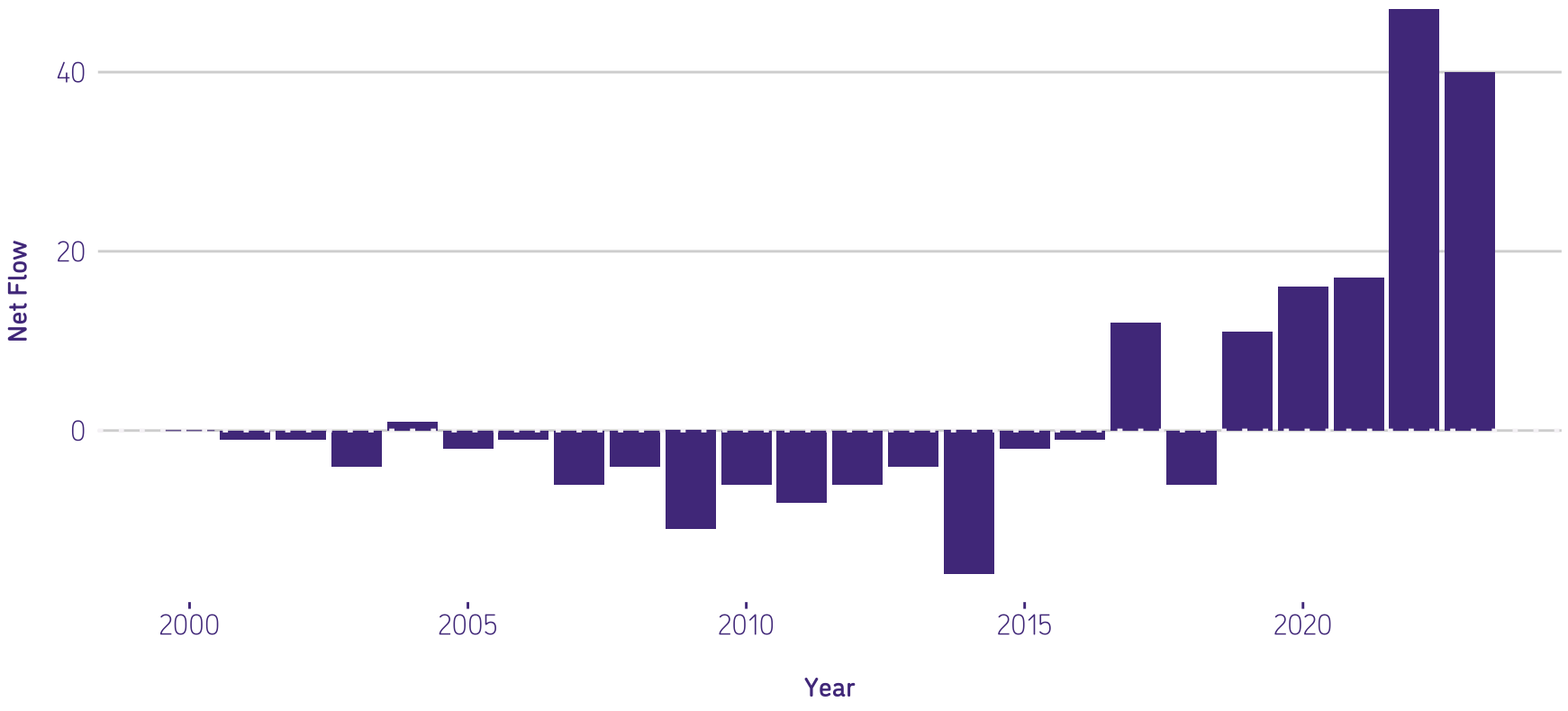
Top Spanish educators of AI talent in Zeki data

No Spanish universities are in the Zeki top 100 AI educators of top AI talent, nor are any prime suppliers of talent to a major company.

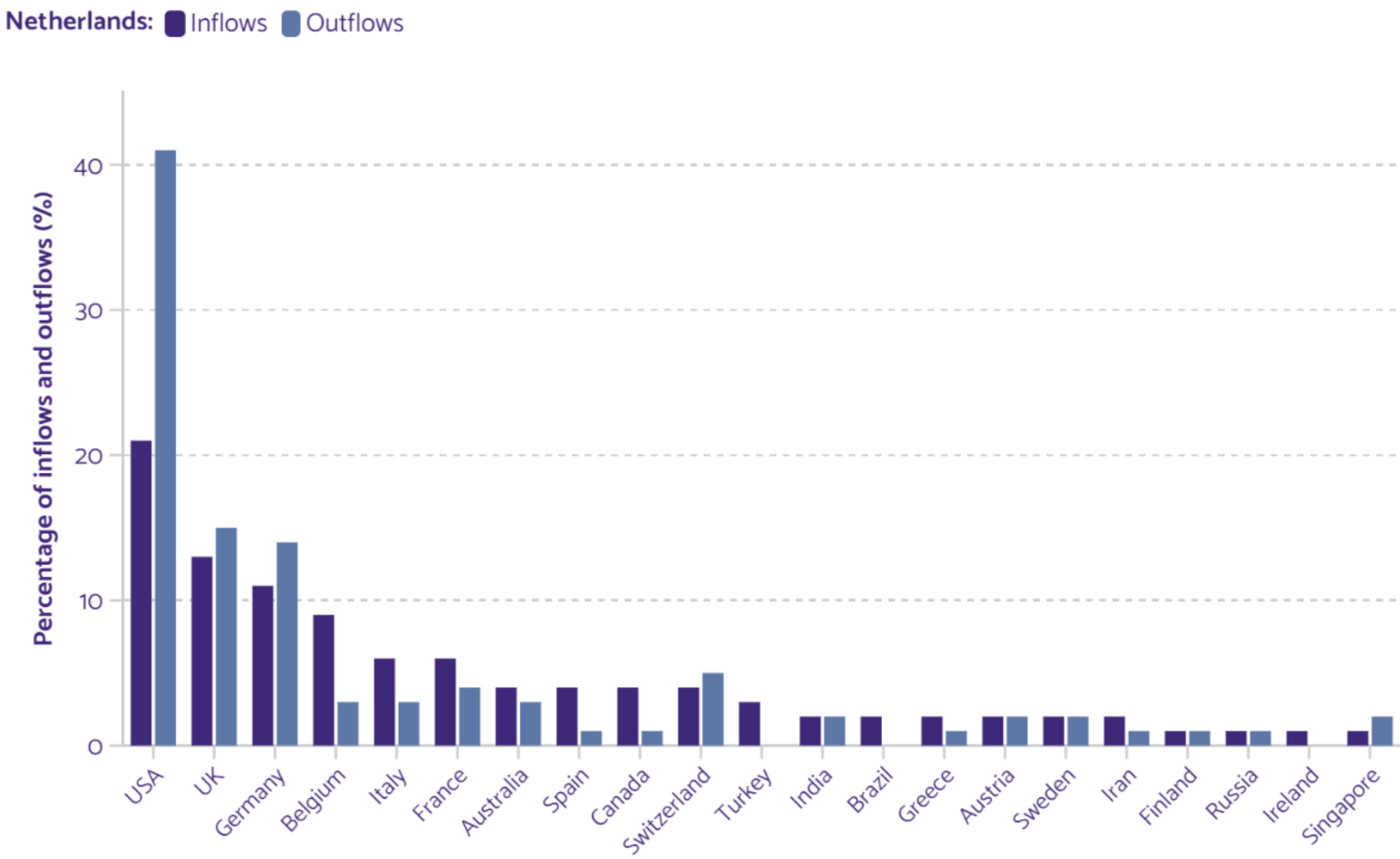
The Netherlands

The Netherlands has **successfully attracted and retained talent for five years**, through a combination of major national champions hiring talent, a vibrant ecosystem of small companies and Dutch universities not being a primary recruitment pool for major US companies.

The Netherlands - Net flow of AI talent over time

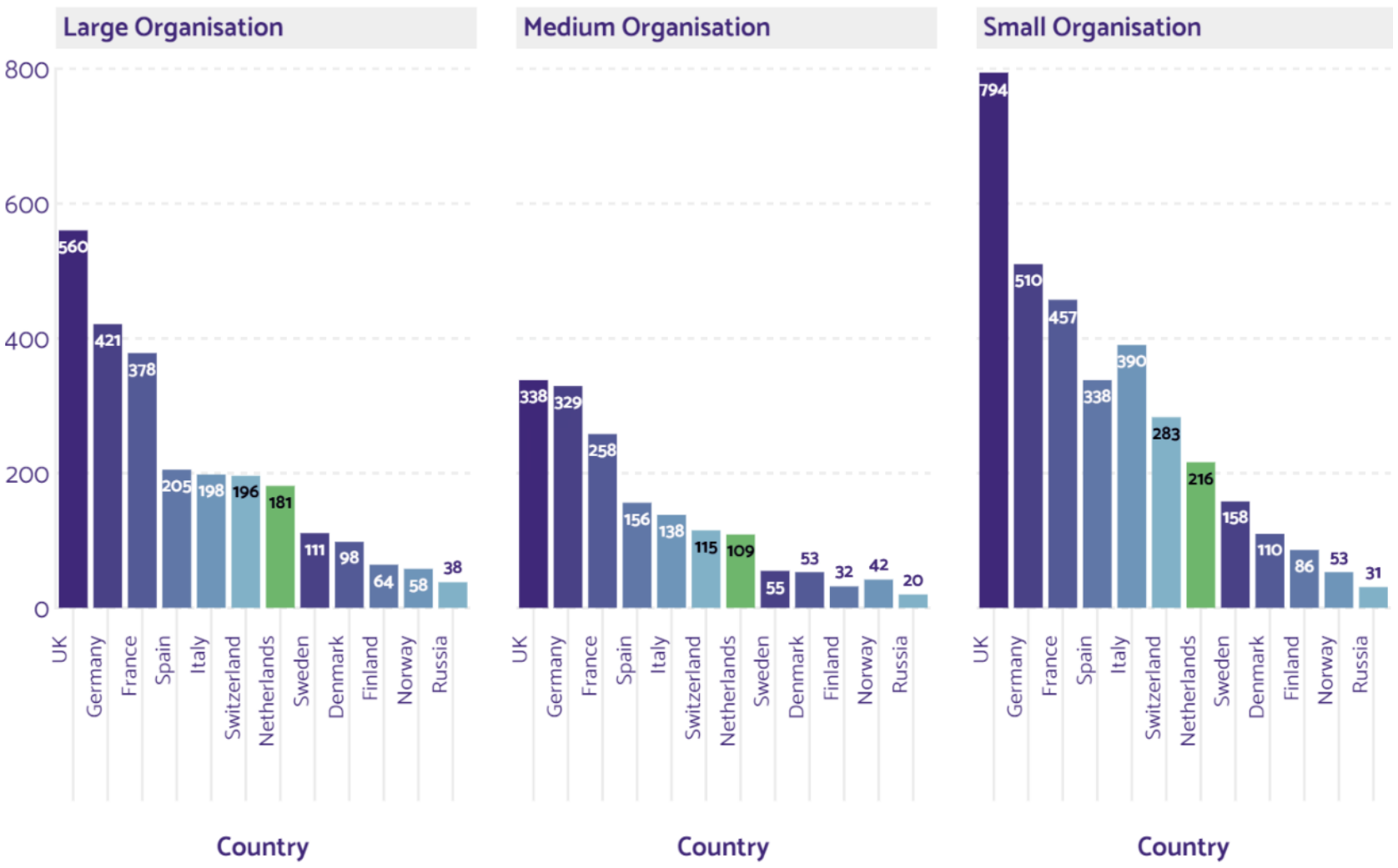


Inflows and outflows of talent to and from The Netherlands



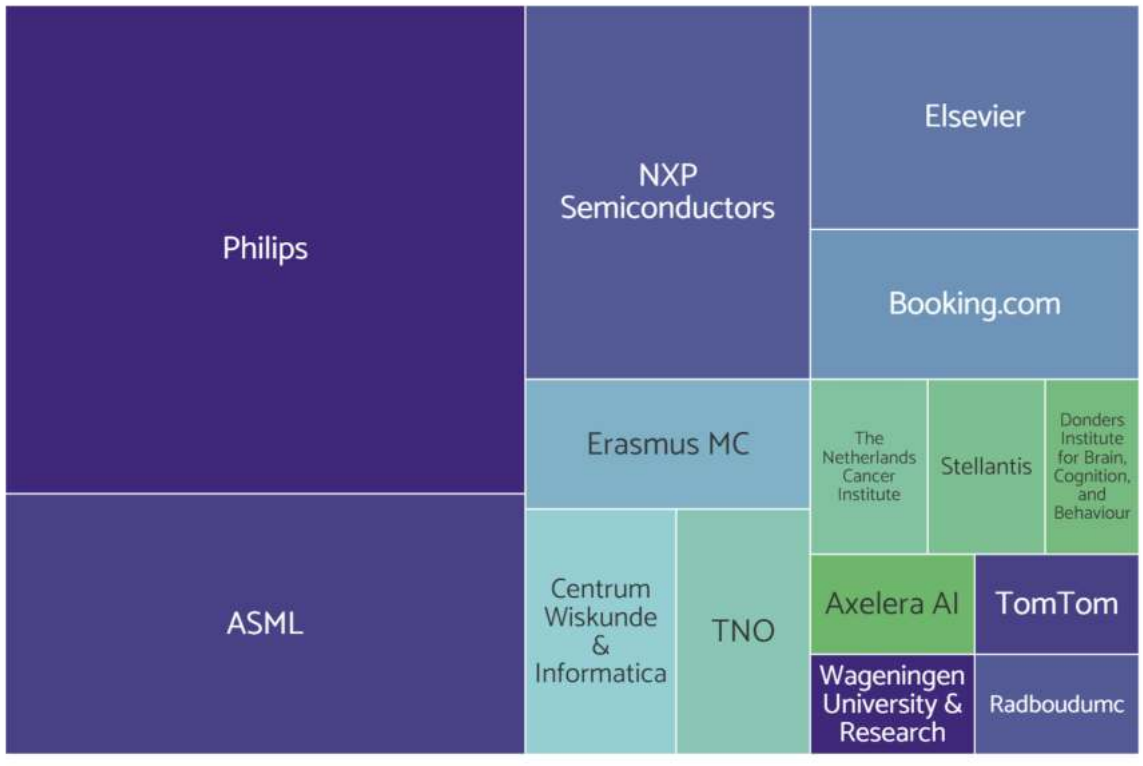
The main outflows of Dutch-educated talent are **to the USA** but there are significant but smaller net inflows from Belgium, Italy Canada, Spain and Turkey.

Diffusion of AI talent by number of companies



Dutch large businesses hire 72 percent of the top AI talent in The Netherlands, a very high number internationally, but the country also has 216 small companies which hire 18 percent of the top AI talent.

Top recruiters of AI talent in The Netherlands

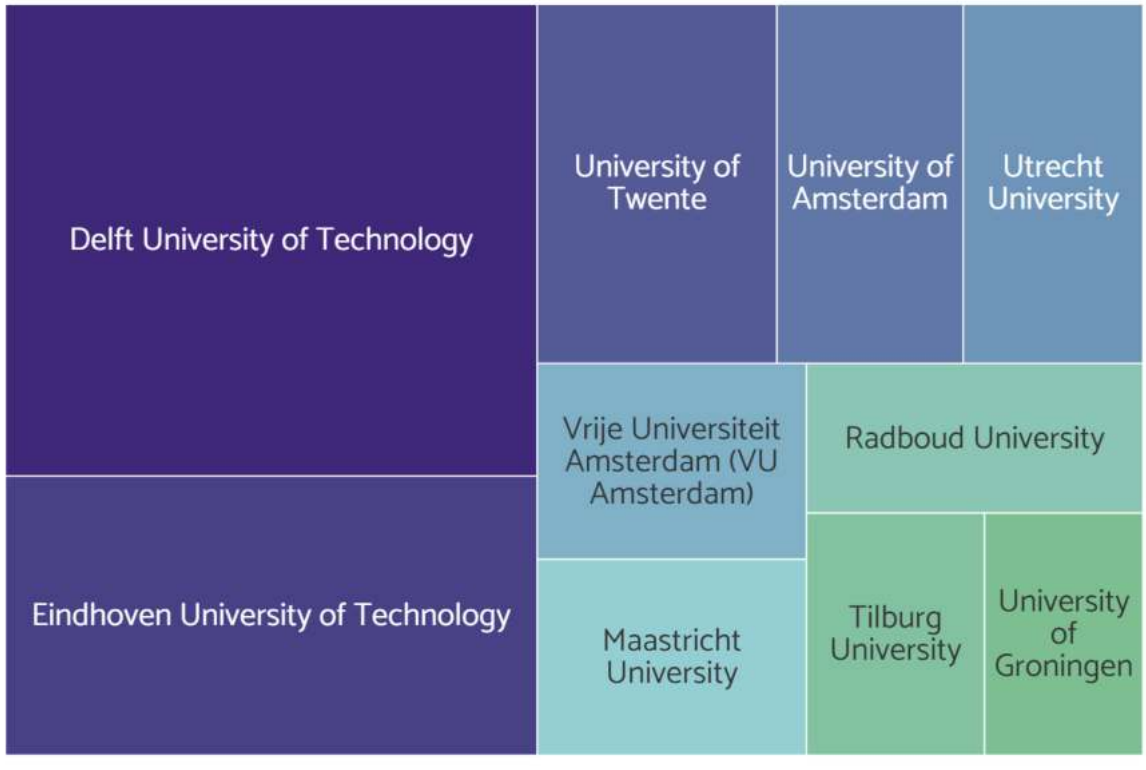


Philips is the national champion hiring more top AI talent than world-leading Dutch semiconductor company ASML.

Other major recruiters include **Stellantis,** an automaker, **Axelera AI**, a leader in computer vision, the **Erasmus University Medical Center**, and TNO a research organisation which supports Dutch industry, including small companies.

The major Dutch banks and Airbus are absent.

Top Dutch educators of AI talent in Zeki data



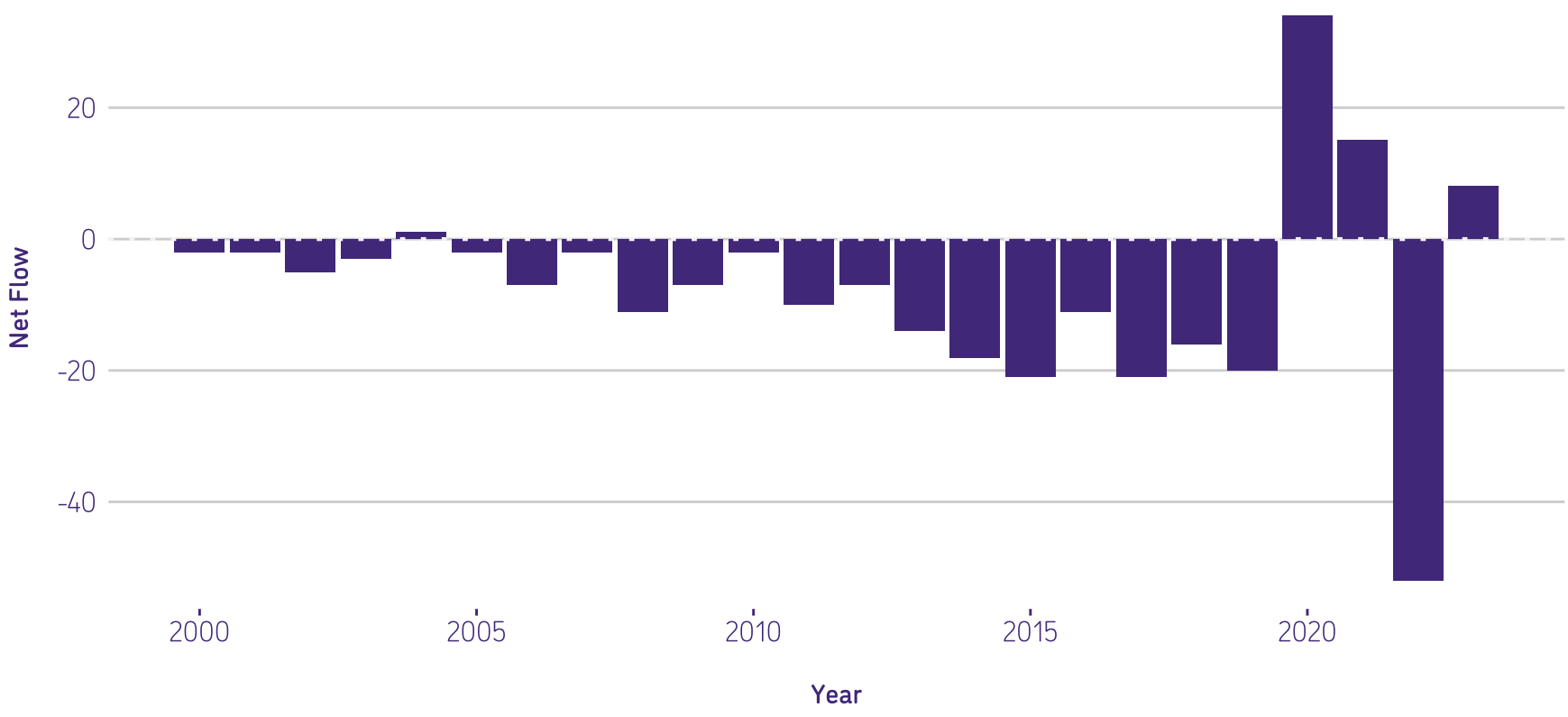
Three Dutch universities, **Delft, Eindhoven and Amsterdam** are in the Zeki top 100 list of educators of top AI talent.

The University of Amsterdam is a prime supplier of talent to Google DeepMind.

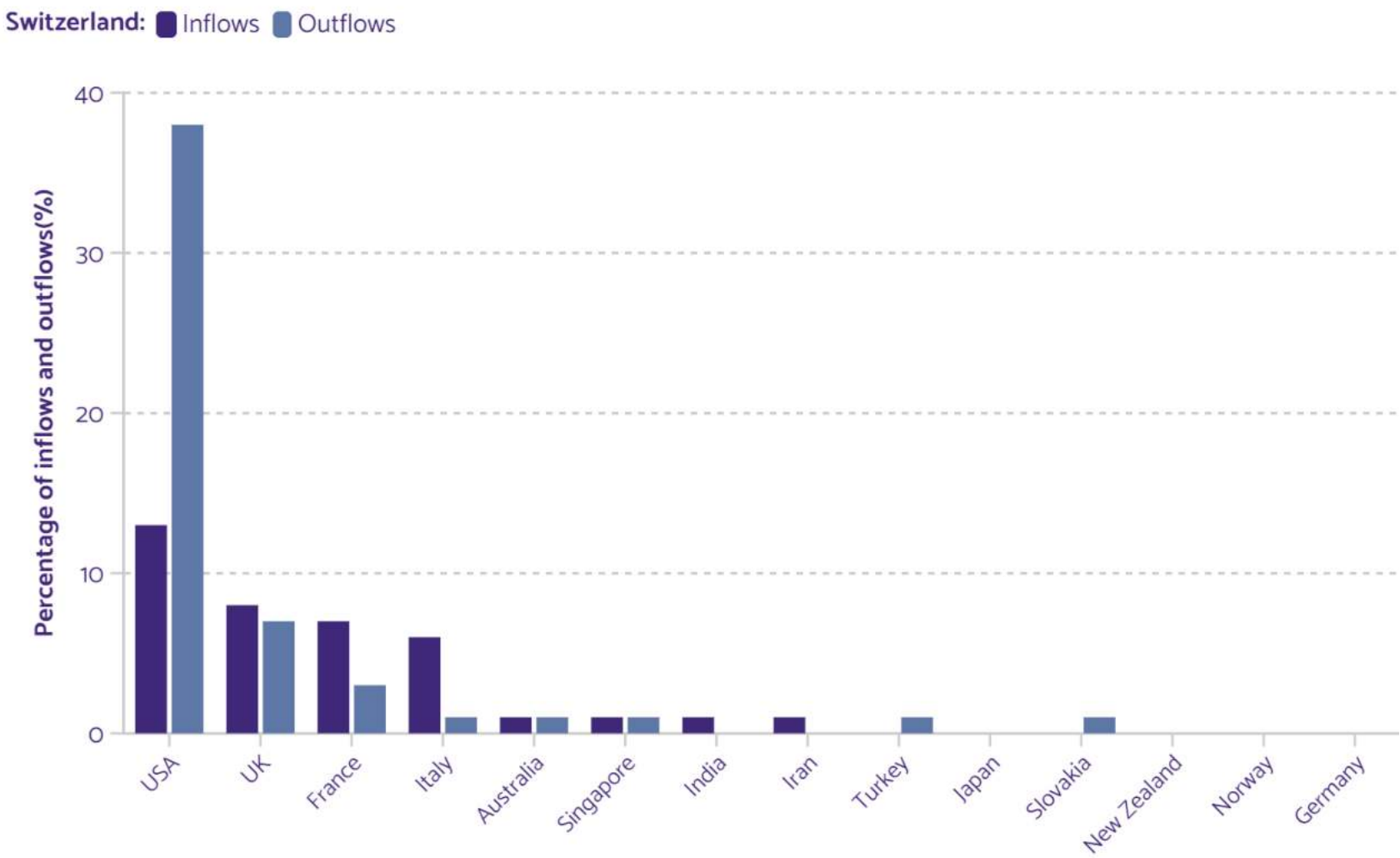
Switzerland

Switzerland has a **very balanced AI ecosystem** that **educates very high numbers of top AI talent** for the size of its economy. Its top AI talent is spread broadly across sectors, alongside national champions and two academic powerhouses.

Switzerland - Net flow of AI talent over time



Inflows and outflows of talent to and from Switzerland



Switzerland counterbalances outflows of talent to the USA with net inflows from the UK, France and Italy.

The **numbers in both directions are relatively small** compared to the United Kingdom, Germany and France.

