How the UK & Europe can lead the global software industry by 2034

Closing the technology gap: A plan for economic growth, technological sovereignty and strategic autonomy

Author: **Phill Robinson**
Founder & CEO, Boardwave
Date: 9th February 2024

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Launched in May 2022, Boardwave is an independent "social enterprise" that has grown rapidly with over 1300+ members across the UK and European software industry, including founders, CEOs and their investors.

For a generation, Silicon Valley's collaborative community has fostered some of the world's most valuable companies. Committed to creating similar conditions for success, Boardwave aims to propel the UK and European software industry forward, nurturing the next generation of global leaders.

Boardwave provides a comprehensive ecosystem of support, offering leaders access to expertise, knowledge sharing, mentoring, and coaching, thought leadership, and personal development. It also facilitates access to capital and ensures a clear voice to governments.

We believe that by 2034, the UK and European software industry can transform from laggard to leader, with many successful global players built in the region. However, significant changes are essential to achieve this goal. This paper outlines the key concerns and proposes solutions that could position the UK and Europe as a software superpower.

Boardwave is privately funded by a consortium of over 75+ of the UK and Europe's leading investors and service providers in the software sector.

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***Definitions:**

Europe

In this paper our definition of Europe is the geographic region and trading group of countries that includes the 27 member states of the **EU, plus Switzerland and Norway** (given their significance and geographic proximity). EU is used to mean the 27 member states

Digital Economy

For some this is a narrow definition that is only related to commerce and banking. In our definition it is the automation and digitisation of all elements of all sectors and of society as a whole.

Software

When discussing the software industry, we encompass the broadest definition of the software industry. For instance, including (but not limited to); B2B, Enterprise Application Software, B2C, Consumer Software, Games, Fintech, Payments and eCommerce, marketplaces as examples.

Contents

Executive Summary

This white paper outlines the strategic priorities for the UK and Europe to become a leading force in the global software industry. It emphasises the need for the UK and Europe to rapidly close the technological gap with the US and why the way to do so is to focus on exploiting key technologies such as AI, and cloud computing.

The paper critically analyses the UK and Europe's historical shortcomings in software innovation and market leadership, whilst highlighting the shifting global landscape catalysed by emerging technologies. It urges both the UK and European governments, policymakers, and business leaders to take decisive action now. We must cultivate a robust digital economy, leveraging new technologies for strategic and economic advantage, whilst continuing to cultivate the software segments where we do well. This call to action is pivotal for the UK and Europe's economic growth, strategic autonomy, and technological sovereignty.

We expect profound change driven by a new generation of technologies that are presently controlled by other regions of the world. A change felt not just in our business sectors but throughout society and how it operates, a shift at least as seismic as the Industrial Revolution, but happening at a speed that humanity has never experienced before.

Context