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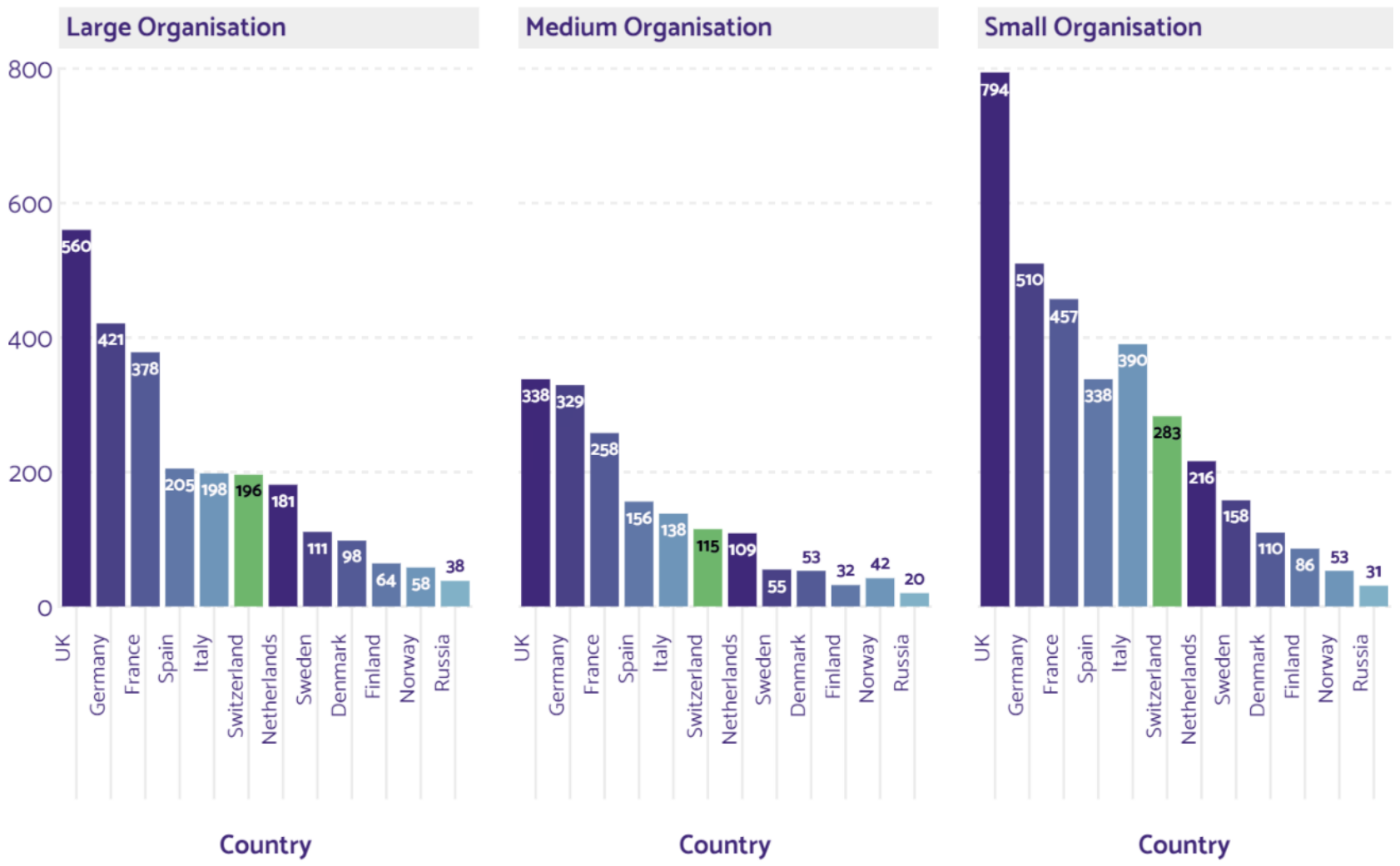
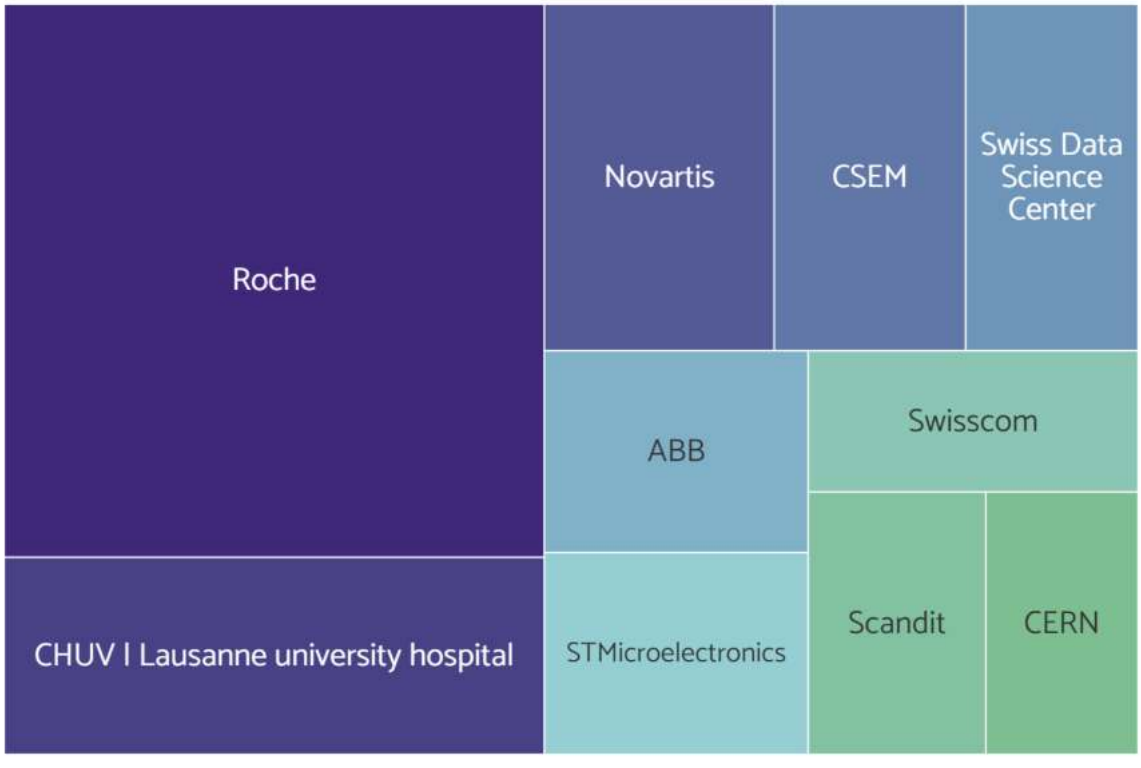
Diffusion of AI talent by number of companies



The Swiss ecosystem hires top AI talent evenly across its large, medium and small businesses, with middle-sized and small firms employing **42 percent of the top Swiss AI talent.**

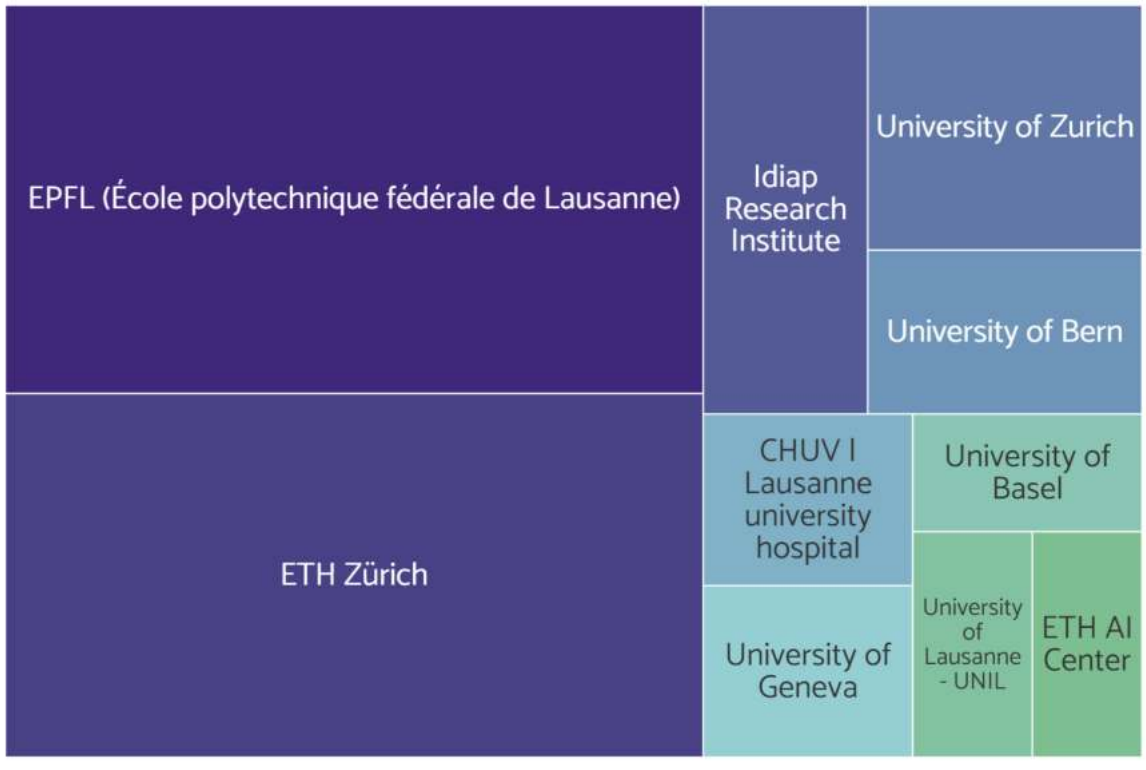
Top recruiters of AI talent in Switzerland



Roche is the national champion, investing heavily in AI, alongside **Genentech,** that leverages the power of AI in drug discovery.

Novartis is becoming a digitally-enabled company, also in drug discovery, partnering with **Microsoft. Scandit** specialises in smart data capture. Absent are the Swiss banks. They are hiring top AI talent but in relatively small numbers.

Top Swiss educators of AI talent in Zeki data



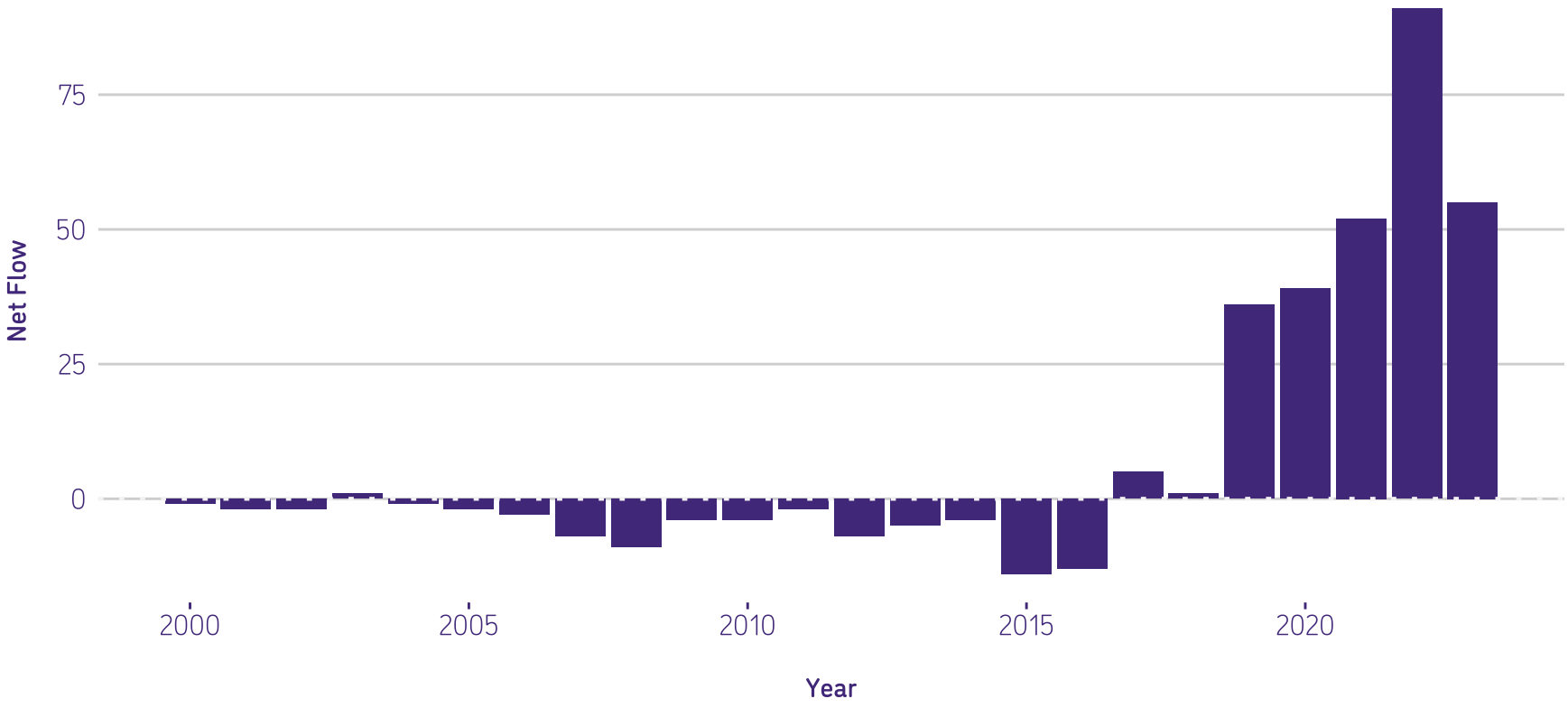
EFPL and ETH Zurich are in the Zeki top 100 educators of top AI talent.

Both are prime suppliers of talent to Google.

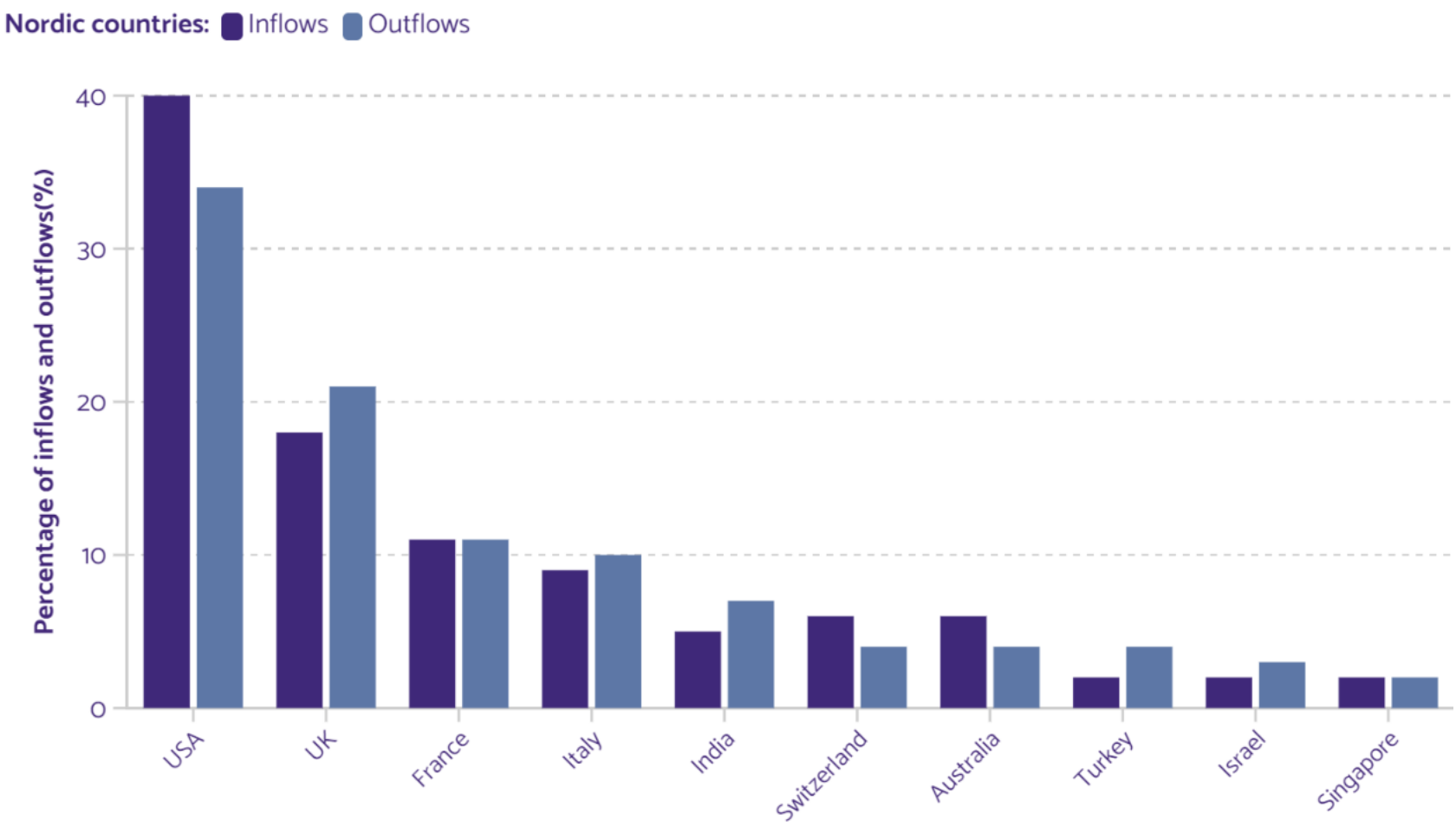
The Nordic Countries

Finland, Sweden, Denmark, Norway, and **Iceland** have created a balanced ecosystem of high numbers of small companies and national champions which hire top AI talent educated at top national universities which are not the hiring focus of US technology companies.

The Nordic Countries - Net flow of AI talent over time

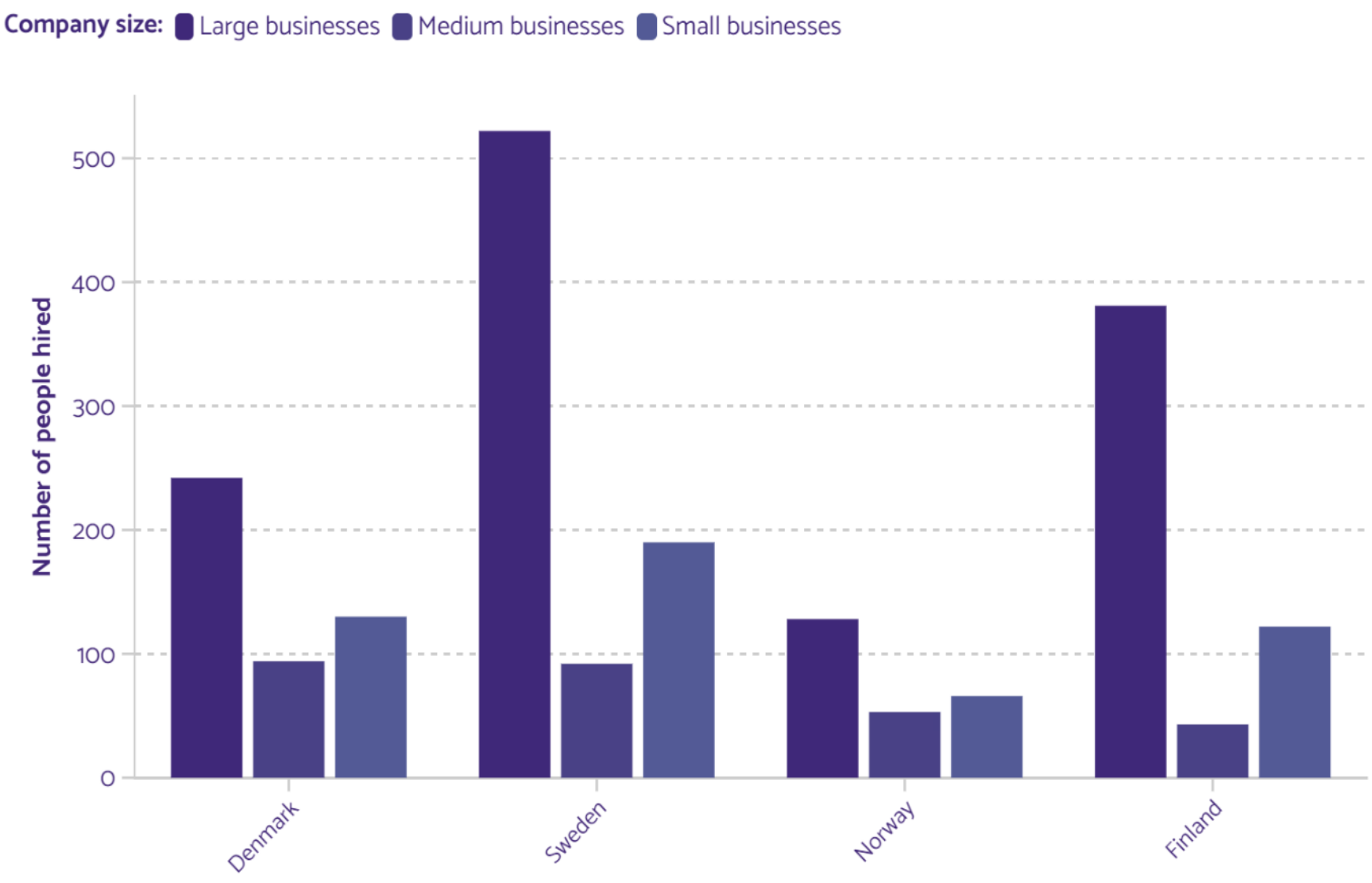


Inflows and outflows of talent to and from the Nordic countries



The Nordic countries experience a net inflow of talent from the USA, **against the global trend,** but a small outflow to the UK.

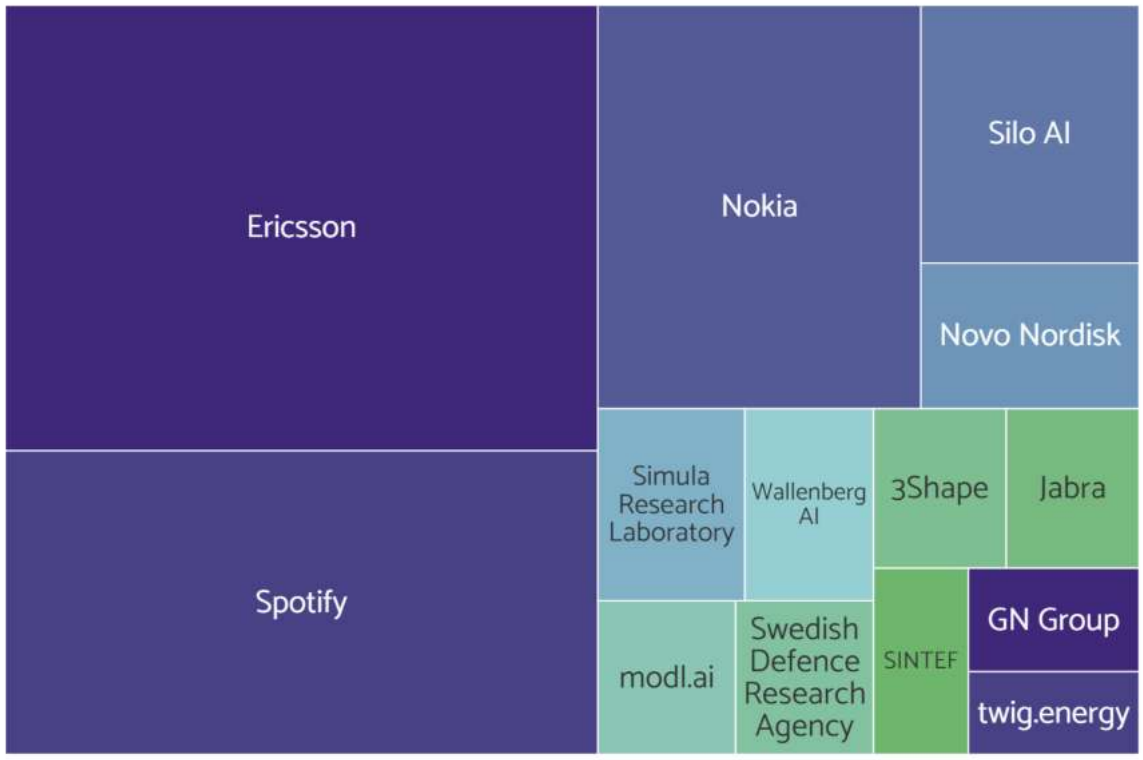
Diffusion of AI talent by size of organisation



The Nordic countries have very strong talent ecosystems of smaller companies. In particular, Denmark and Norway where they employ 48 percent of AI talent in their respective countries.

As a result **the Nordic countries make up 4.6 percent of companies in our data** - a very high number relative to the size of their economies.

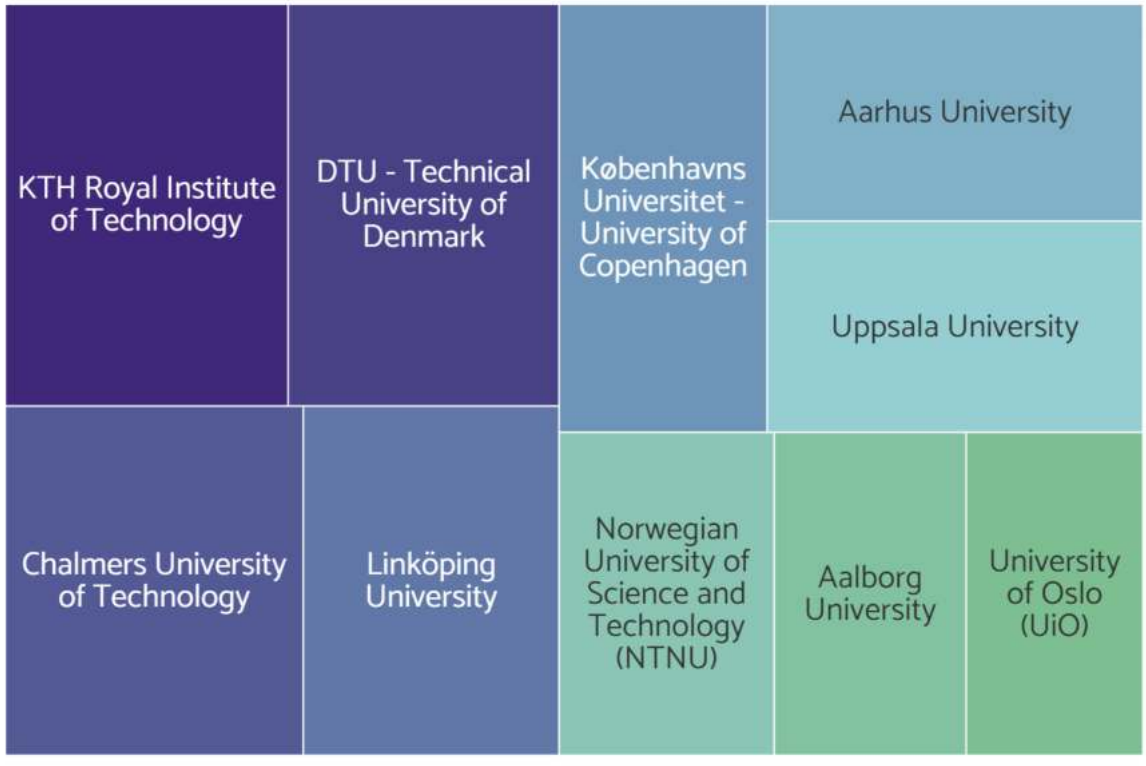
Top recruiters of AI talent in the Nordic countries



Most Nordic countries have national champions, **Nokia in Finland, Ericsson and Spotify in Sweden**.

Top recruiters include private laboratories working with industry partners. Wallenberg AI in Sweden works on autonomous systems and software whilst Silo AI in Finland focuses on smart devices and city technologies. modl.ai, based in Denmark, specialises in game development.

Top Nordic educators of AI talent



Aalborg University, Finland and **KTH Royal Institute of Technology, Sweden** feature in the Zeki top 100 AI educators of top AI talent but none are prime suppliers of top AI talent to big US tech companies.

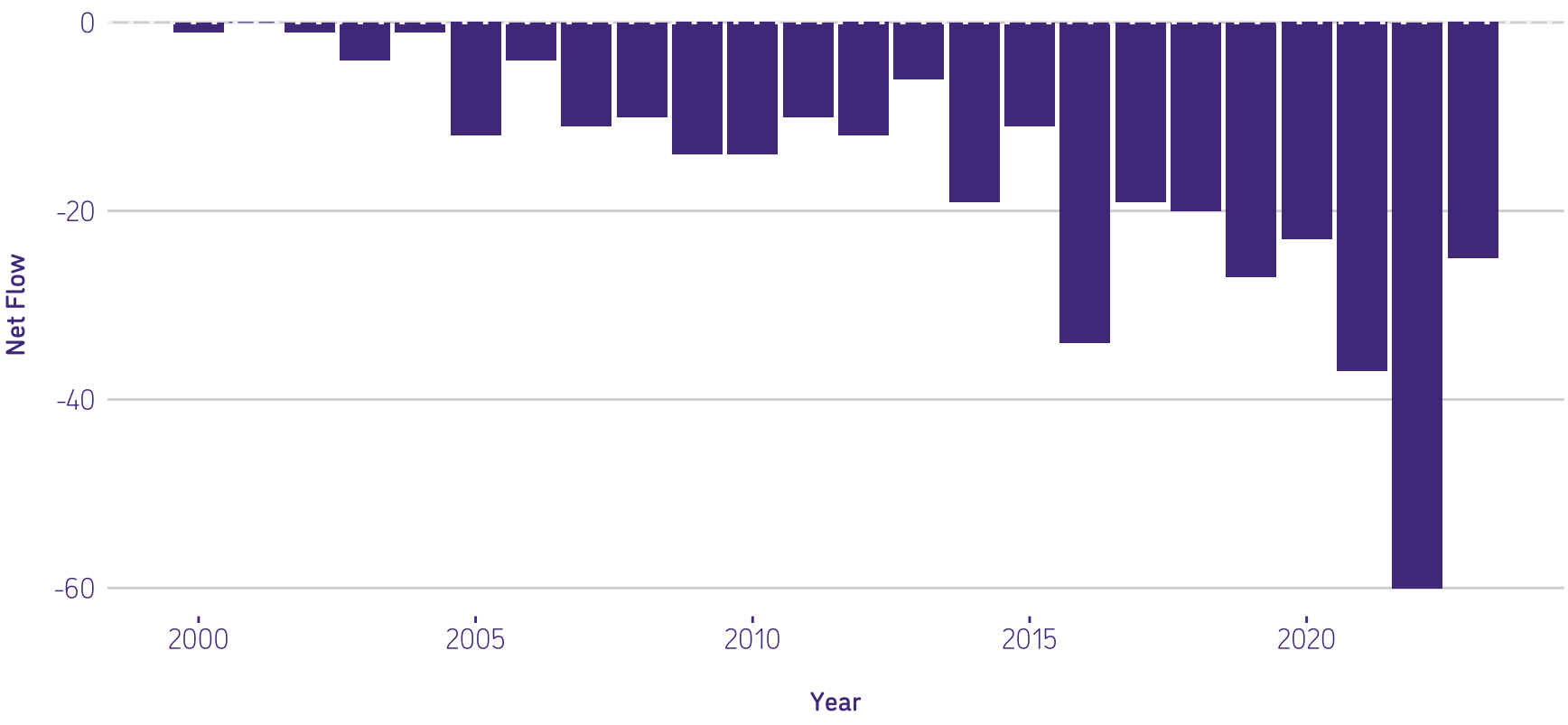
KTH Royal Institute of Technology is a prime supplier of talent to Ericsson.

Israel

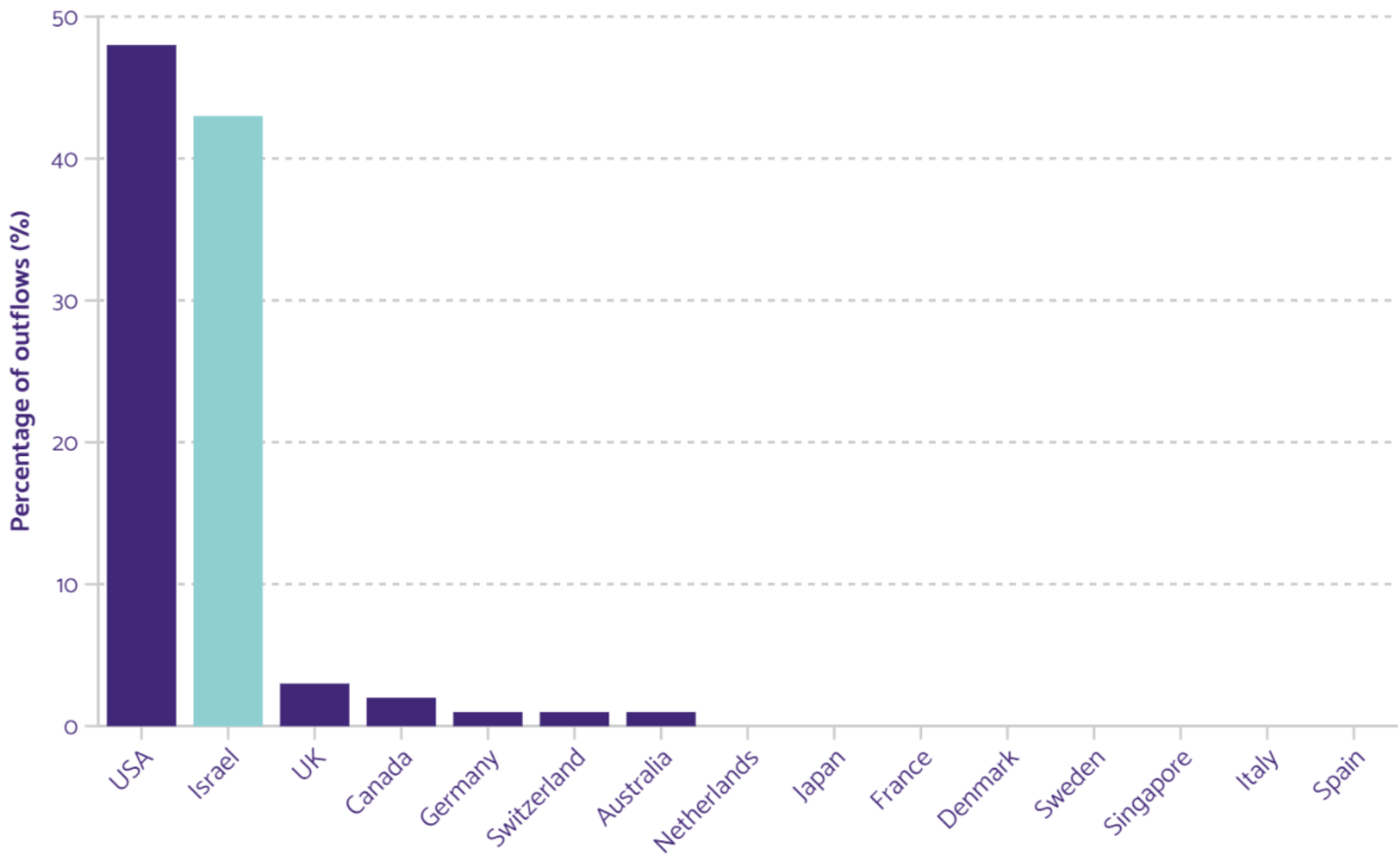
Despite having a vibrant, diverse AI ecosystem with large numbers of AI-driven companies, including a number of relatively new unicorn companies, **Israel loses a large number of talent it educates to the USA on a sustained basis.**

Major US tech companies have a large appetite for Israeli talent which is likely the main driver of this outflow.

Israel - Net flow of AI talent over time

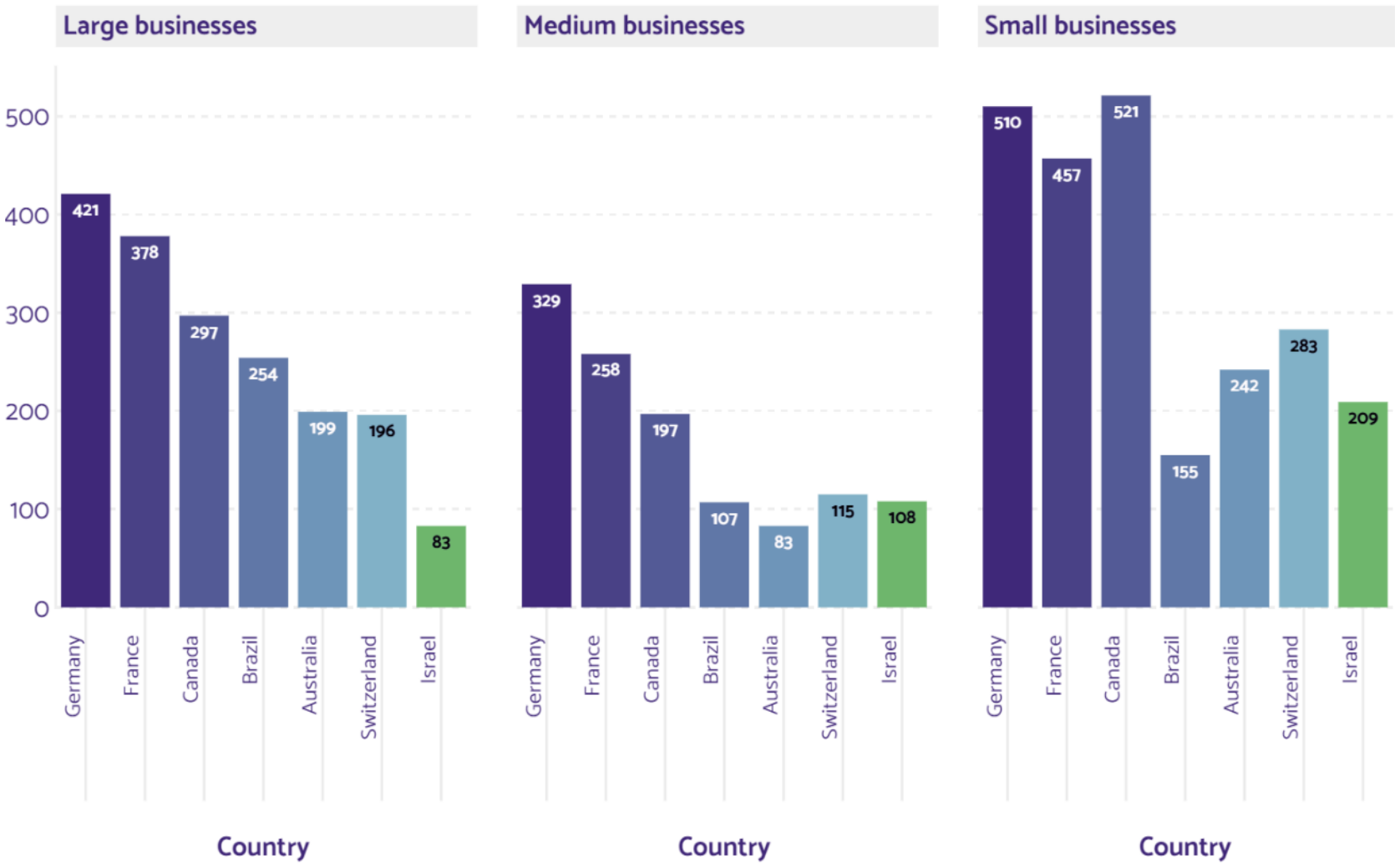


Outflows of talent to and from Israel



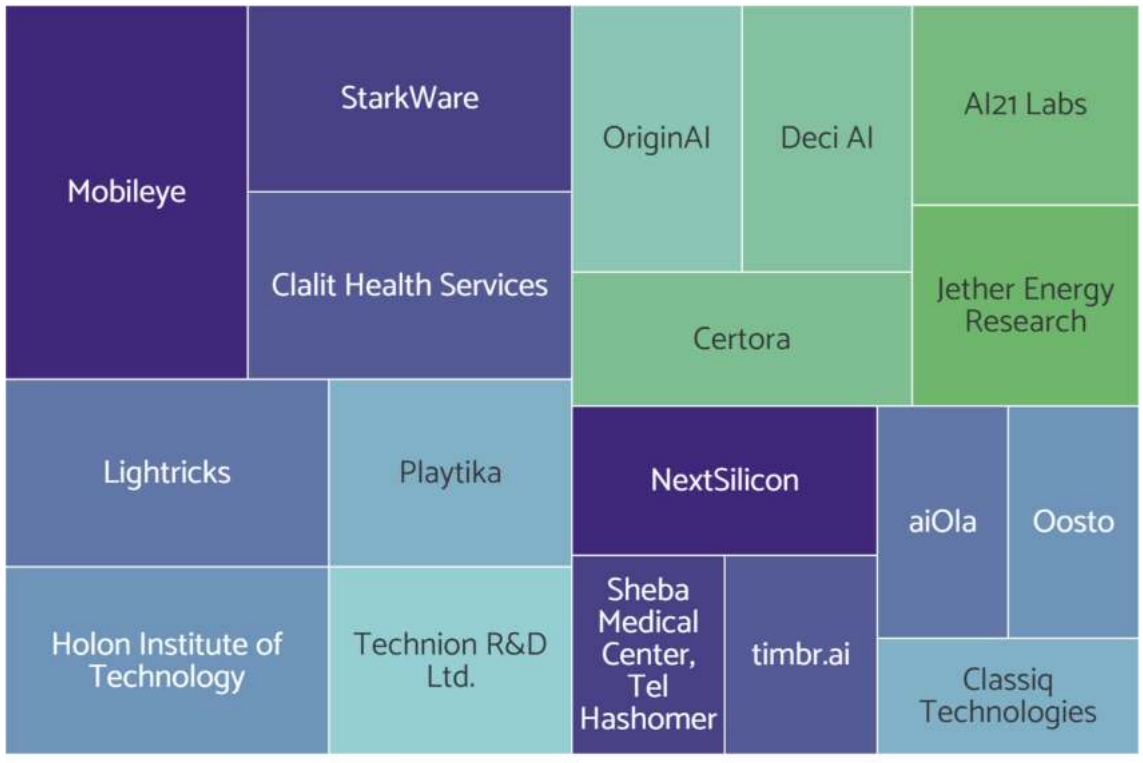
The **flow of talent out of Israel is nearly all to the USA** and accounts for **more than the total** amount of talent that stays in Israel **after completing their education.**

Diffusion of AI talent by number of companies



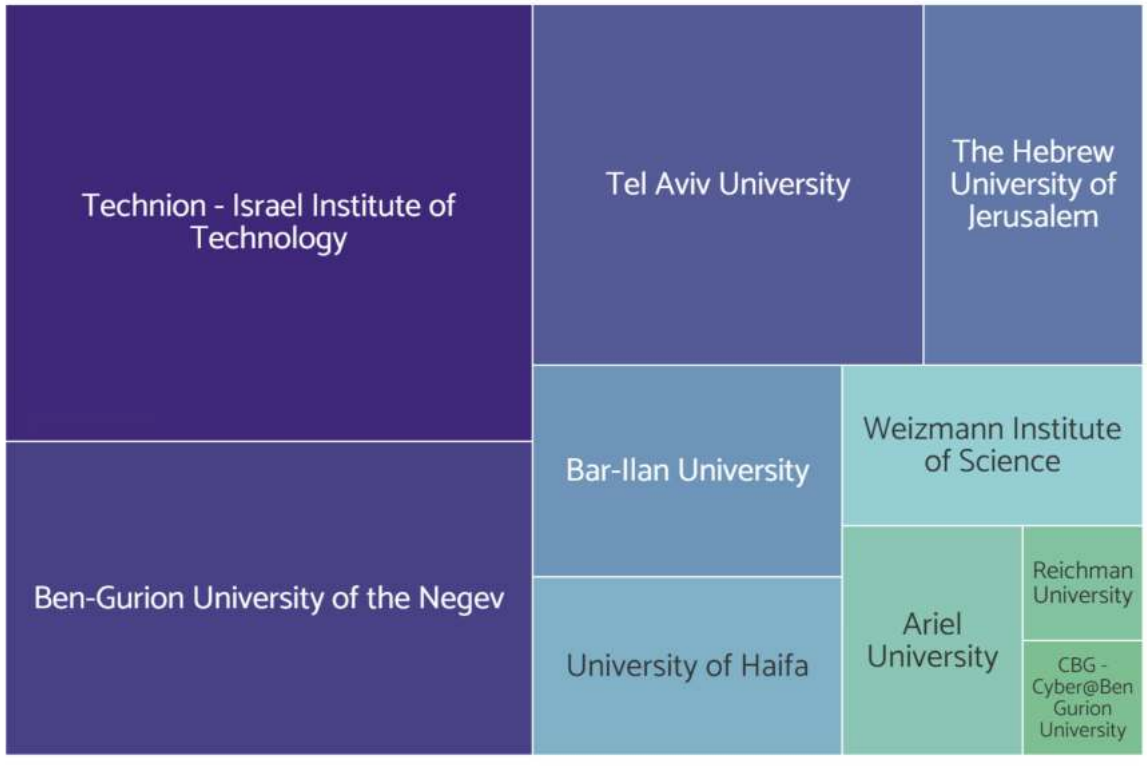
Within Israel's ecosystem, **small companies recruit 37 percent of talent** with **middle-sized businesses recruiting a further 22 percent**. Large businesses have a very small share of the market by global comparison.

Top recruiters of AI talent in Israel



Israel's top recruiters of AI talent contain a number of unicorn companies, founded in the last five to six years such as **Mobileye**, which delivers autonomous driving technology, and **StarkWare**, involved in blockchain and cryptography. They also include **Clalit**, the largest of Israel's state mandated health services which was an early adopter of electronic health records. **Lightricks** specialises in video and image editing and **Playtika** in gaming.

Top Israeli educators of AI talent in Zeki data



Technion, Ben-Gurion and **Tel Aviv** universities feature in the Zeki top 100 AI educators of top AI talent.

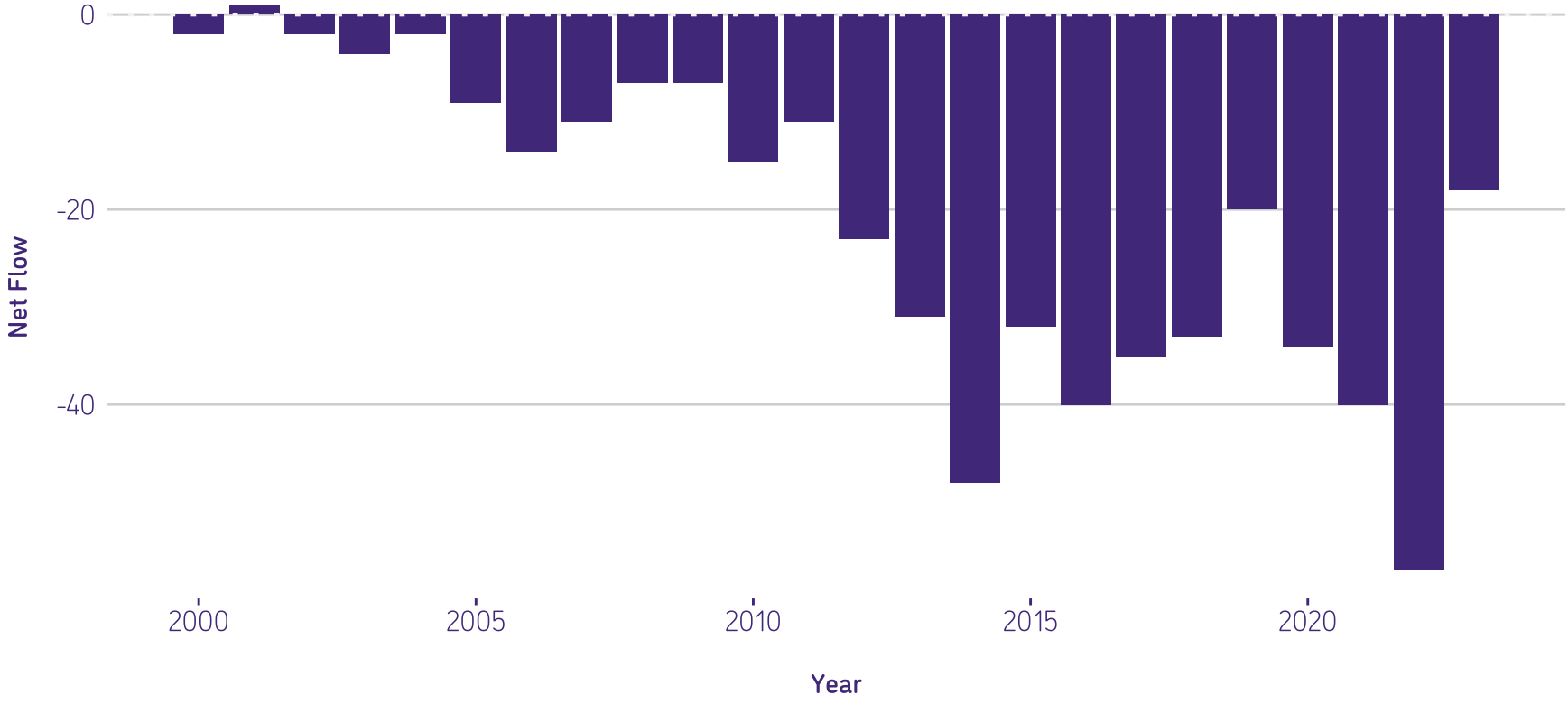
Tel Aviv University and **The Hebrew University of Jerusalem** are prime suppliers of talent to Google and Technion to Amazon.

Canada

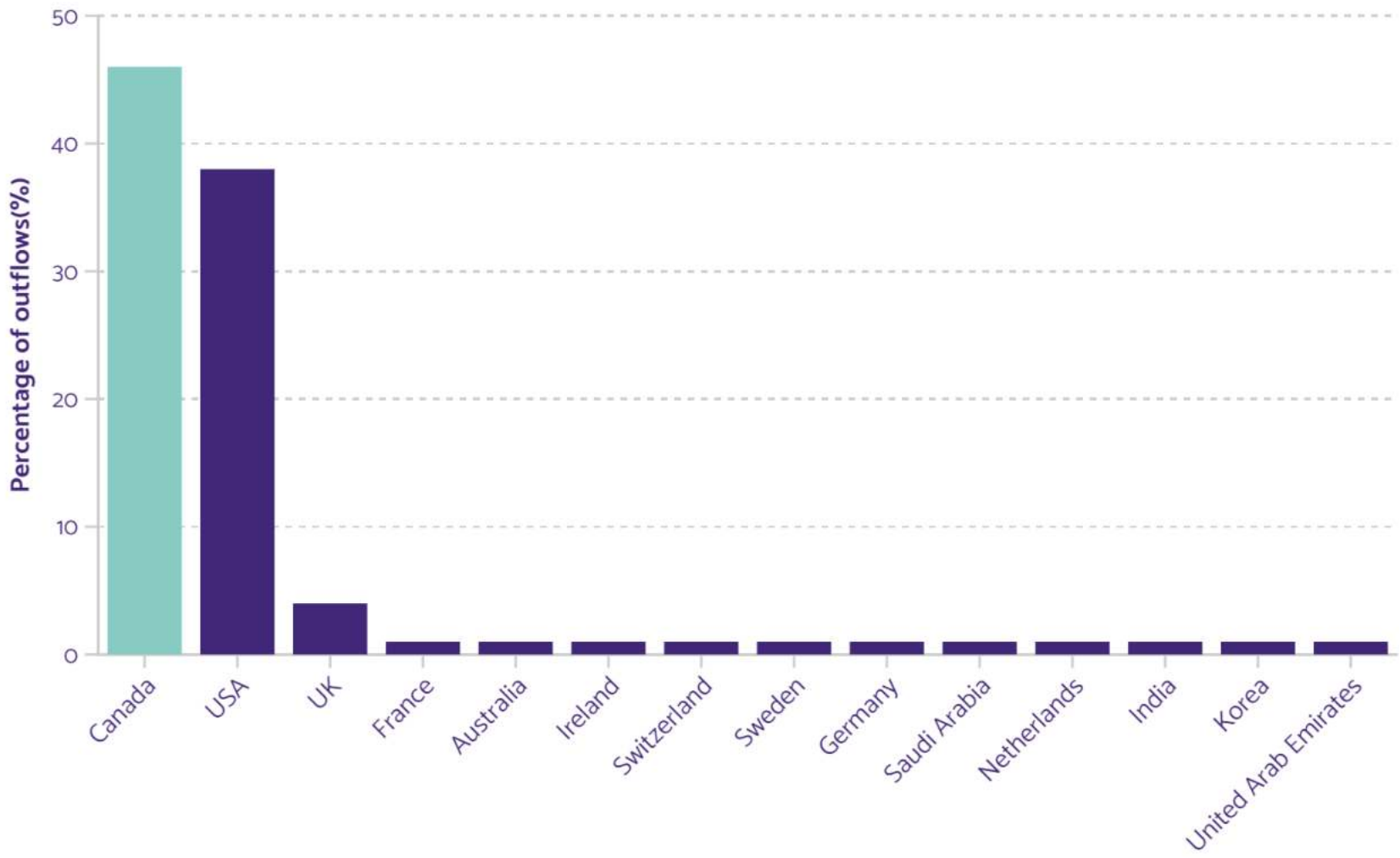
Canadian top AI talent is highly sought after, in particular by US tech companies, most likely acting as a key driver of outflows from the country.

Canada has a vibrant AI talent ecosystem with **middle-sized companies hiring the majority of top AI talent**, unlike most other countries. These tend to be research organisations that do not have the capacity to hire in large numbers like major industrial companies are doing in other countries. Canada's top recruiters include its quantum computing sector, highlighting the potential future convergence of skills around these technologies.

Canada - Net flow of AI talent over time



Outflows of talent to and from Canada



The amount of Canadian **talent that moves to the USA is close to the amount of talent that stays**.

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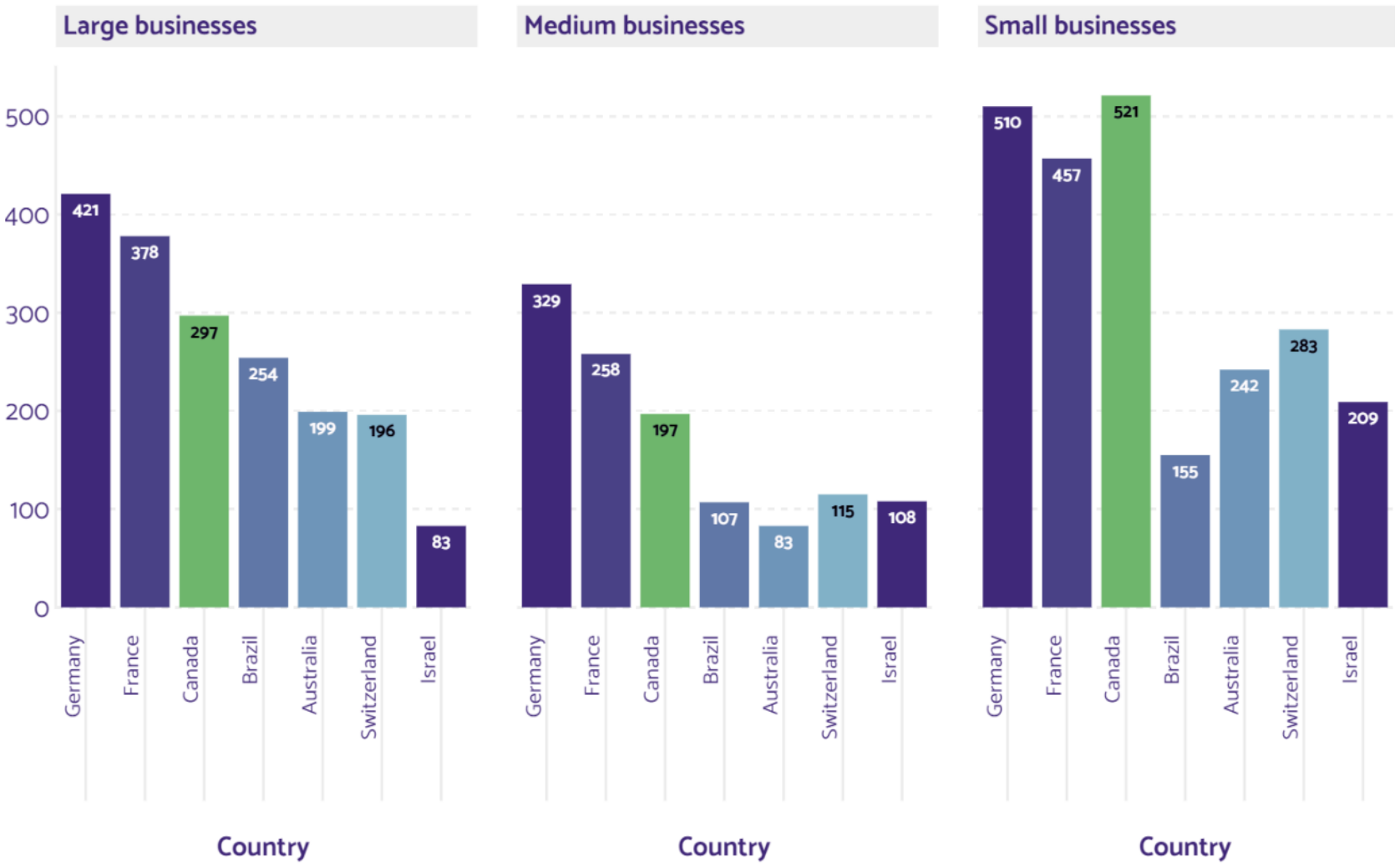
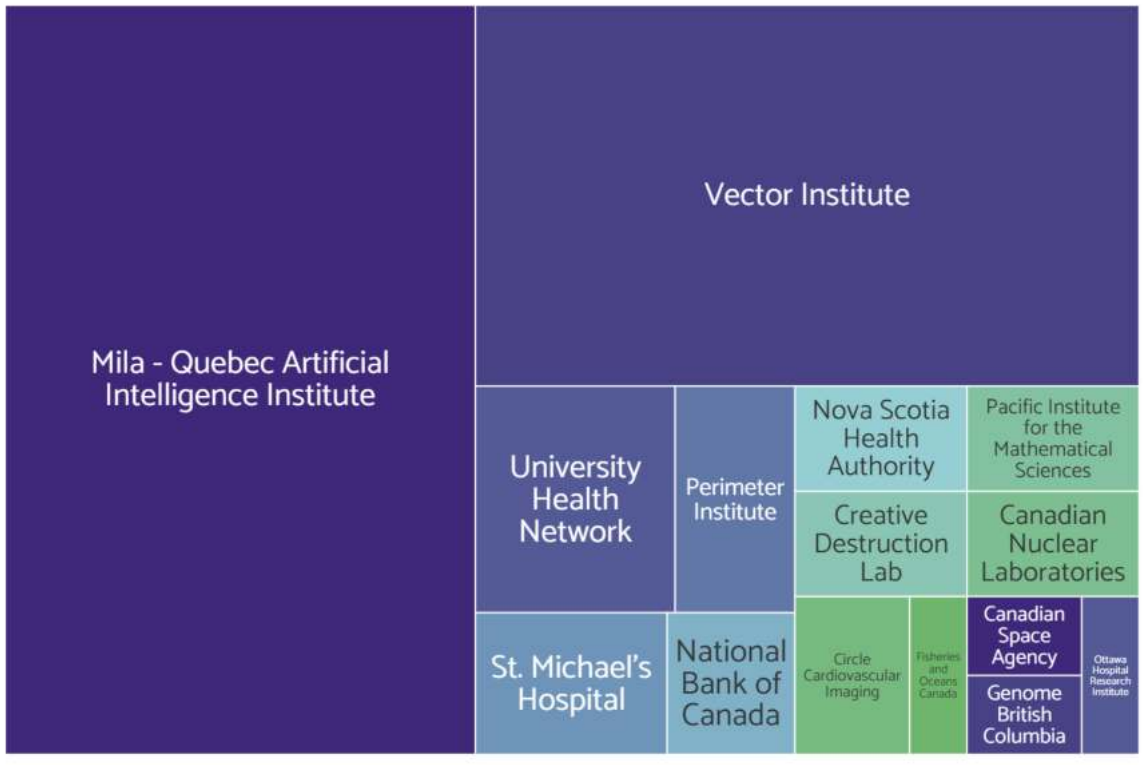
Diffusion of AI talent by number of companies



Canada is **rare** in having a number of middle-sized companies which **hire 52 percent of top AI talent talent** and high numbers of small companies (521). These include **Invision Ai**, a software company offering object detection and classification, and **Xanadu.ai**, a quantum computing company.

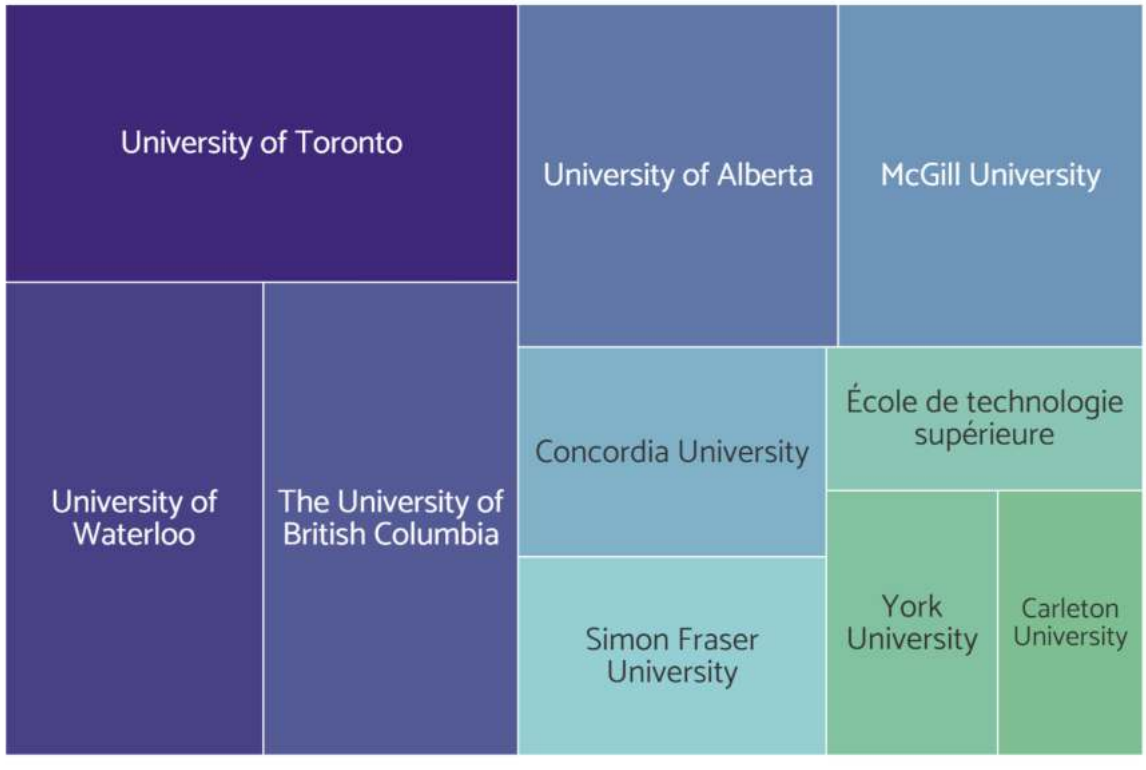
Top recruiters of AI talent in Canada



Mila is Canada's national champion having expanded the scope of its activities in 2017.

It has strong links to the **Vector Institute** which is dedicated to AI research. **The Perimeter Institute** researches theoretical physics and quantum. Large banks and health networks are present but not Canada's large energy sector.

Top Canadian educators of AI talent in Zeki data



The Universities of **McGill, British Columbia, Alberta, Waterloo** and **Toronto** feature in the Zeki top 100 AI educators of top AI talent.

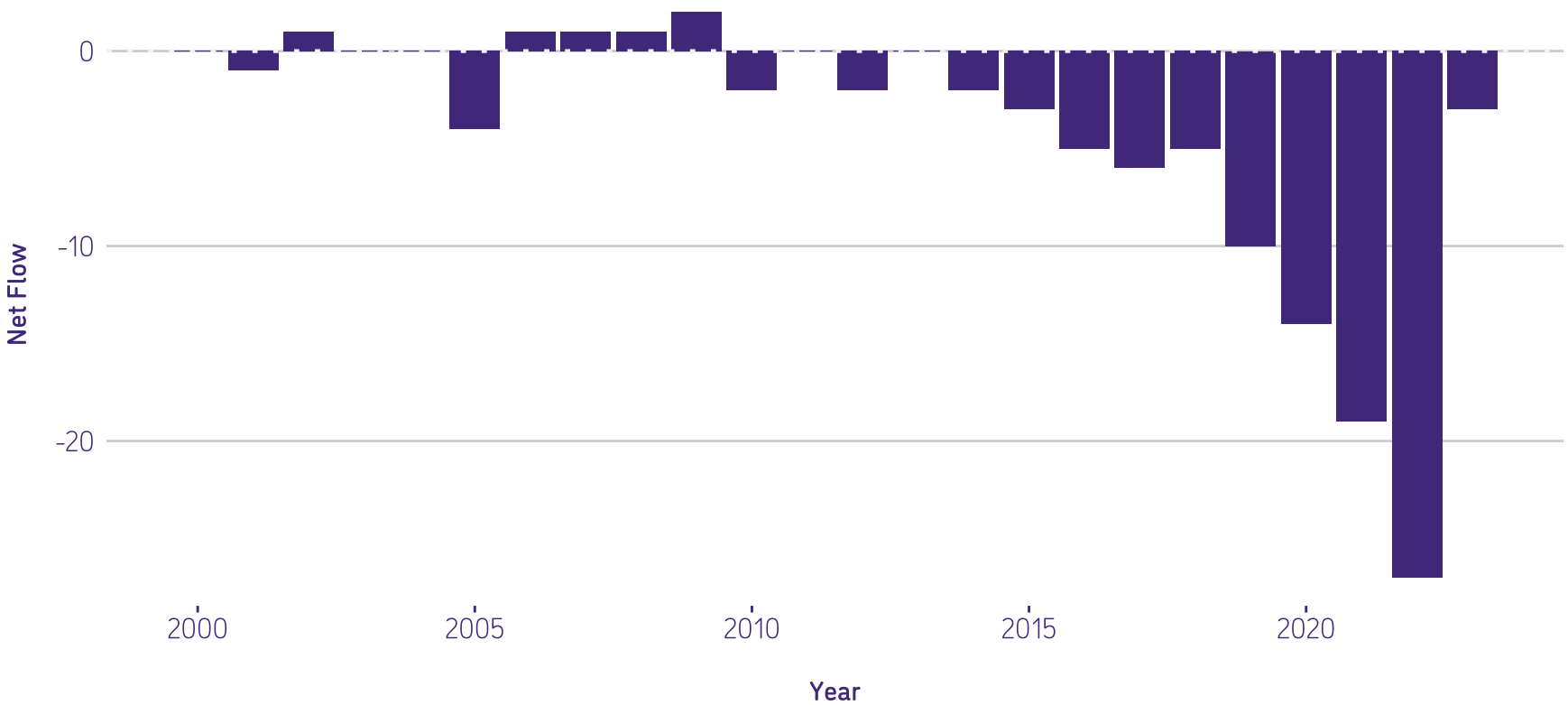
McGill, British Columbia, Alberta and Toronto are also **prime suppliers of talent to Google**; the University of Waterloo is a supplier to Microsoft.

Brazil

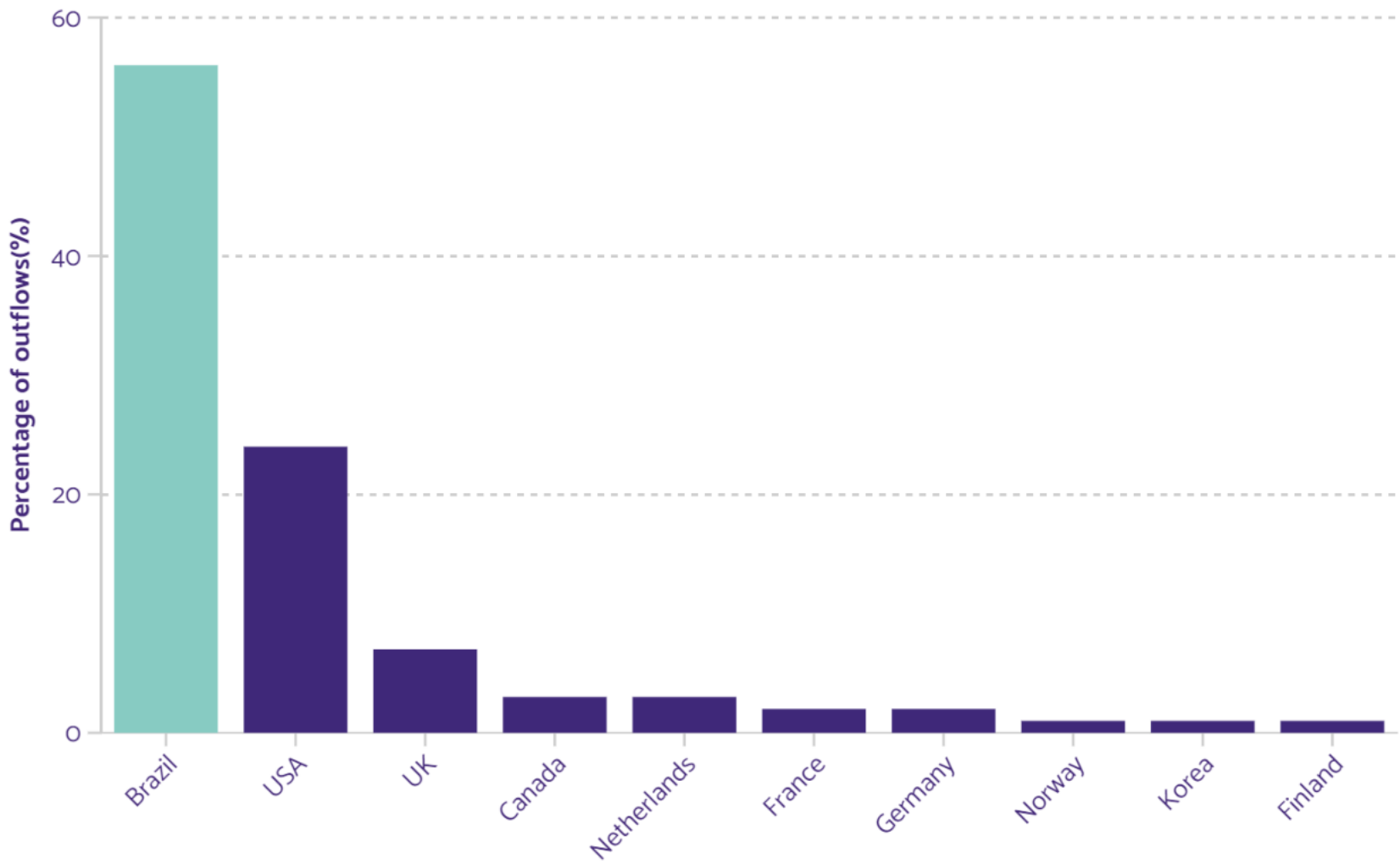
Brazil is experiencing a **sustained loss of talent** but not in large numbers. It has no national champion to anchor talent at home and a **very top heavy AI eco-system**.

Brazil is however the **only country where the financial services sector is the main recruiter of top AI talent**, underlying its dominant position in this sector across Latin America.

Brazil - Net flow of AI talent over time



Outflows of talent to and from Brazil



Brazil's **net outflows are mainly to the USA and Europe** rather than within Latin America.

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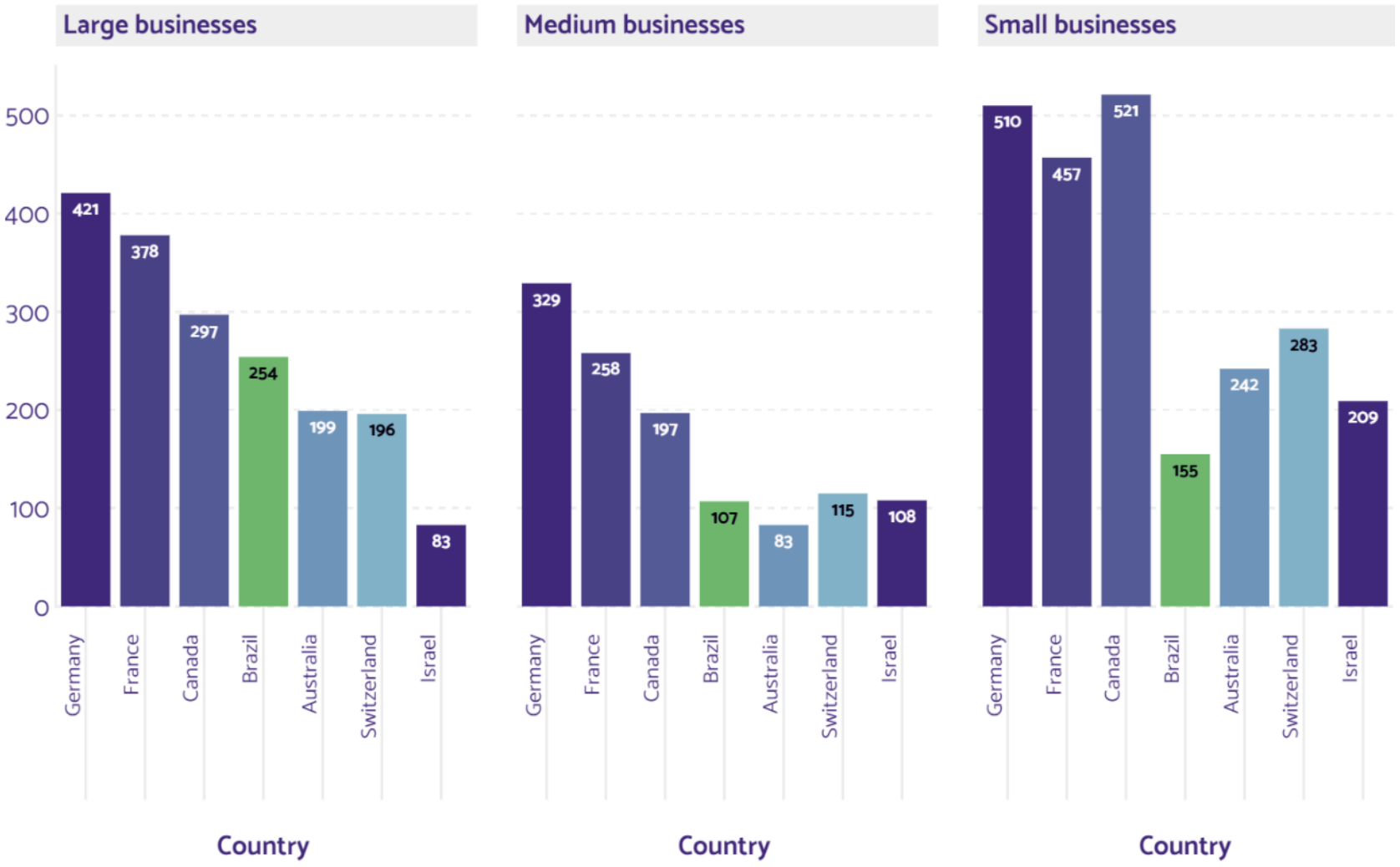
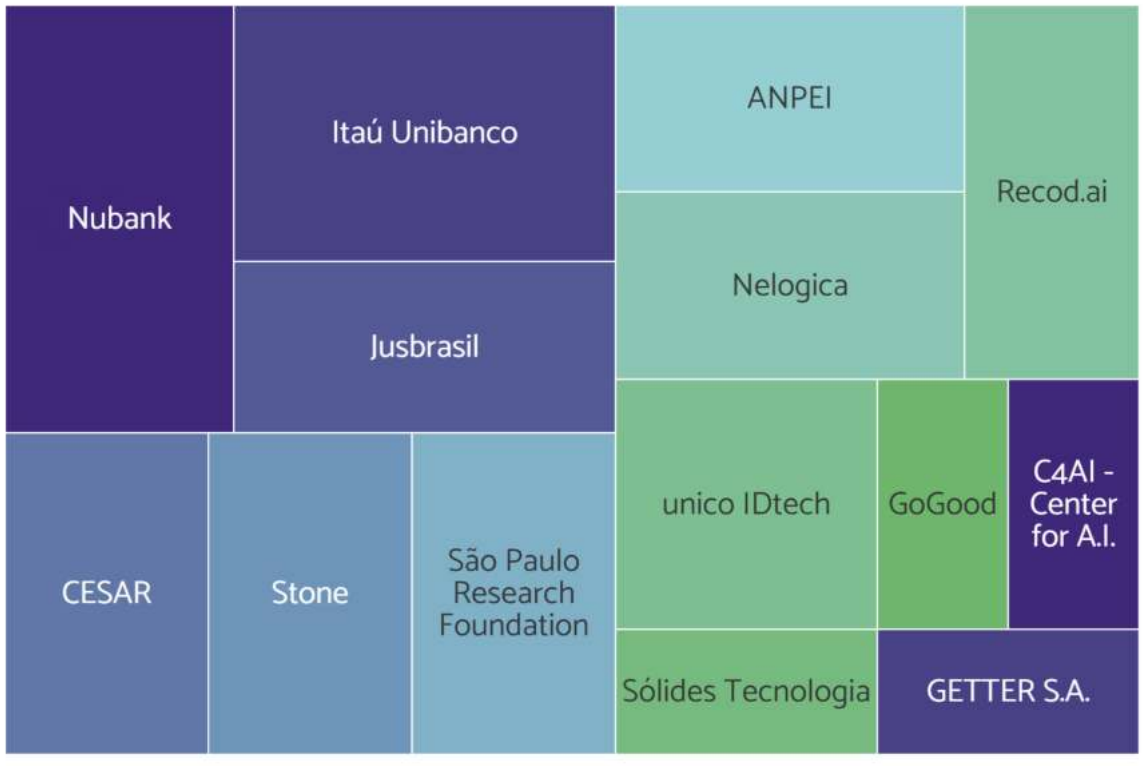
Diffusion of AI talent by number of companies



Small Brazilian companies **hire 58 percent of talent** despite Brazil having a smaller number of small and middle-sized companies compared to ecosystems in Europe and Canada.

Many large Brazilian companies are hiring top AI talent but not in large numbers.

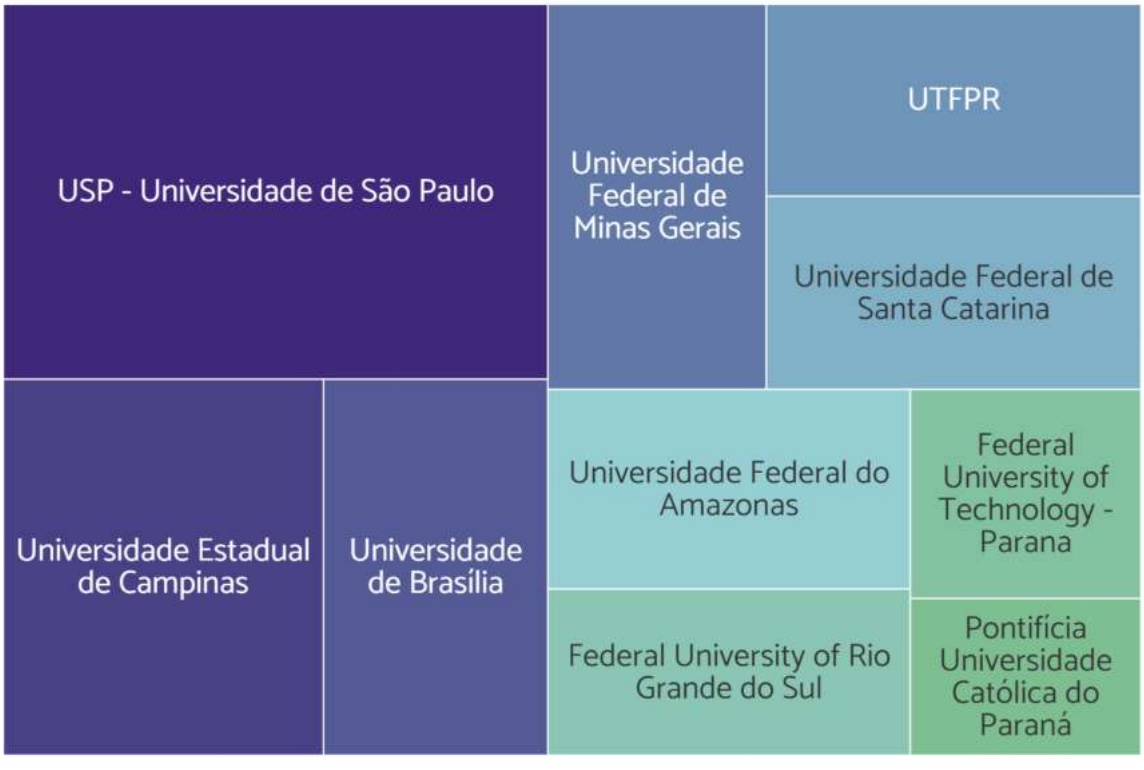
Top recruiters of AI talent in Brazil



Brazil's top recruiters differ from other countries as they are dominated by **banks** and **fintech**. **Nubank** is the largest fintech in Latin America, backed by **Sequoia Capital, Tiger Global Management** and **Tencent**.

Itau Unibanco is the largest bank in Latin America whilst **Stone** is a secure payment company. **Jusbrasil** is a legaltech platform with over 30 million users a month.

Top Brazilian educators of AI talent in Zeki data



There are **no Brazilian universities** in the Zeki top 100 AI educators of top AI talent. But the **Universidade de São Paulo** has set up a Centre for Artificial Intelligence in partnership with **IBM**.

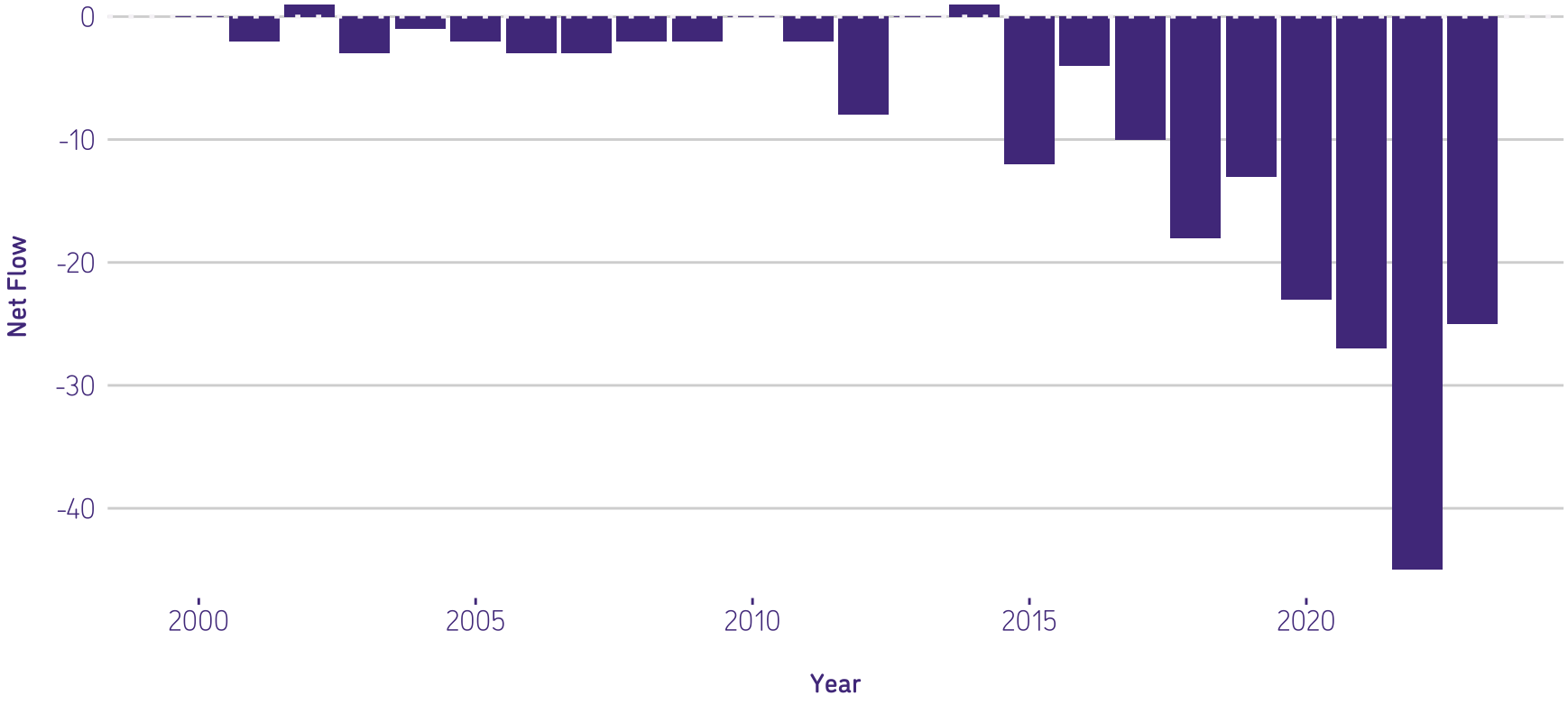
No Brazilian universities are prime suppliers of talent to a major company.

India

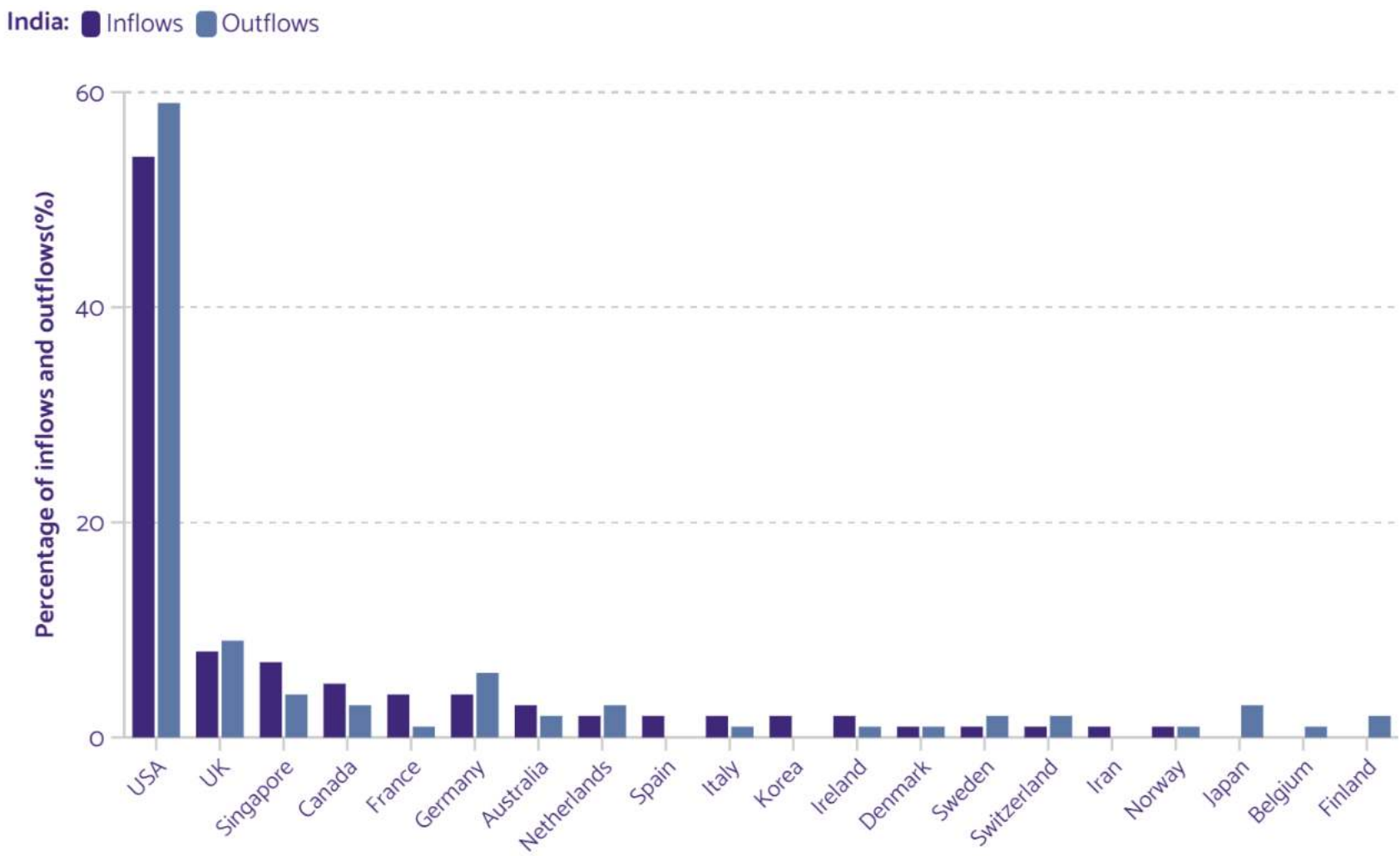
India continues to experience a **sharp outflow of top AI talent** despite its national ambition to be an AI superpower and its universities which are training some of the best talent globally.

Its large businesses **recruit in small numbers** leaving the market open to multinational companies. It has **three times as many small companies** hiring top AI talent than its regional counterparts but half as many as the major European economies.

India - Net flow of AI talent over time



Inflows and outflows of talent to and from India



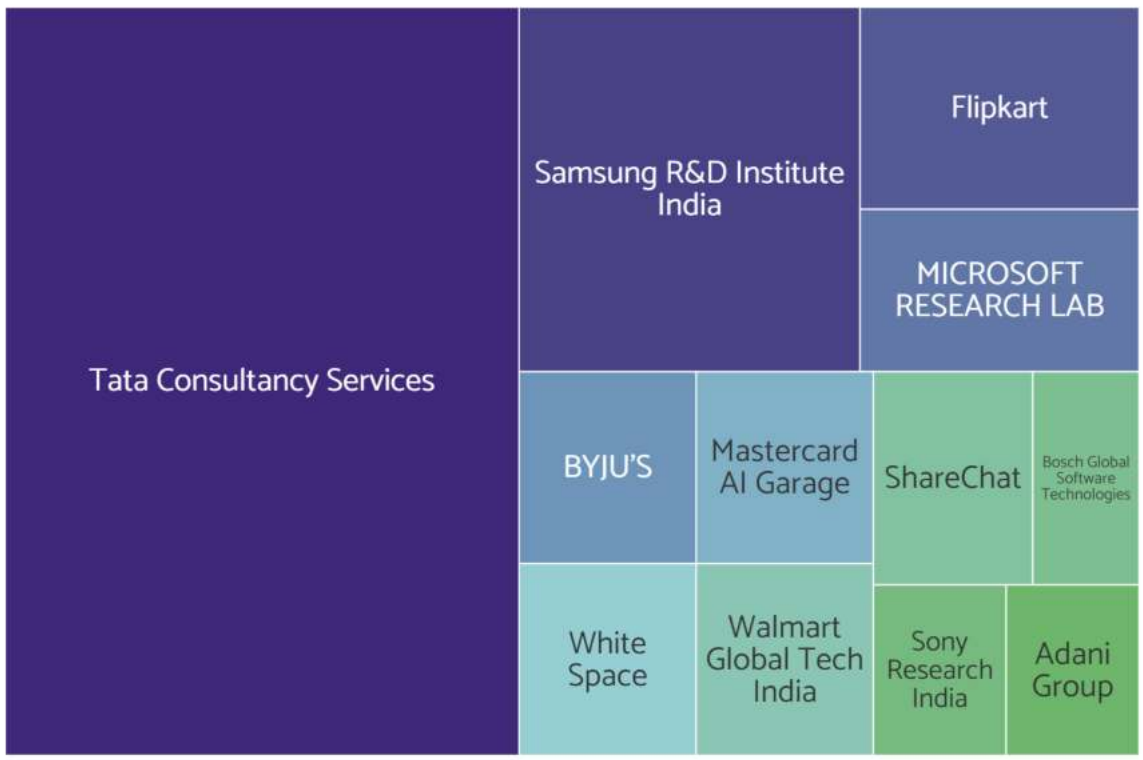
Indian talent **moves between the USA and India** in large numbers, highlighting the attraction of an advanced degree education in the USA for Indian talent. Numbers heading to Germany are also increasing.

Diffusion of AI talent by number of companies

India **only has 3.5 percent of the companies in our data** despite the size of its economy. It has three times as many small companies as its regional counterparts but half as many as the major European countries.

Because large businesses like **Zoho**, a B2B technology company, **Swiggy**, an online food platform and **BYJU's**, an edtech platform, hire in small numbers, they do not register as top local recruiters of top AI talent.

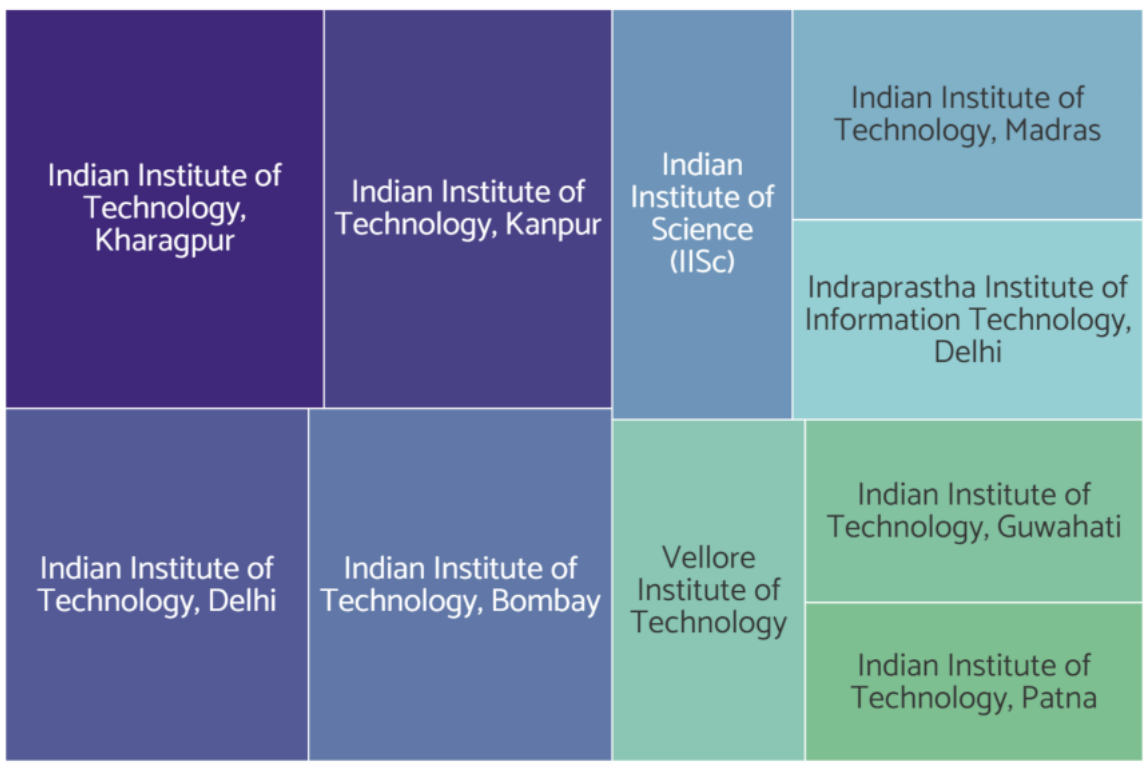
Top recruiters of AI talent in India



The main recruiters in India are **dominated by international companies setting up local offices** to draw on Indian talent.

The exception is **Tata Consultancy Services**, the largest technology company in India but also **the second largest global user of the US H1-B visa scheme** that enables US employers to source highly-skilled talent abroad.

Top Indian educators of AI talent in Zeki data



There are no Indian universities in the Zeki top 100 AI educators of top AI talent, but there are 4 in the next 10 places, **IIT Kharagpur, Bombay, Madras** and **Hyderabad**.

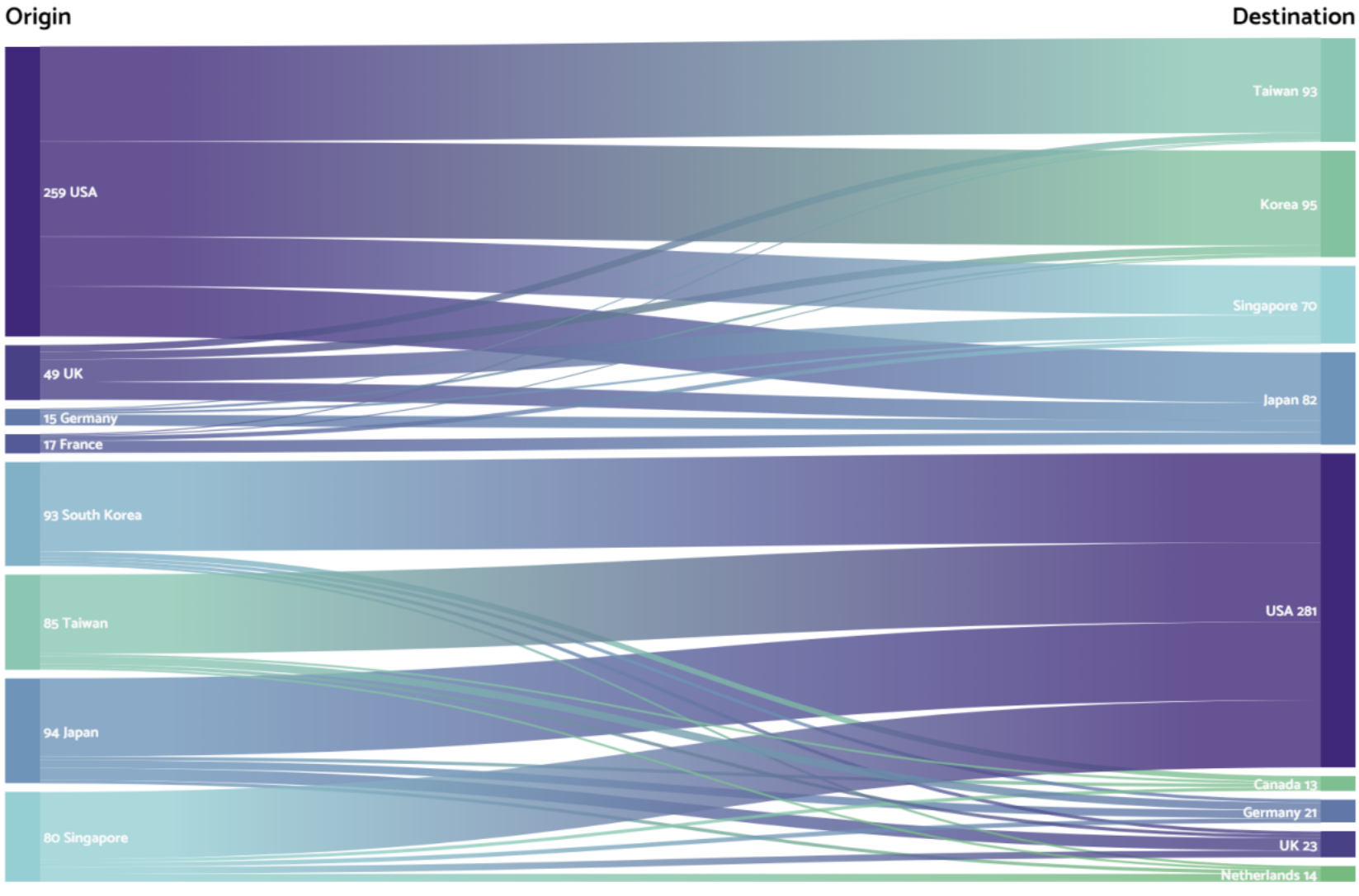
None are prime suppliers to a major company.

East and South East Asia

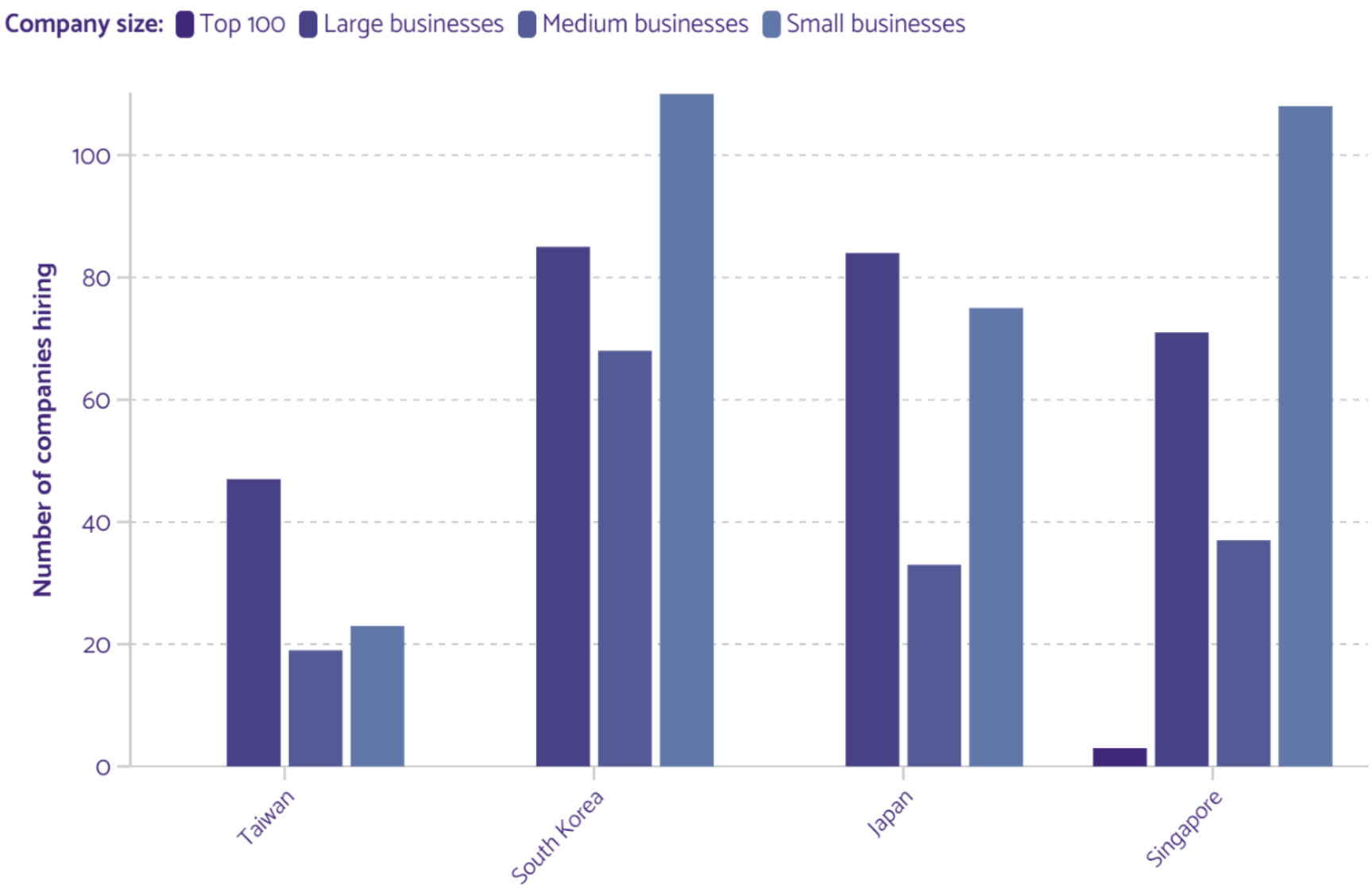
Japan, South Korea, Taiwan and **Singapore** maintain equilibrium in net inflows and outflows with small relative changes annually.

The **main interchange is with the USA** reflecting the strong attraction of an advanced degree in the USA for talent from these regions who then usually return home after completing their degree, most likely **taking their skills and expertise** to the many large companies who hire top AI talent.

Inflows and outflows of AI talent to and from East and South East Asian countries



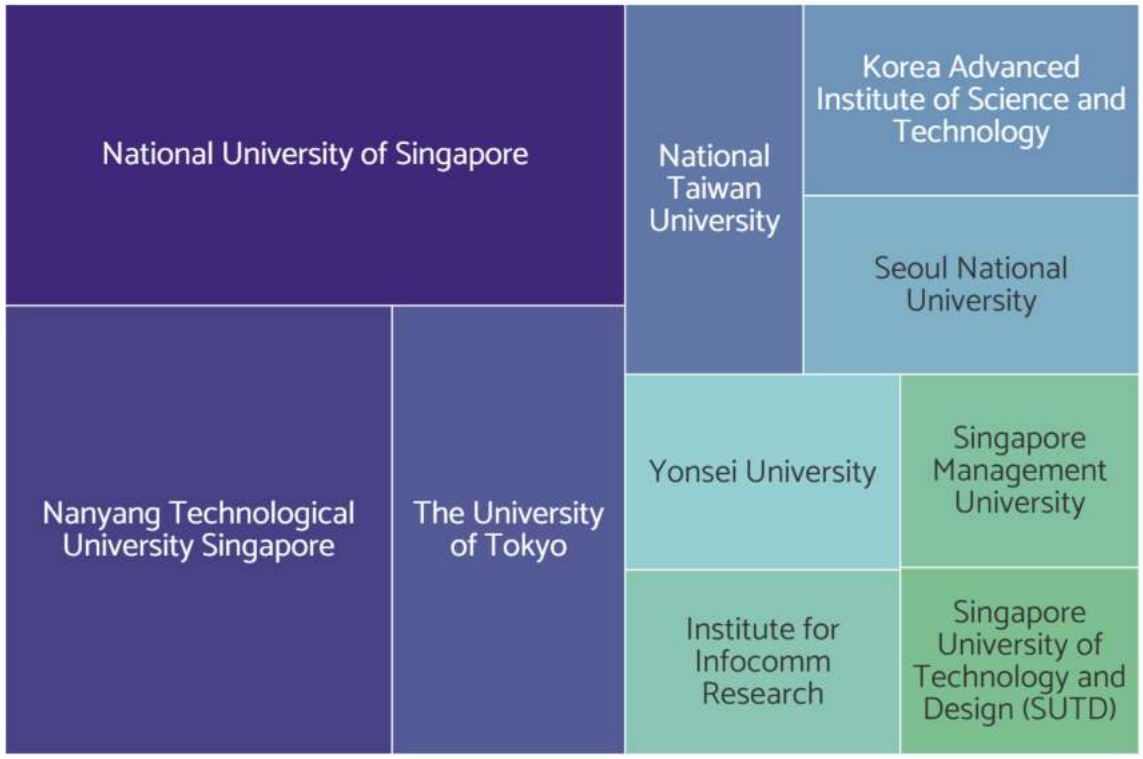
Diffusion rates of companies in East and South East Asia



Companies from **Taiwan, Singapore, Japan** and **Korea** make up just **over 2 percent of the companies** in Zeki data.

The striking number of small businesses in Singapore and South Korea compared to Japan and Taiwan, highlights the deep and diverse AI ecosystem

Top East and South East Asian educators of AI talent in Zeki data



The University of Tokyo, Nanyang Technological University Singapore, Seoul National University, National University of Singapore and Korean Advanced Institute of Science and Technology (KAIST) all feature in the Zeki top 100 AI educators of top AI talent.

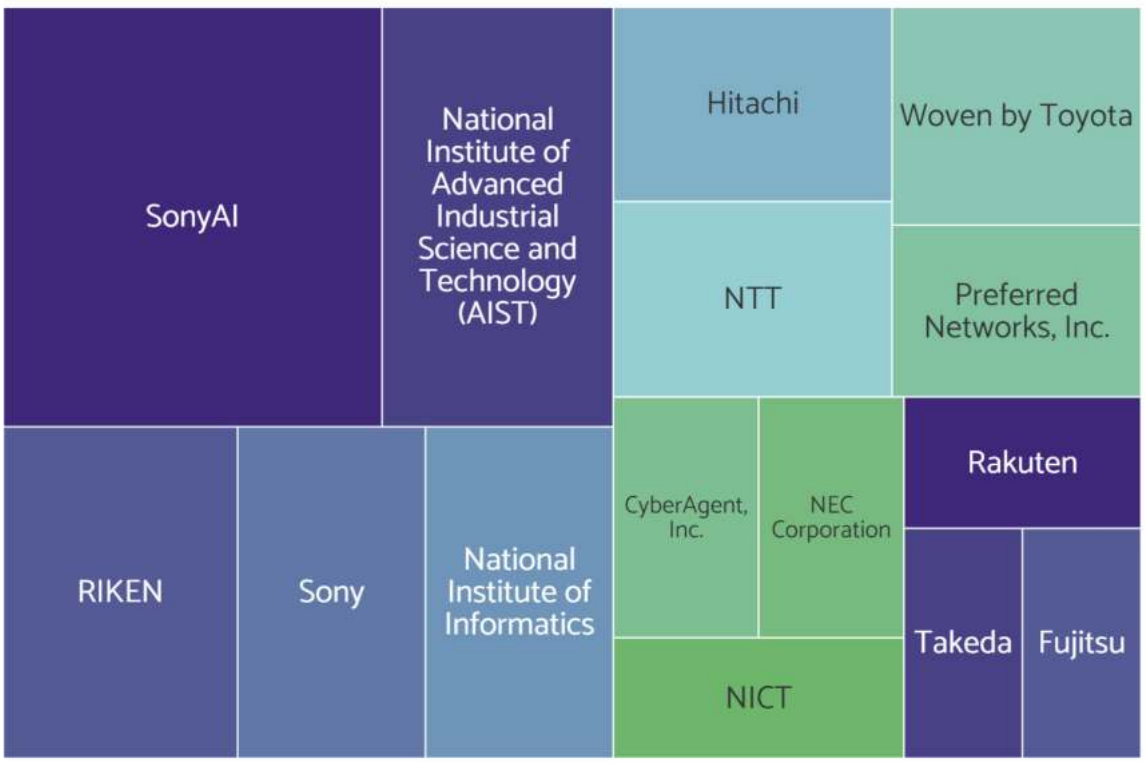
KAIST and **Seoul National University** are prime suppliers of talent to Samsung Electronics, **National Taiwan University** to Nvidia, **Taiwan** and **Nanyang Technological University** to Singapore's Agency for Science, Technology and Research (A*STAR).

Top recruiters in East and South East Asian countries dominate the market.

Large companies, in particular in South Korea and Japan, hire twice as many top AI talent as their counterparts in Europe.

As a result there is much less diffusion of talent to middle-sized and small companies within their ecosystems compared to other advanced economies. They recruit mainly close to home.

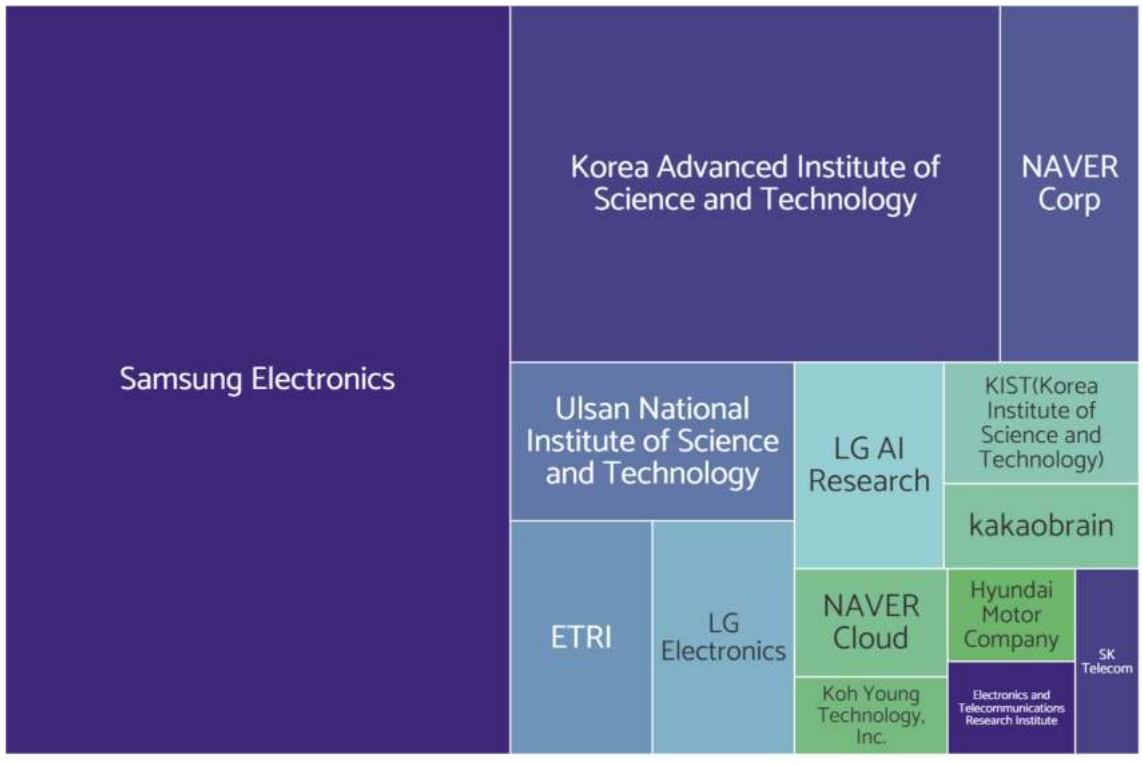
Top recruiters of AI talent in Japan



The top recruiter in Japan is **Sony AI**, established in 2020 and a world leader in sensing technology.

Major **national research institutes** are also large recruiters. **RIKEN** employs over 3,000 scientists and is fully funded by the Japanese government.

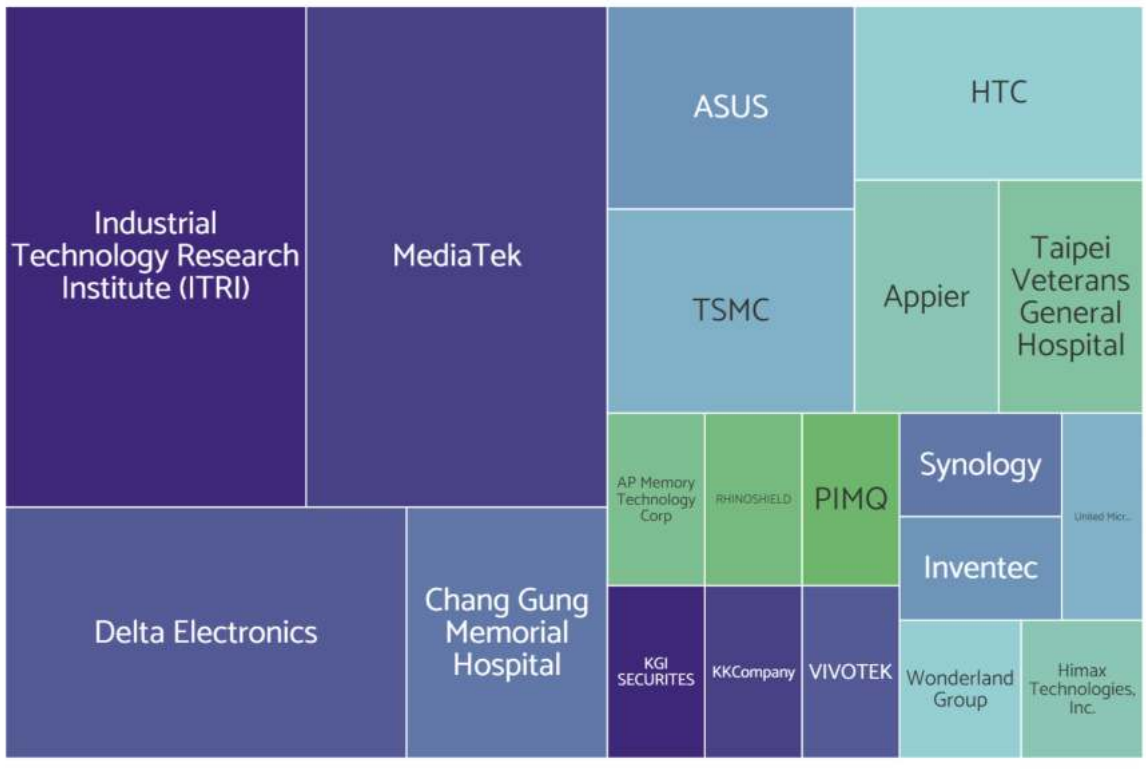
Top recruiters of AI talent in South Korea



Samsung Electronics hosts an annual AI forum and aims with its S24 phone, which has generative AI features, to gain a technological edge over its main rival Apple.

LG has earmarked $3 billion of R&D investment in AI over the next five years.

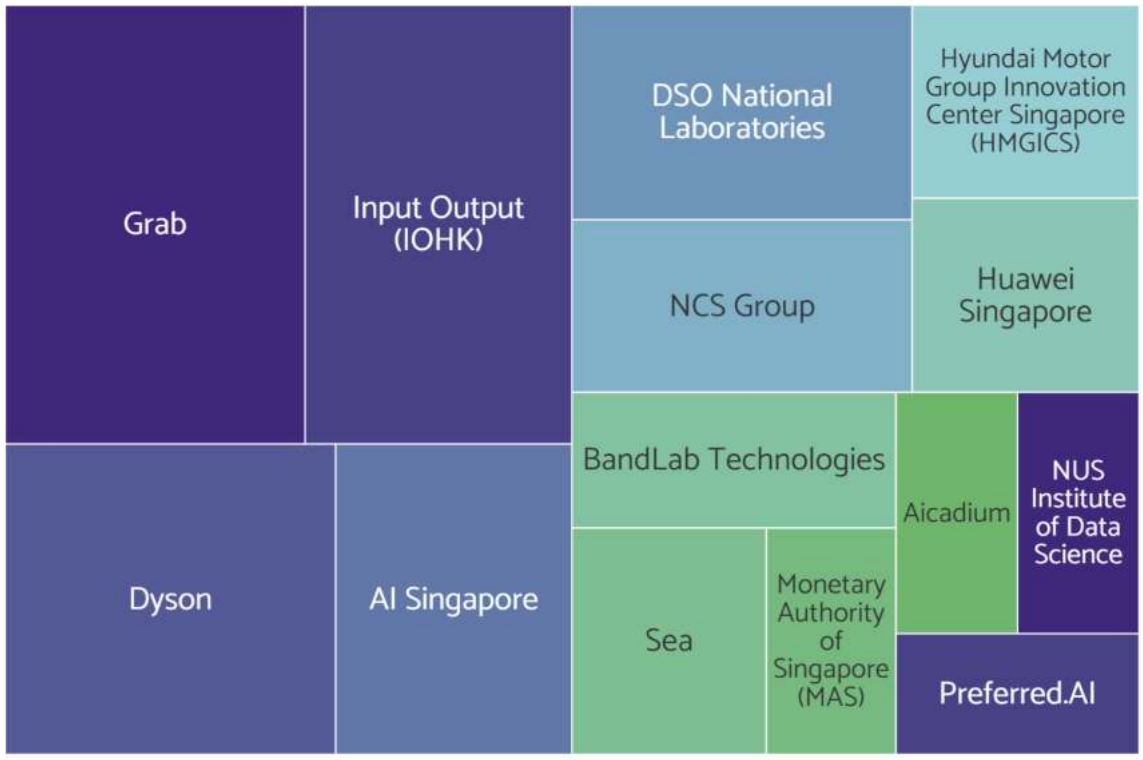
Top recruiters of AI talent in Taiwan



Taiwan's top recruiters of AI talent are chipmakers such as **TSMC** and **MediaTek**, which also have close connections to **Cambridge University**. **Delta Electronics** is seeking to lead in the AI server market.

The striking recruiter is **Chang Gung Memorial Hospital** that started moving to paperless patient records in 2004 and is now a world leader in digital health information management.

Top recruiters of AI talent in Singapore



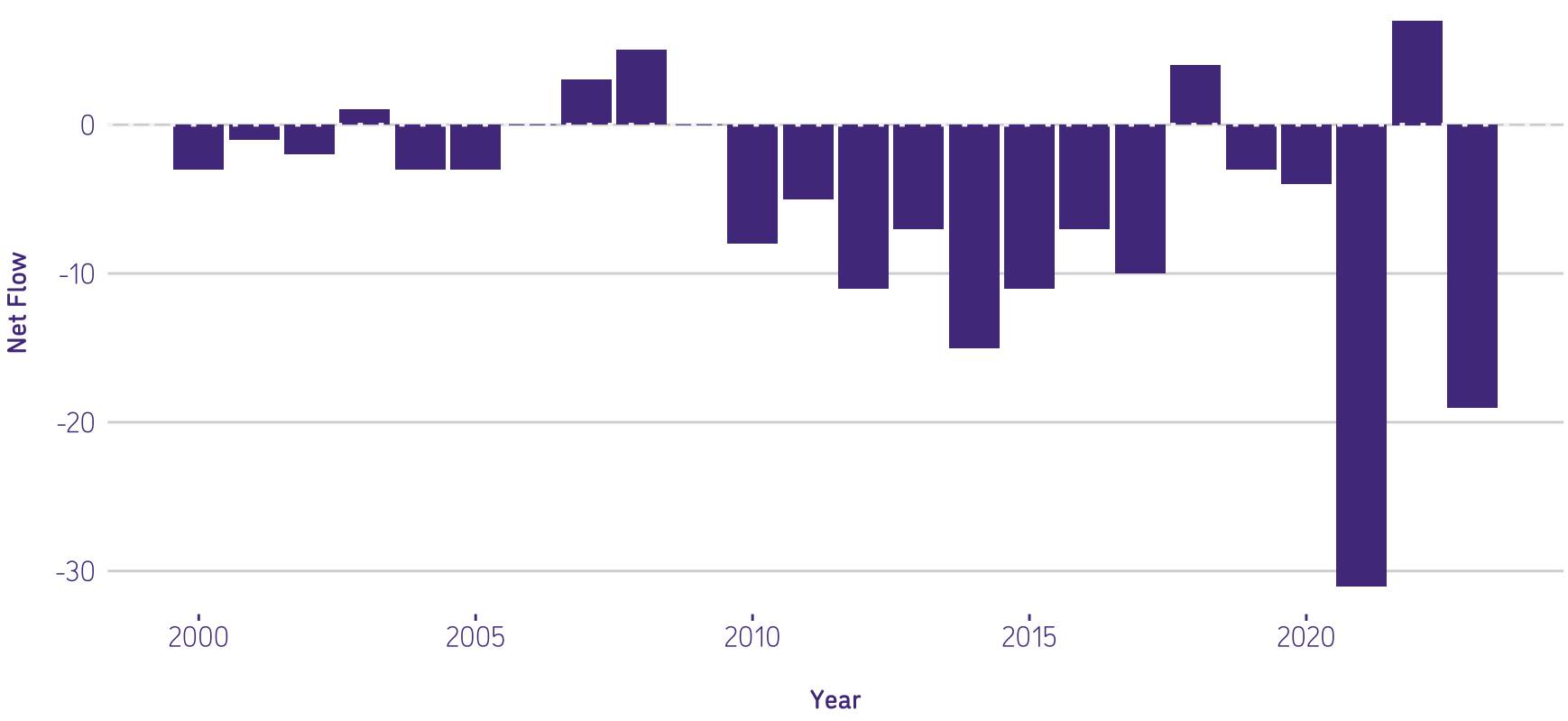
In Singapore, there is more diffusion of top AI talent to smaller companies and **there is great diversity amongst top recruiters**.

Grab is the developer of a super app used across Southeast Asia. **Dyson** is seeking to use AI in advanced manufacturing with a global R&D footprint, in particular in The Philippines and UK. **IOHK** is a block chain infrastructure research and engineering company whilst **BandLab Technologies** is a social music platform.

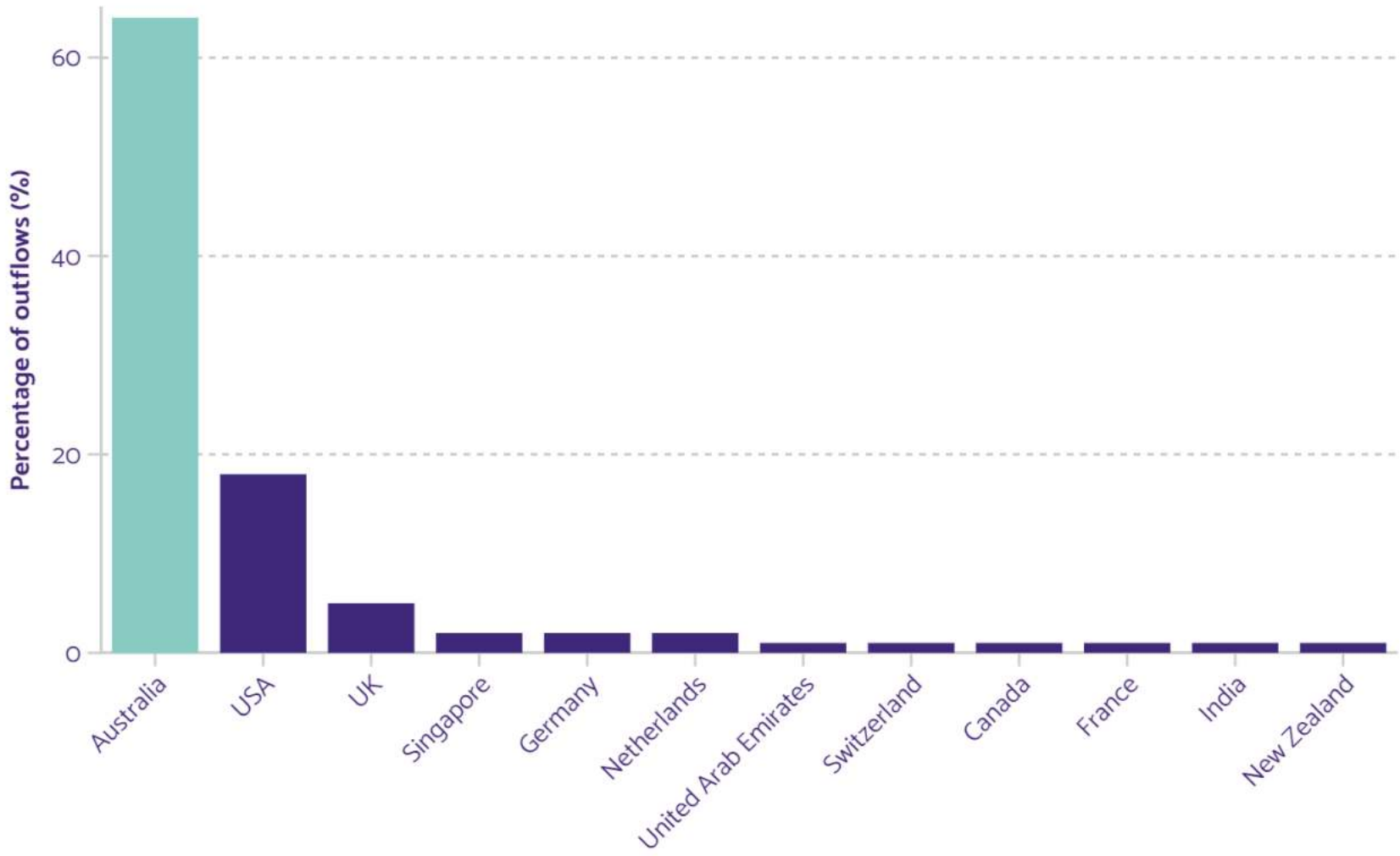
Australia

Despite a relatively large outflow of talent in 2021, Australia has a **balanced and broad AI ecosystem** where its national research institutes **absorb the talent it educates**. Only one of its universities is a prime supporter of talent to a major US company.

Australia - Net flow of AI talent over time



Outflows of talent to and from Australia



Australian outflows of talent are to a **very broad number of countries** and **far less to the USA** than other countries. Over 60 percent of people stay in Australia - highlighted in light blue.

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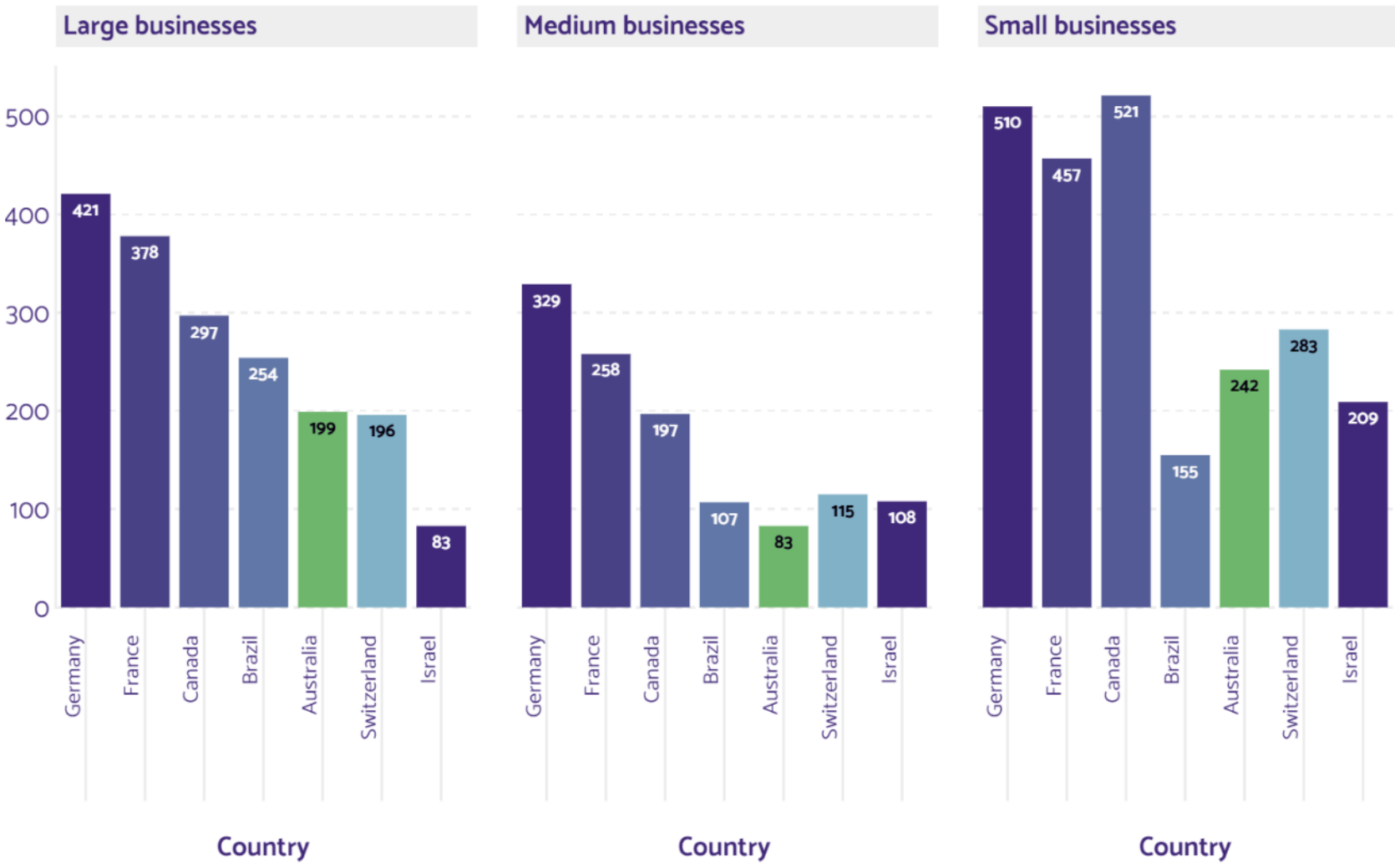
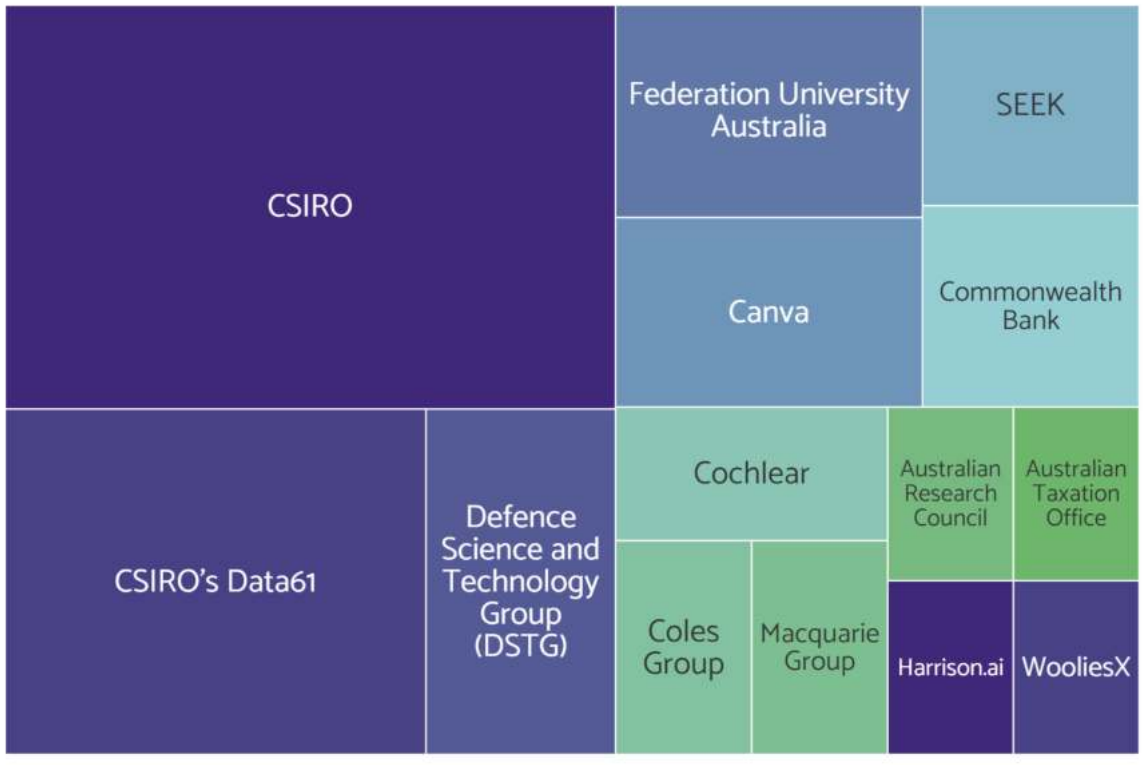
Diffusion of AI talent by number of companies



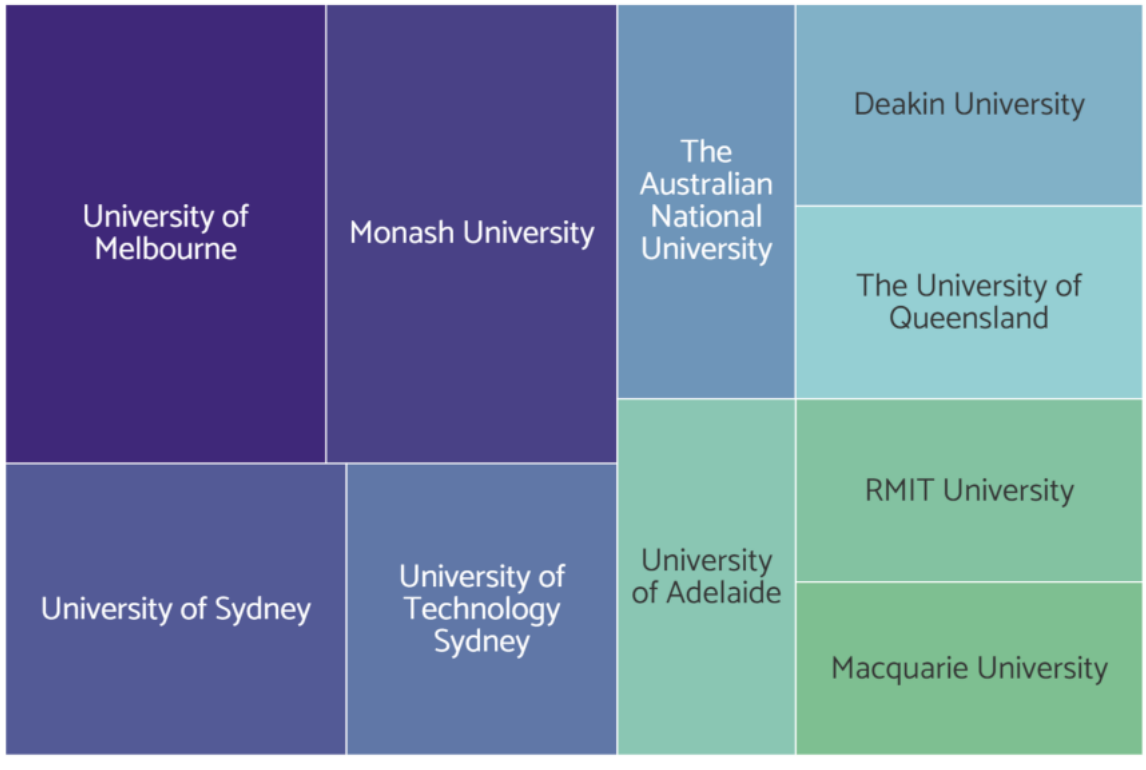
AI talent in Australia is primarily hired by **small companies - 38 percent** and **large companies - 49.5 percent** with an unusually small presence of middle-sized companies (12.5 percent).

Top recruiters of AI talent in Australia



Australia's top recruiters are dominated by **national research institutes but do include Canva**, an online graphic design app, **SEEK**, an online employment marketplace, **Cochlear**, a medical device company and **Harrison.ai** that delivers AI automation to clinical care. Google announced in 2021 a major investment to build research capacity in Australia creating 6,000 jobs.

Top Australian educators of AI talent in Zeki data



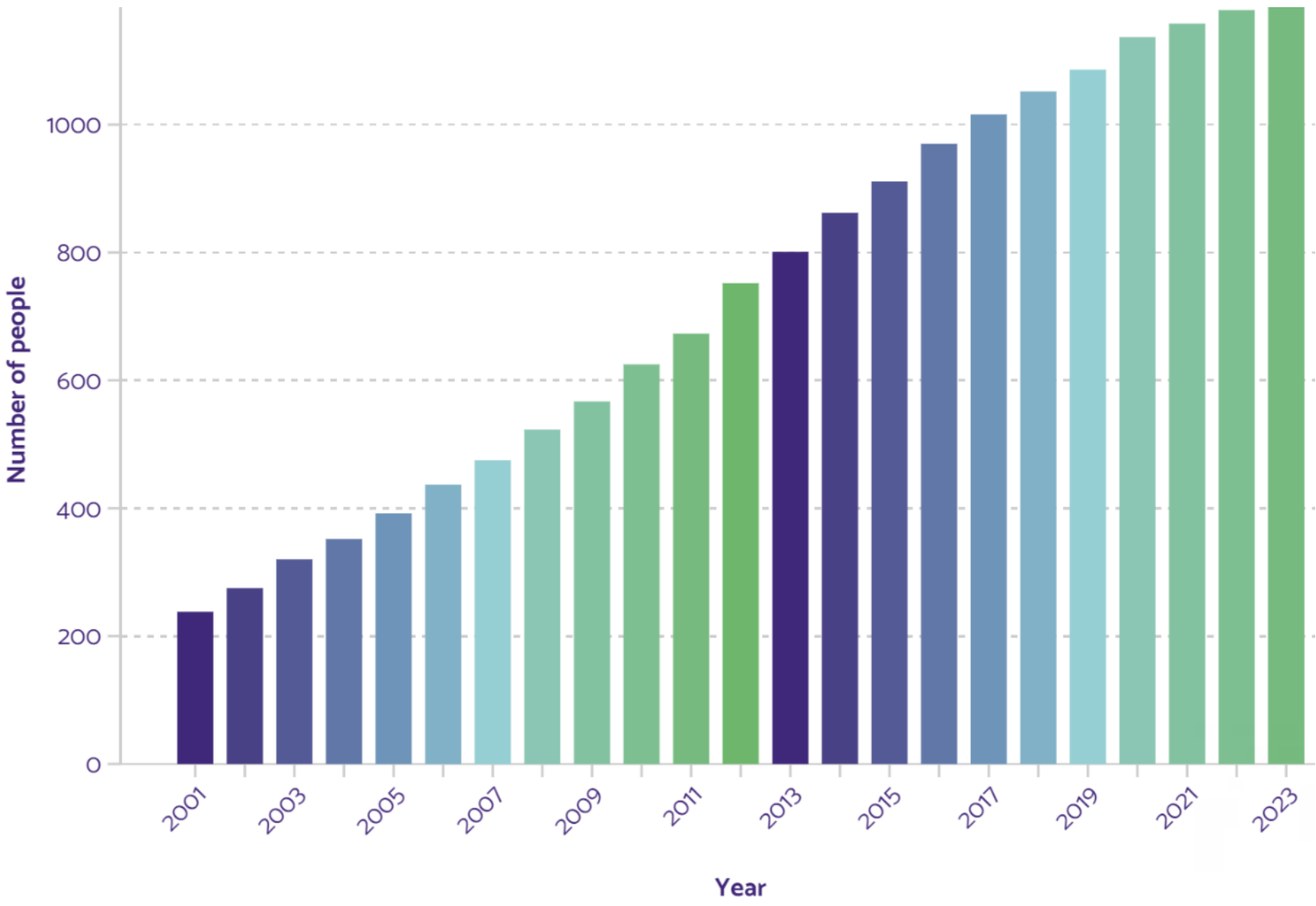
The Australian National University, Monash, Sydney and **Melbourne** universities all feature in the Zeki top 100 AI educators of top AI talent.

Melbourne is a prime supplier of talent to **Amazon** and the Australian National University to **CSIRO Data 61**, an offshoot of CSIRO which hosts labs working on Mixed Reality, Robotics and AI4CYBER.

North, West and Southern Africa

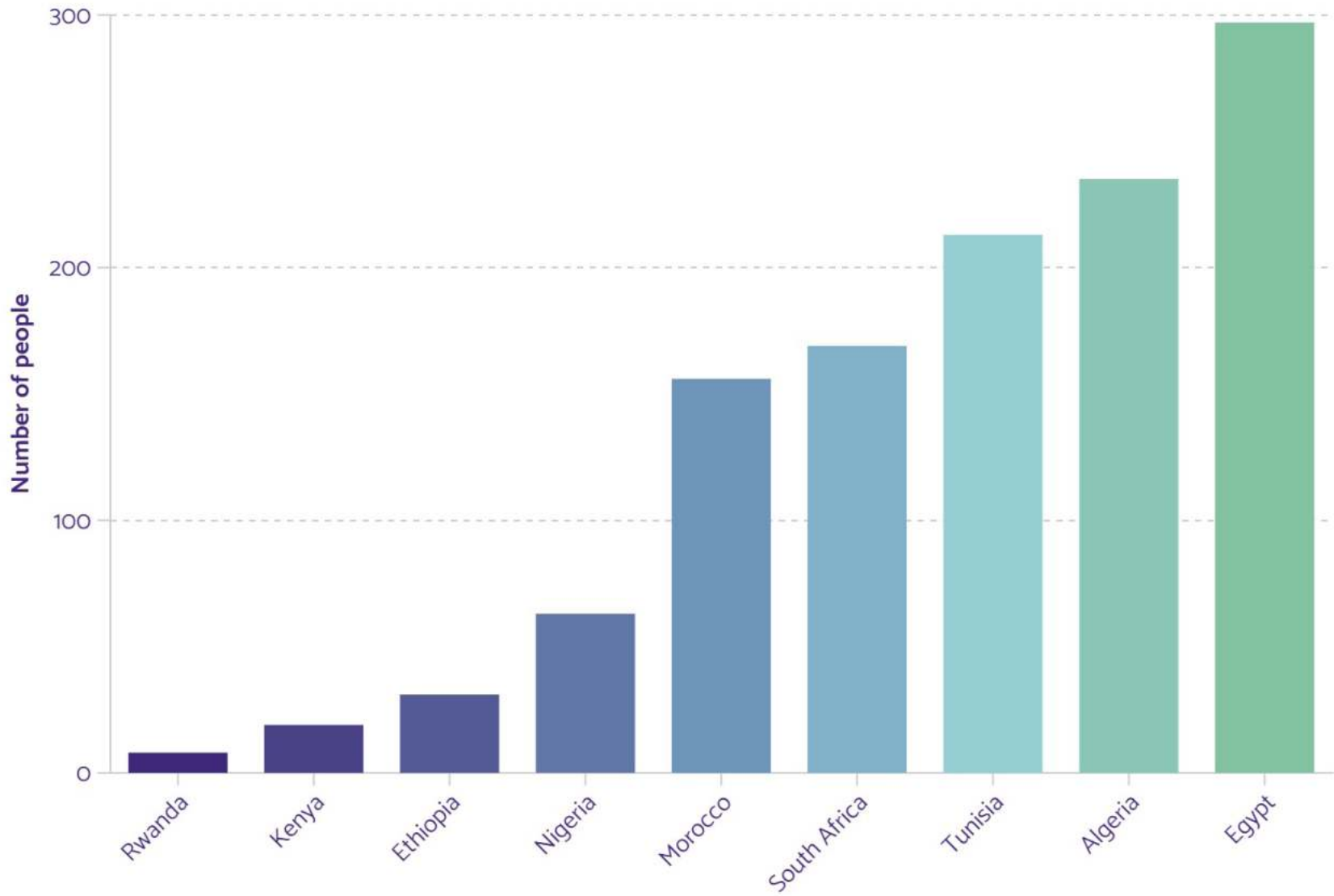
We do not see in our data any brain drain from Africa. Net inflows and outflows of talent are very small across the main African economies. Numbers of top AI talent are growing and there is a vibrant start-up ecosystem in South Africa.

Growth of top talent in AI hubs in Africa



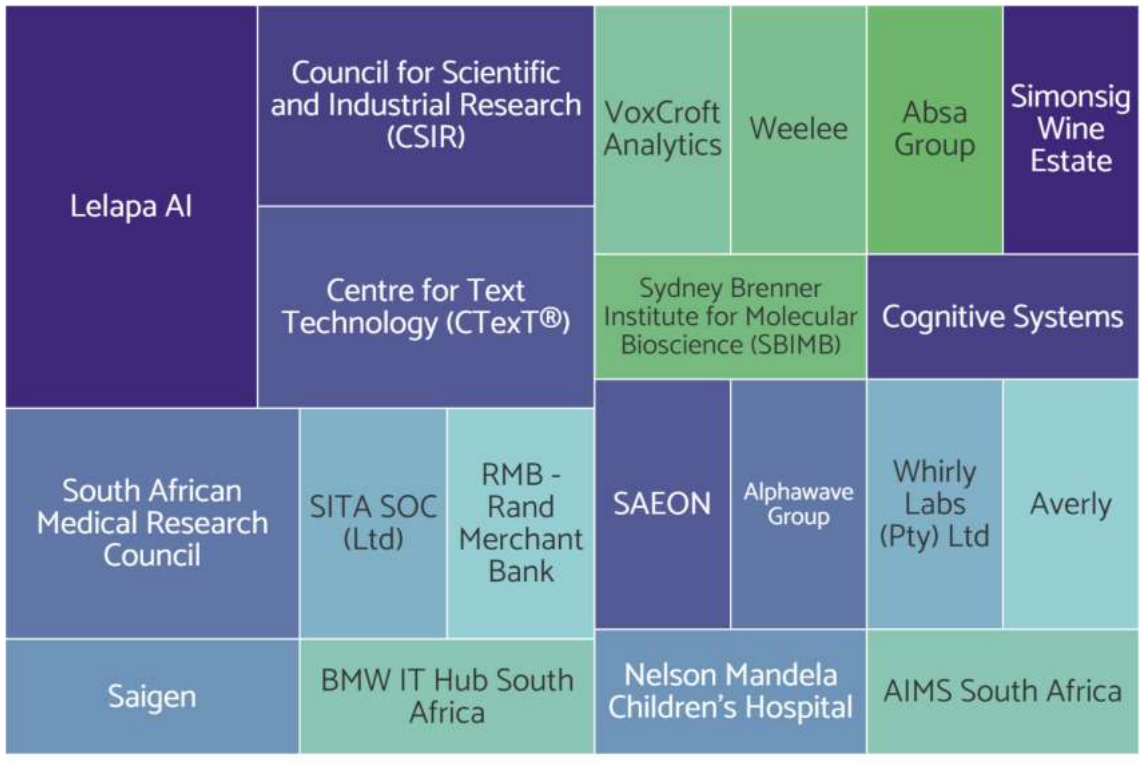
The growth in top AI talent in Africa averaged **24.7 percent annually over the last 10 years.**

Geographical distribution of top AI talent in Africa



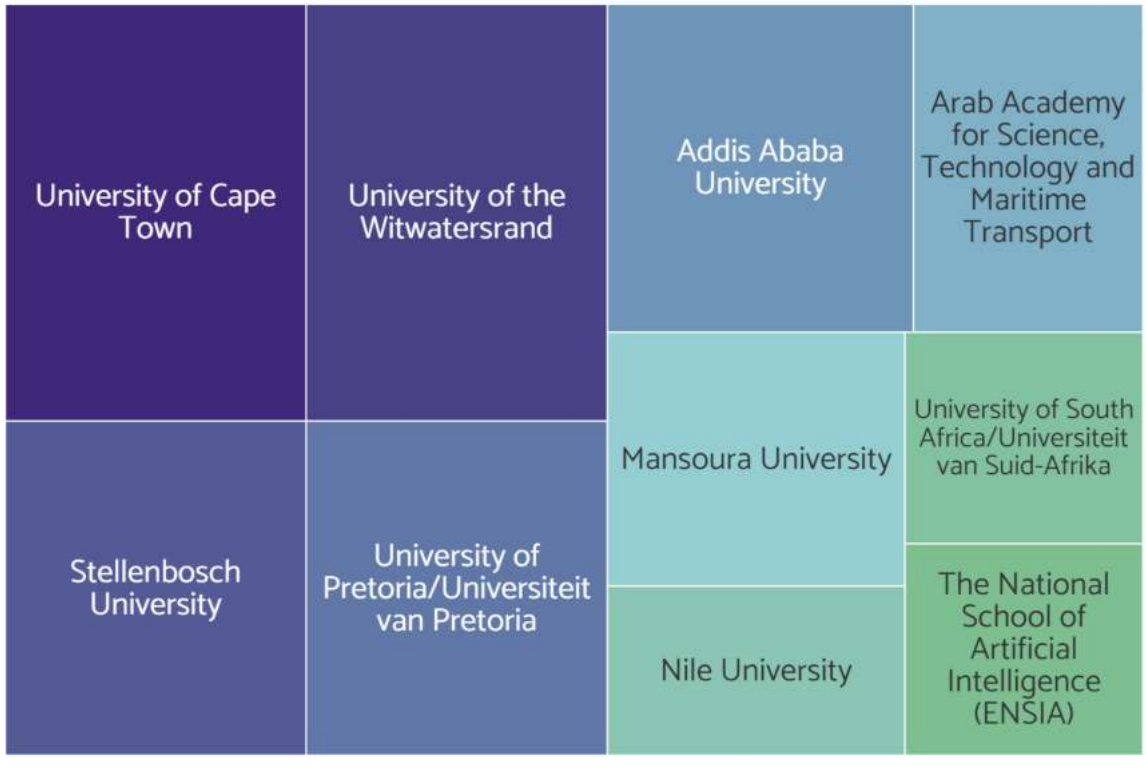
The North African countries, **Egypt, Algeria, Tunisia and Morocco** have the largest share of top AI talent followed by South Africa, relative to the size of its economy. Nigeria accounts for a very small share.

Top recruiters of talent in Africa



Africa's top recruiters are mainly **government agencies** but the largest recruiter, **Lelapa AI** is a South African start-up building AI for African languages. **VoxCroft** is a South African company seeking to be a world leader in AI-driven risk analytics whilst; **Saigen**, also based in South Africa, uses AI for speech recognition.

Top African educators of AI talent in Zeki data



South African Universities are the main educators of top AI talent in Africa.

In 2023, the European Union announced a €345 million grant to support research and innovation projects across the Mediterranean, including North African countries, focused on **health, climate** and **renewable energy sources.**

CHAPTER SIX

Where to find top AI talent

For this chapter of the report, we look across all 140,000 top AI scientists and engineers in our dataset.

Top AI talent is highly mobile. 51 percent of the talent in our data are now in a country different from where they were educated. They move roles constantly as we have described in Chapter Two. Top AI talent is spread globally over 94 countries, working or educated at 2,296 universities, or in roles at over 20,000 companies.

But this talent is also finite, with low single digit percentage growth in new talent coming into the market each year for the last five years. Top AI scientists and engineers are increasingly going online and building their networks as scientific research and discovery increasingly goes online.

They are being offered many more opportunities and avenues to take forward their career and research. Within this context, companies and universities seeking to hire this talent will need to be very proactive in engaging early with this talent, positioning their brand and engagement strategies to be relevant at the particular moments and at the specific events and forums where top AI scientists and engineers are considering their career options.

Governments seeking to attract and retain talent need to understand what motivates them to move countries and target their engagements at those most likely to leave.

Distribution of 10,000 AI talent for top 70 countries

KEY FINDINGS

TOP AI TALENT IS FOUND MAINLY OUTSIDE THE USA

Top AI talent is widely distributed with only the minority in the USA. This offers the opportunity to acquire top AI talent which is more diverse and equally proficient away from the bottlenecks of the established centres of excellence in the major advanced economies where competition is fierce.

THOSE WHO STAY CLOSE TO HOME ARE MOTIVATED TO ACHIEVE RESEARCH EXCELLENCE

Those motivated to continue to do intensive research will most likely leave if they cannot find capacity for their skills and expertise in their domestic university system. Most do but this is not the case in some countries, in particular South Korea.

KEY FINDINGS CONTINUED

TALENT LOOKING TO MOVE OVERSEAS HAVE MORE OUTWARD FACING CHARACTERISTICS

We see uniform characteristics globally on how the most highly mobile talent positions itself in the market. They are more outward-facing and highly networked and this starts early in their career. Spotting this talent early will give companies first mover advantage in acquiring this talent.

TALENT SPOTTING SPONSORS OF TOP AI CONFERENCES ARE NOW IN A CROWDED FIELD

Major AI conferences bring together very high numbers of top AI scientists and engineers. A larger and broader set of companies are now sponsoring these events to talent spot and position their brand. We expect this trend to continue. Companies will have to differentiate themselves more to attract talent in this increasingly crowded field.

THIS WILL INCLUDE PROVIDING MORE THOUGHT LEADERSHIP ON ISSUES THAT COUNT

Top AI talent is increasingly present at research forums focussed on building a more diverse community and developing AI built on more representative data, that society can trust and understand. Companies can position their brand in these forums to gain relevance but this will mean coming to the table with thought leadership.

Zeki has collected over 2 million data points going back 10 years on roles played by AI and broader computer science talent in the community.

We look at roles that they have chosen to play to position their career or have been chosen for them as part of a meritocratic process. These include leaderships roles, levels of visibility at major events, hackathons and competitions, and also recipients of prestigious awards, funding or scholarships.

We also look at their research performance and reach including whether they have sought to broaden their network outside of the research community. Each data point is then scored according to its prestige or impact.

Zeki draws conclusions from this data on how an individual is positioning themselves in the market.

Are they, for example, looking to pursue a research-intensive career, or are they looking to go into applied research in industry with less emphasis in publishing research? What motivates them to move?

Indicators Zeki can apply to our data to derive insight

- **LEADERSHIP** OF PROJECTS
- **EXCELLENCE** OF RESEARCH
- **REACH** OF ACADEMIC NETWORK
- **LINEAGE** LINKS TO BEST IN FIELD
- **MOBILITY** NUMBER OF WORK ROLES
- **NETWORK** SCALE OF PROFESSIONAL NETWORK
- **FIT** ALIGNMENT WITH ROLE
- **LINK** TO STAFF IN COMPANY
- **INFLUENCE** AMONGST PEERS
- **FINANCE** BREADTH OF ACCESS
- **VISIBILITY** IN COMMUNITY
- **ESTEEM** RECOGNITION OF PEERS
- **GENDER**
- **AFFILIATION** CURRENT ROLE (S)
- **LOCATION**
- **SIMILARITY** TO EXISTING STAFF
- **AREAS OF EXPERTISE**
- **TRAJECTORY** PACE OF SUCCESS
- **NATIONAL RANK**
- **GLOBAL RANK**

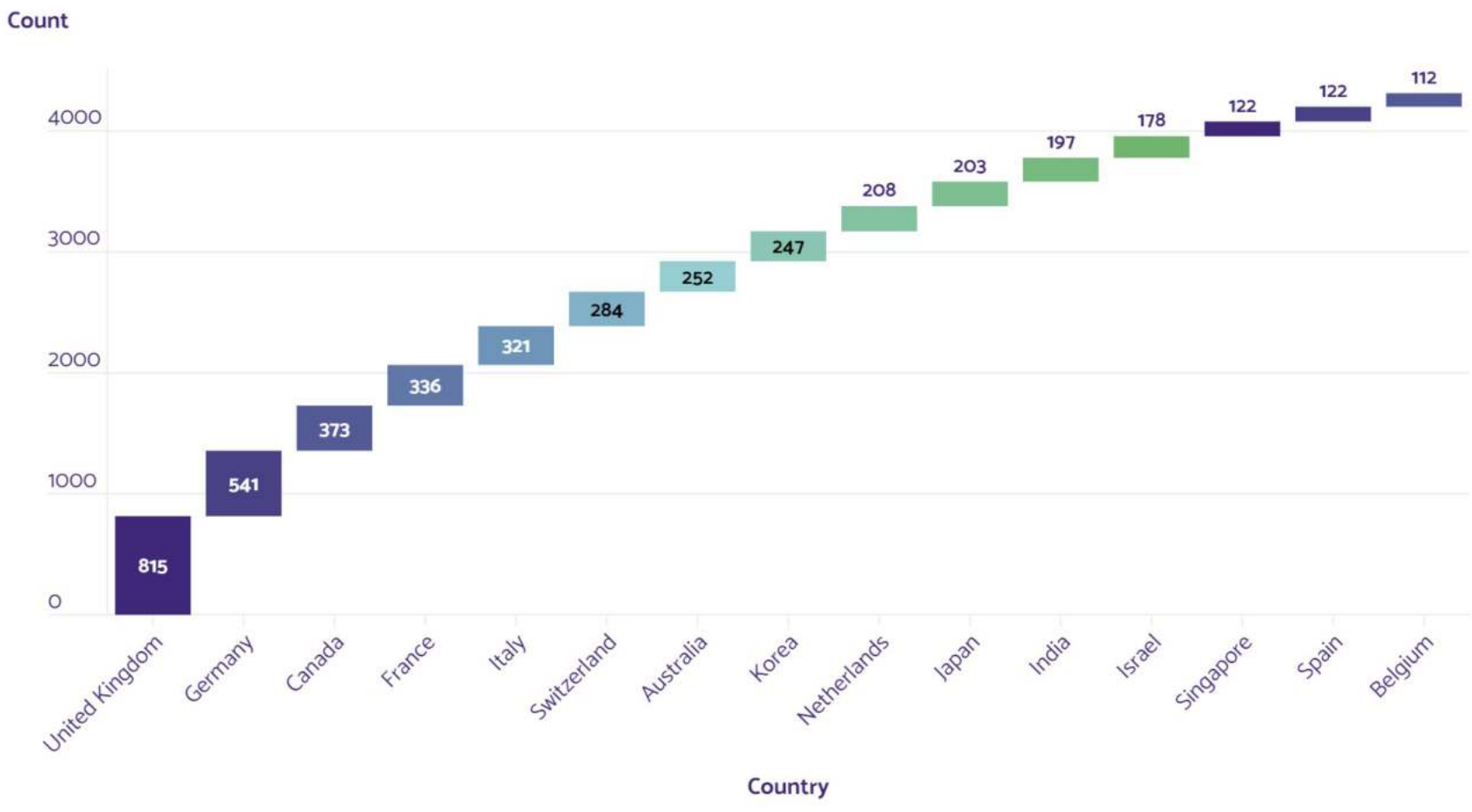
We look also at the top 10,000 AI talents in our data who have scored the highest, reflecting their research excellence skills, the career network they have built and their visibility and esteem within the community.

US talent makes up the minority with 47 percent of this top 10,000. The United Kingdom has just over 8 percent and Germany just over 5 percent.

But this very top talent is widely distributed over 74 countries, especially when the USA is factored out in the data, as shown in the Top 15 countries graphic, where other advanced economies clearly dominate.

Some countries, such as Singapore, have a relatively high number of top AI talent. Our data also shows a long tail of around 25 countries with only 5 top AI talents or fewer.

Top AI talent is widely distributed, even the very top talent



Note: Graphic does not incorporate data from the USA, where the count stands at 4711 individuals.

Top US universities train most of the very top AI scientists but many universities worldwide train talent of similar excellence.

Universities themselves hire a large amount of top AI talent whilst also training the top AI scientists and engineers which companies hire.

Universities have capacity and funding restraints and need always to strike a balance between overseas and domestic students they train.

We looked at the top 10,000 AI scientists and engineers in our data and where they trained.

US universities dominate the top 35 universities by sheer numbers (see page 148) but are in a significant minority among the top 100 universities which include many universities in Europe and India.

US universities train around 67 percent of this very top talent, with the UK a distant second, training around 11 percent of talent, followed by Canada and Germany. Smaller economies such as Singapore, Israel and The Netherlands train high numbers of very talented AI scientists and engineers relative to the size of their economies.

Of special note is the absence of France in the top 20 universities, despite its strong presence in the previous page in terms of share of very top AI talent by nationality. This is despite the research-intensive institutes that France boasts in its extensive network of university-affiliated laboratories of The National Centre for Scientific Research (CNRS) and the National Institute for Research in Digital Science and Technology (INRIA).

Smart talent acquisition strategies will need to look beyond the top US universities which will increasingly act as inefficient and inflationary bottlenecks in the talent market if all the main recruiters of talent focus only on these universities for lack of intelligence on where else to look. There is equally brilliant but less visible talent training at a very broad set of universities.

Zeki's top 35 educators of the very top AI talent

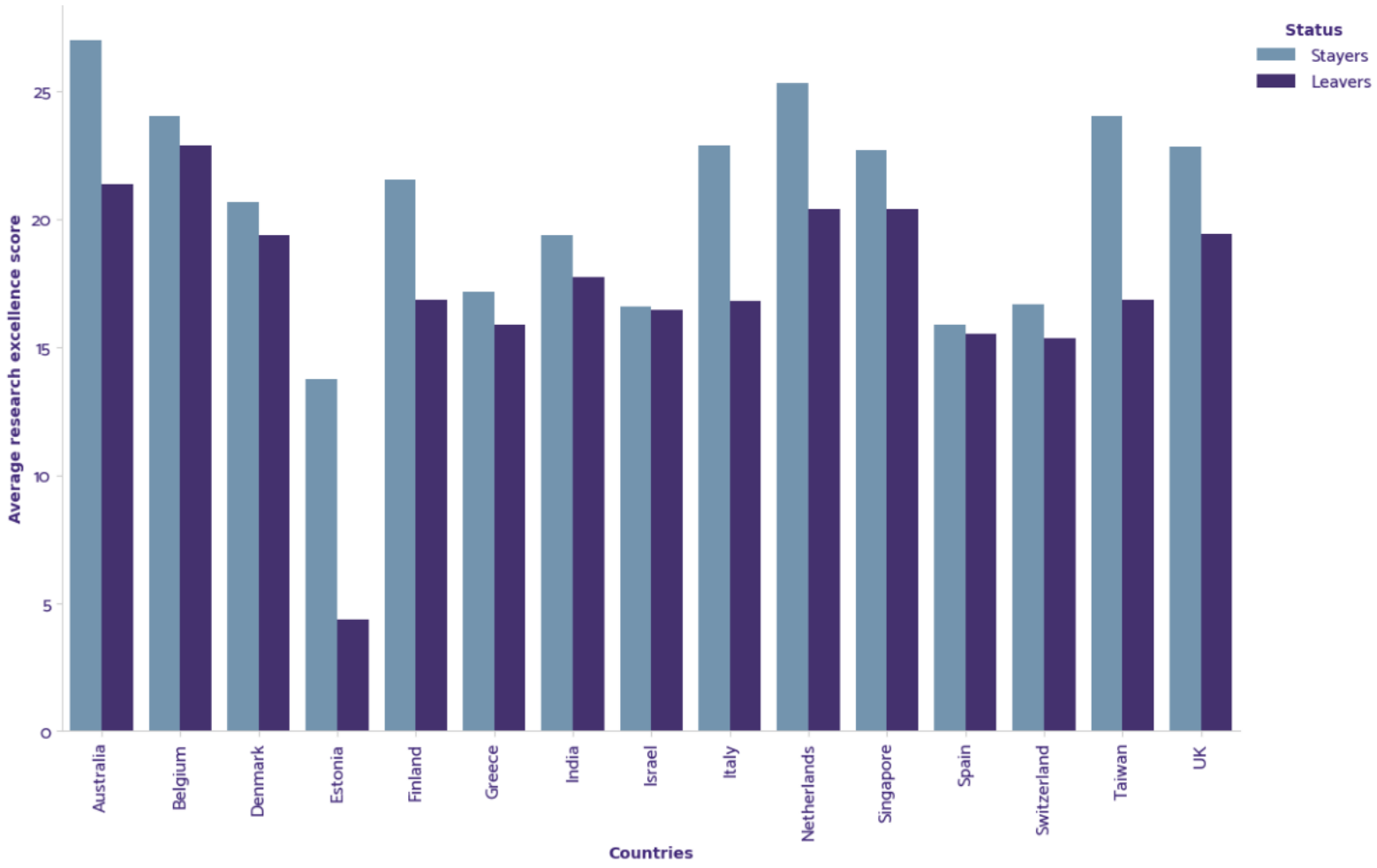
Rank	University name	Location
1	University of California, Berkeley	United States of America
2	Rice University	United States of America
3	Stanford University	United States of America
4	Massachusetts Institute of Technology	United States of America
5	Princeton University	United States of America
6	Cornell University	United States of America
7	Harvard University	United States of America
8	Carnegie Mellon University	United States of America
9	University of Washington	United States of America
10	University of Pennsylvania	United States of America
11	Caltech	United States of America
12	Columbia University	United States of America
13	The University of Texas at Austin	United States of America
14	New York University	United States of America
15	University of Southern California	United States of America
16	Sapienza Università di Roma	Italy
17	University of Toronto	Canada
18	Yale University	United States of America
19	University of Oxford	United Kingdom
20	University of Maryland	United States of America
21	UCL	United Kingdom
22	University of Illinois Urbana-Champaign	United States of America
23	UCLA	United States of America
24	Tel Aviv University	Israel
25	Harvard Medical School	United States of America
26	Georgia Institute of Technology	United States of America
27	ETH Zürich	Switzerland
28	University of Amsterdam	Netherlands
29	University of Massachusetts Amherst	United States of America
30	Brown University	United States of America
31	University of Melbourne	Australia
32	University of Cambridge	United Kingdom
33	University of Colorado Boulder	United States of America
34	Massachusetts General Hospital	United States of America
35	UC Irvine	United States of America

Top AI talent intend on deepening their research level to stay where they were educated.

To achieve a high Zeki score on research excellence, a top AI talent will have produced high numbers of research papers presented at a prestigious AI conference or published in a prestigious journal.

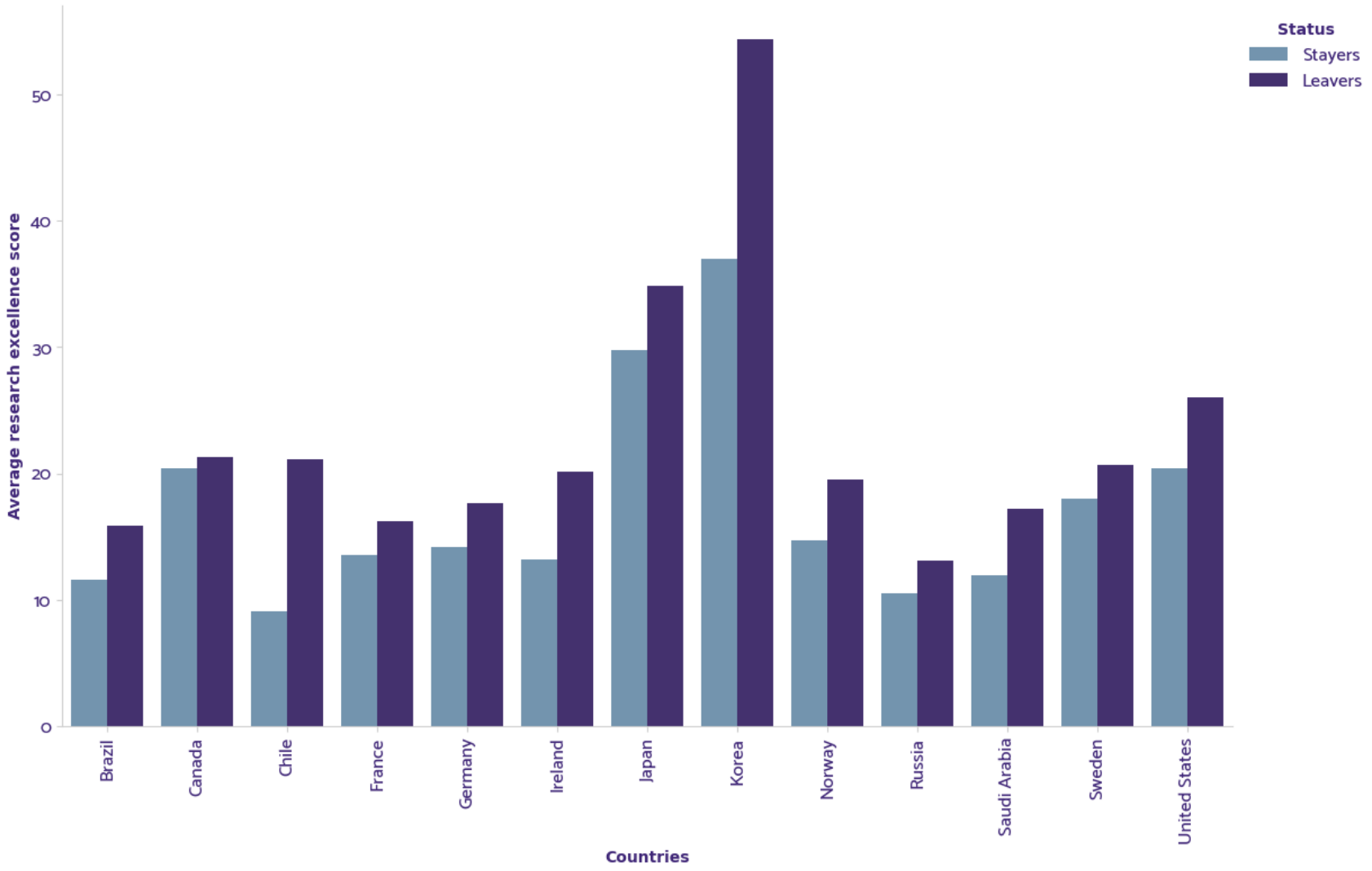
This indicator favours talent which is motivated to remain in fundamental research and pursue a more research intensive career, most likely in academia. Countries want to maintain high levels of research excellence within their university systems but also need to ensure they have the capacity to absorb this talent. An indicator of their success is that more people have the opportunity to stay in research in their countries than leave.

Average research excellence for stayers > leavers



Our data indicates that talent looking to build a research-intensive career is finding roles in most countries where they were educated. And the majority that do leave then return after a period overseas.

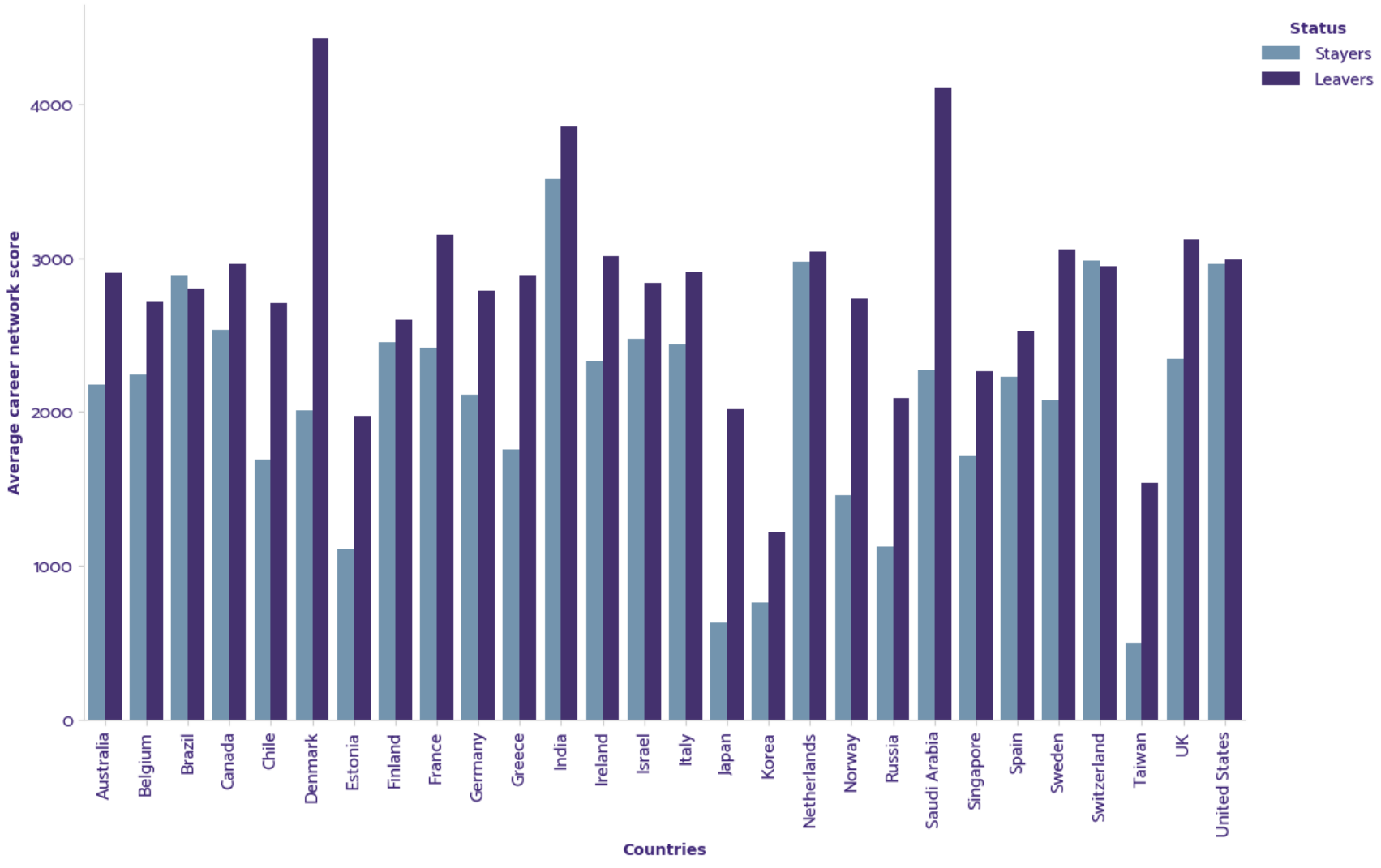
Average research excellence for leavers > stayers



There are however exceptions, where our data indicates **talent is not finding sufficient opportunities at home**, in particular **Korea, Japan** and **Chile**. Their destination is overwhelmingly to the USA.

Zeki has looked at how top AI talent positions itself in the market using our scoring system. Have they decided to take on research intensive roles, which tend to be more inward facing? Or have they taken on more outward looking roles that give them more visibility in the market and access to broader networks?

Career network of stayers and leavers



Our career network score measures how much an individual has built up a presence online.

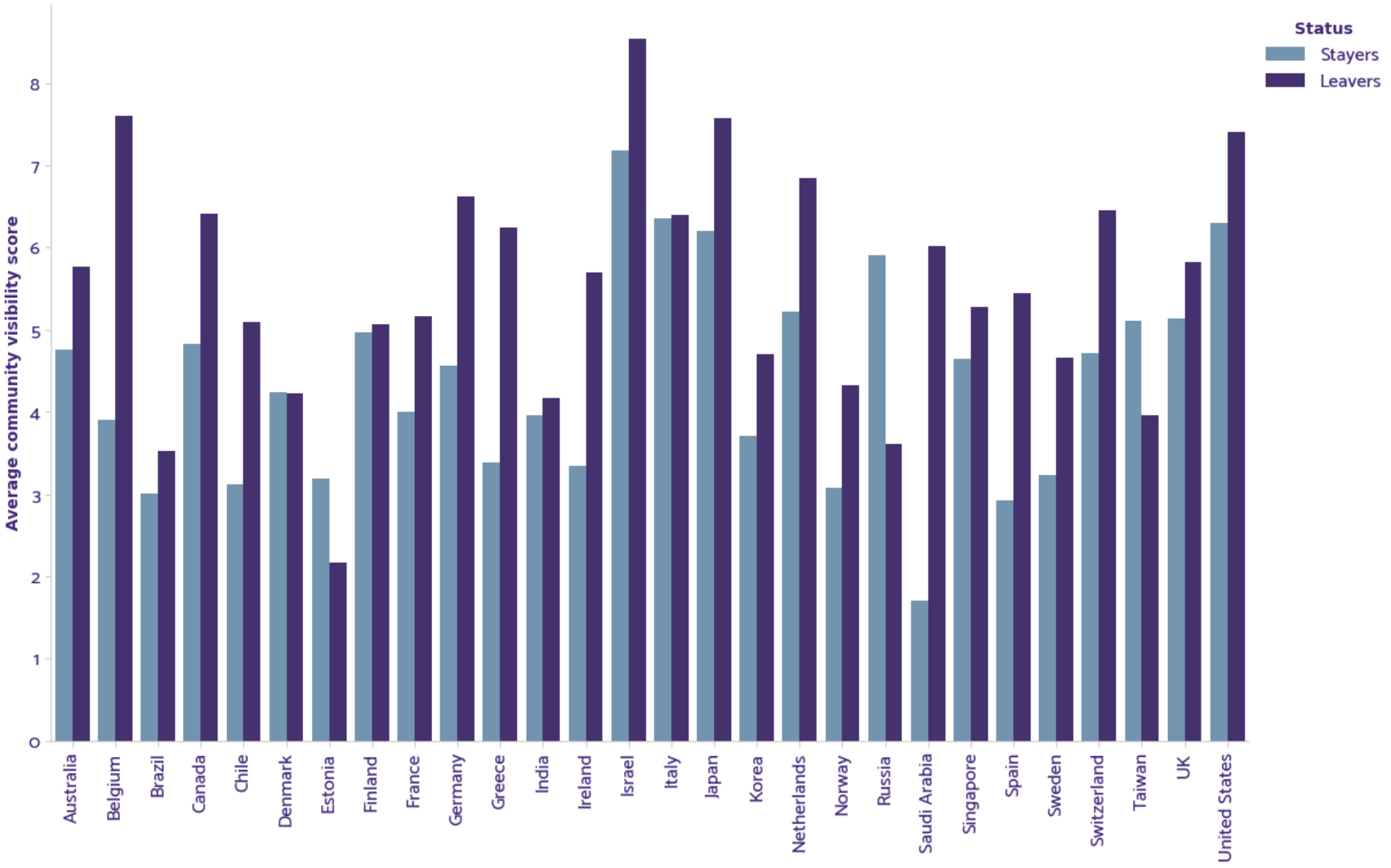
There is a consistent global trend that talent which has invested in building a network to broaden their reach beyond traditional research circles are more likely to leave their country of education. This conscious decision to build presence on internet, business or social media platforms gives them more access to information and therefore broader opportunities. It also makes them more accessible to international recruiters looking for talent on these platforms. This career positioning happens early career.

The same global trend holds for those who are most visible in the community because they have positioned themselves or been selected for high profile roles in showcasing their research at major events or in the most read science publications, like Nature or Science.

This visibility also makes them more accessible to international recruiters of talent and more likely to leave their country of education.

Again this visibility happens increasingly early in career.

Community visibility of stayers and leavers



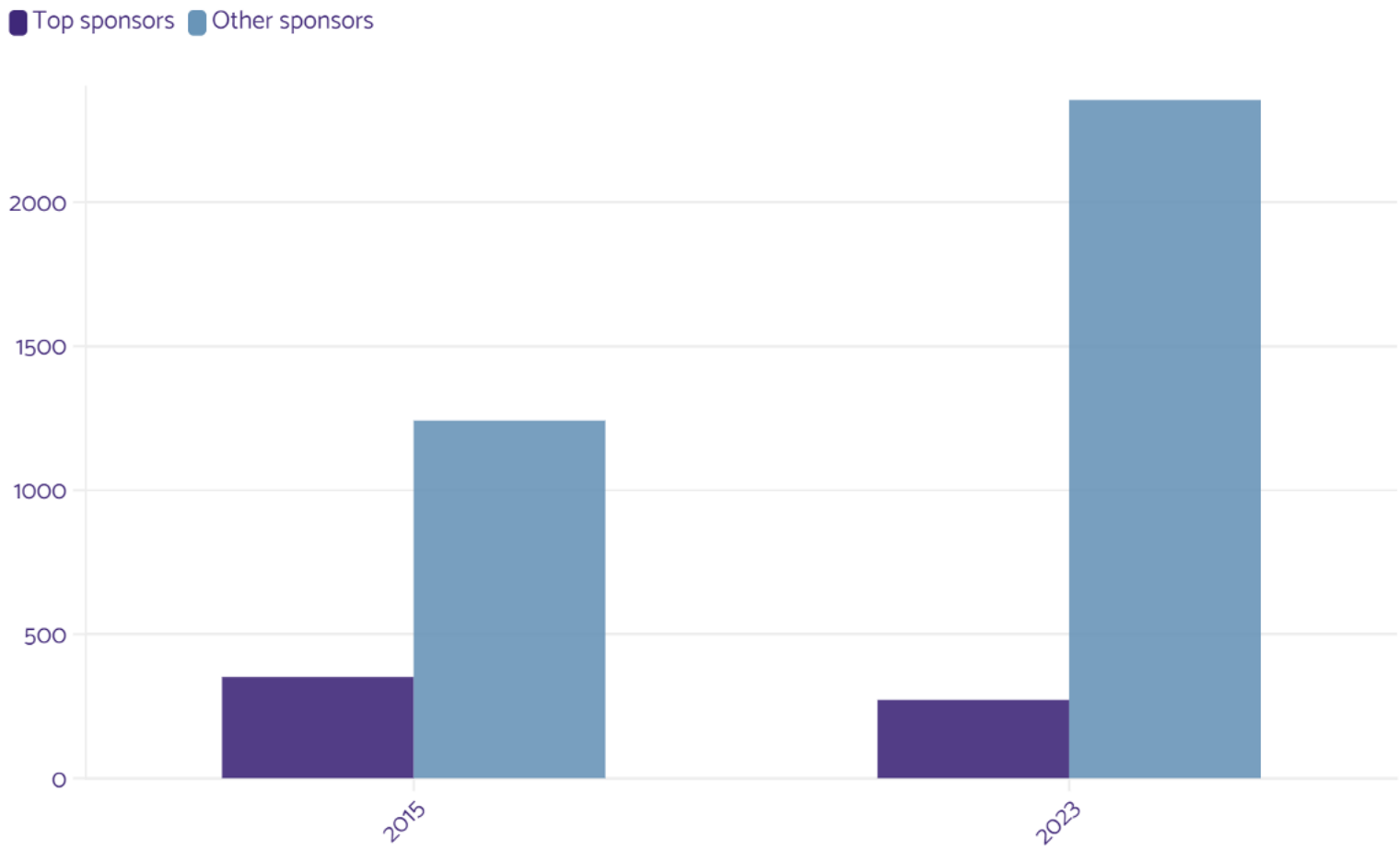
Major AI conferences are where top AI talent congregates to network and share information.

The Neural Information Processing Systems Conference is one of the most prestigious. In 2015, 3,852 AI scientists and engineers participated with 16,382 participating in 2023.

AI companies are actively positioning their brand in the market, especially at the top AI conferences which they can sponsor. They hold social events and talent spot. But this is now a crowded field and companies will have to differentiate more to attract top AI scientists and engineers.

We looked at numbers of sponsors of 10 key AI conferences going back 10 years. The number of sponsors has not only doubled but also diversified.

The number of sponsors for significant AI conferences has doubled



Major companies from a variety of sectors now sponsor major AI conferences to raise their visibility.

Companies like LinkedIn, Uber and Booking.com are hiring large numbers of top AI talent in Zeki data.

Sponsor name	Sector	Number of hires in Zeki data
LinkedIn	Online service provider company	1331
Uber	Transport company	1156
Booking.com	Travel agency	873
Xerox	IT company	709
JD.com, Inc.	E-commerce	705
TikTok	Social networking software	485
Didi Chuxing Technology Co.	Transport company	379
Audi AG	Automobile	329
Bosch	Engineering company	280
Zalando	Fashion	219
Toyota	Automobile	212
Nissan	Automobile	212
Lyft	Transport company	193
Sea Ltd	Consumer internet company	156
LG Electronics	Electronics	151
SK Telecom	Telelcommunications	146
Spotify	Music streaming service	130
D. E. Shaw & Co., L.P.	Financial services	104
Capital One	Financial services	87
Disney Research	Entertainment	76
Jane Street Capital	Financial services	69

And more recently, **new sponsors are emerging** including retailers, real estate and sports analytics companies.

Sponsor name	Sector	Year first sponsored major conference
Google DeepMind	Artificial intelligence	2016
Pinterest	Social media service	2016
Lionbridge Technologies, Inc	Translation/interpretation services	2016
Hudson River Trading	Financial services	2017
Lambda Labs	Architecture	2017
Wave Computing	Software consultancy	2017
Sportlogiq	Sports analytics	2017
SberBank	Financial services	2017
Element AI	Artificial intelligence company	2017
Voxel Group	Travel industry	2019
Zillow Group	Real estate	2019
Home Depot	Retailer	2020
XTX Markets	Retailer	2020
Zoom, Inc.	Communications technology	2020
Orange	Telecommunications	2022

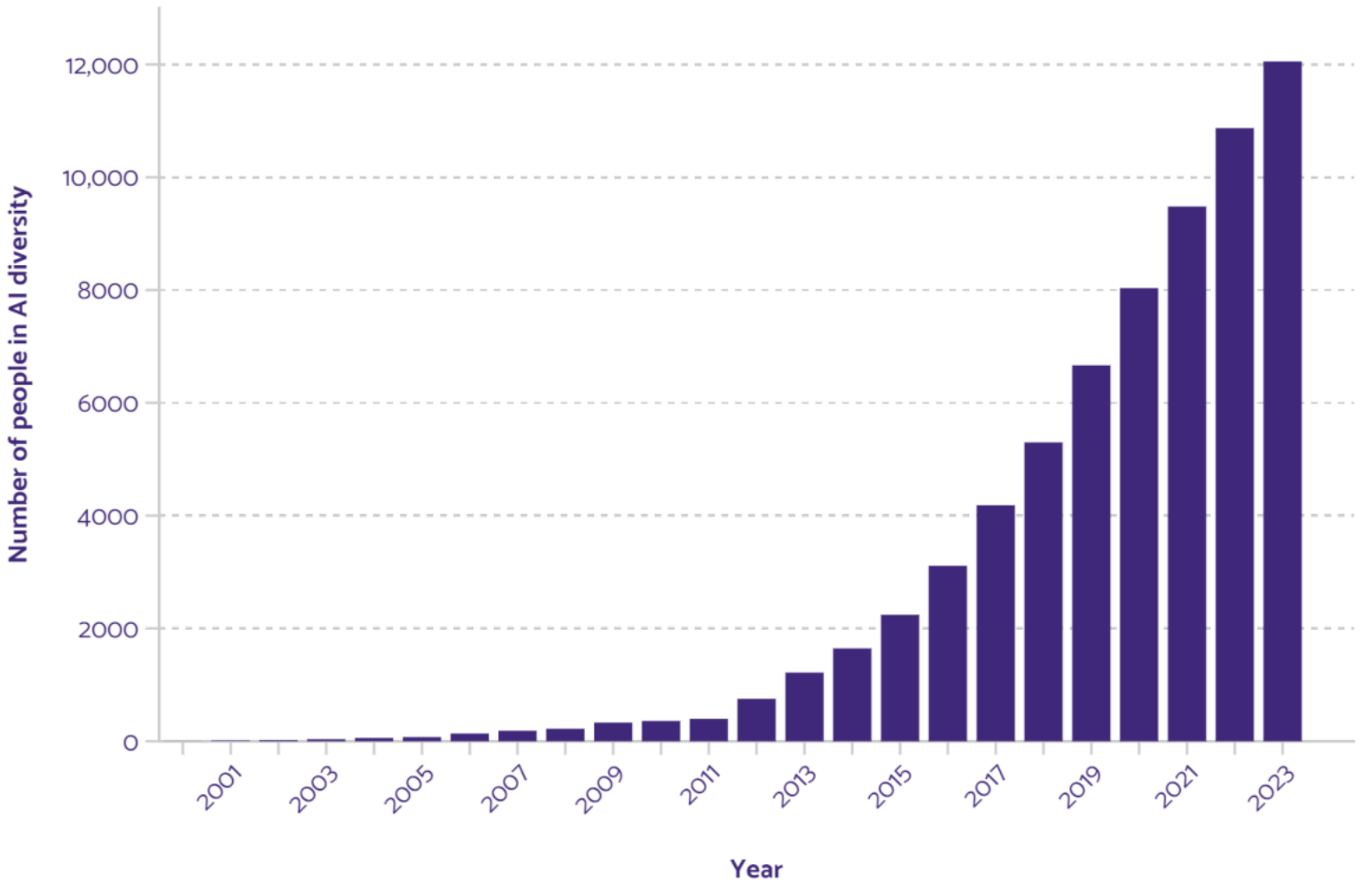
Top AI talent is increasingly participating in research forums focused on building a more diverse community.

Few companies participate. Companies will be more relevant and attractive to this talent if they contribute research and thought leadership into these forums.

Diverse groups are becoming more frequent and visible at major conferences, bringing different people together to celebrate success and share research they have done, including on how to ensure AI runs on more adequate and representative data.

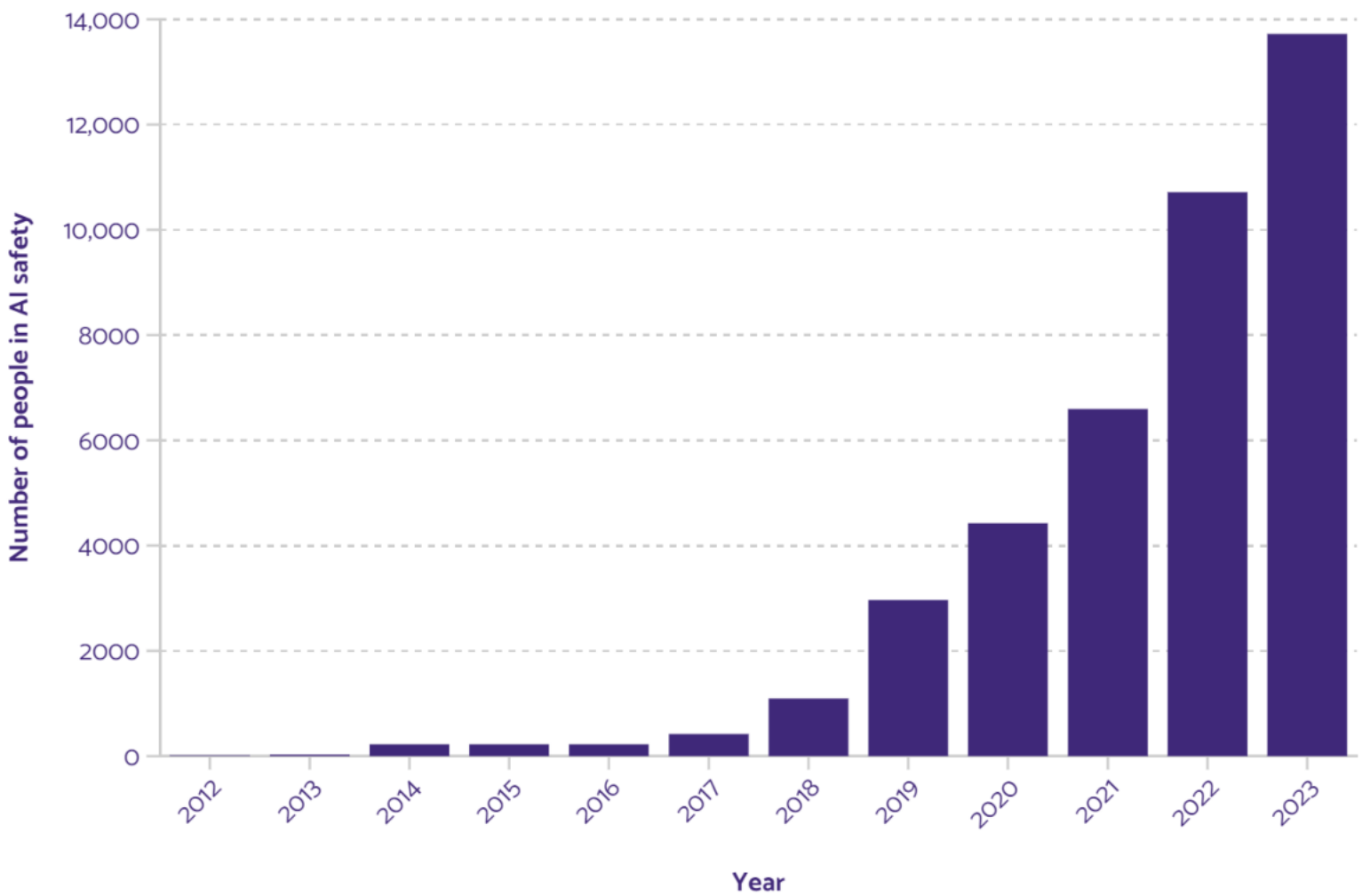
We collected data on 94 workshops on AI diversity held at major AI conferences over the last 10 years. This visual shows that there is rapid growth in the numbers of people participating in these events, in particular younger emerging talent.

Increasing talent in AI diversity



We also **collected data on 260 workshops on AI safety from 2017-2023** as this area of research is starting to emerge rapidly as a key area of focus for researchers as they find ways to make AI more explainable, robust and fair. Again, we see rapid growth in the numbers of people participating in these events, in particular young emerging talent.

Increasing talent in AI safety



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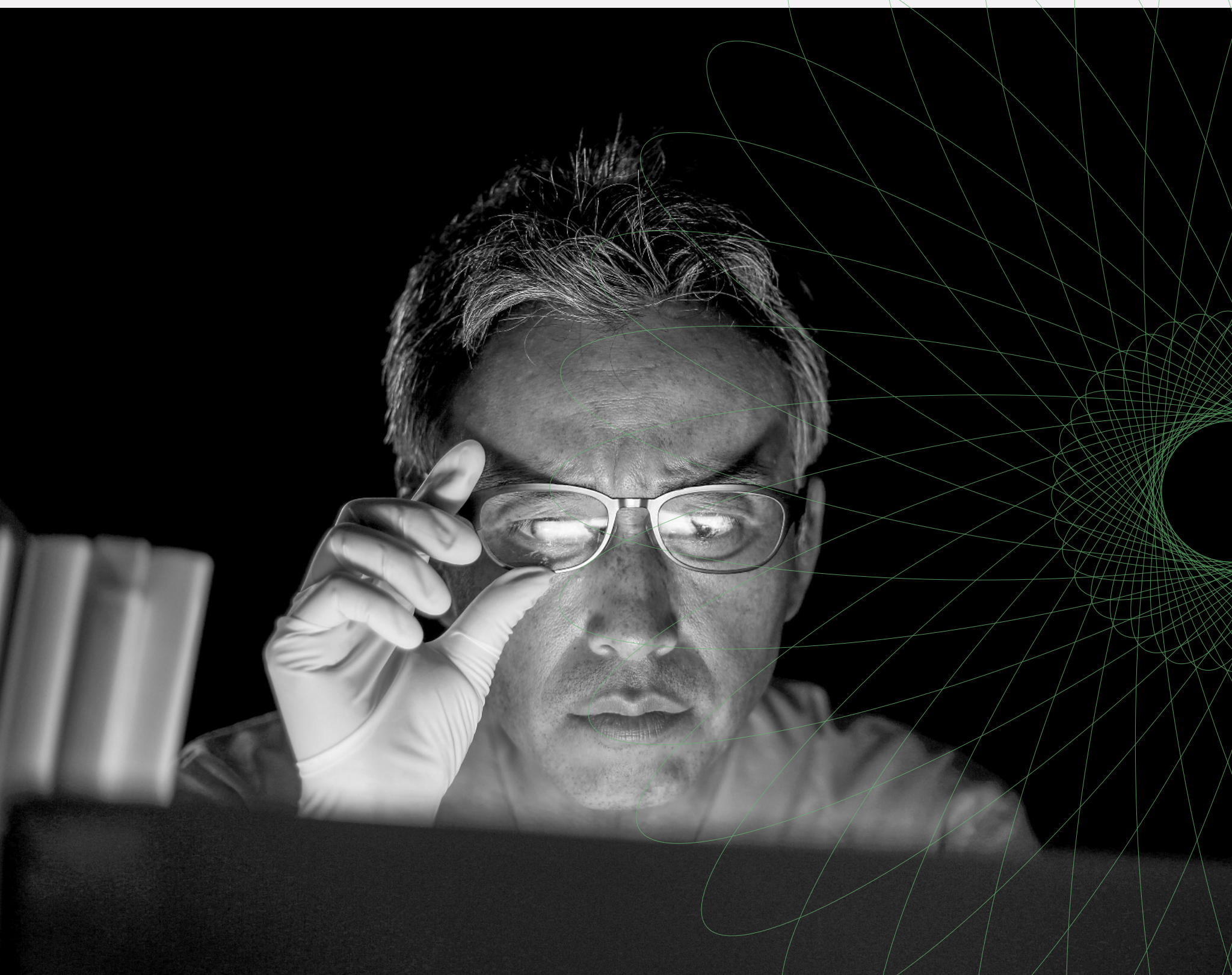
Companies and universities in Zeki data



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Contributors

Thomas Hurd - **Author and CEO**

David Lobina - **Head of Research, Intelligence, and Insights**

Phoenix Williams - **Data Scientist**

Závecz Ferenc Dániel - **Insights and Data Analyst**

Ritvika Kedia - **Insights Analyst**

Thomas Piercey - **Lead UI/UX Data Applications Engineer**

Nita Congress - **Copy Editor**

Danielle Agtani - **Designer**

Zeki Research Ltd
71-75 Shelton Street,
London,
England,
WC2 H9JQ
www.thezeki.com

zeki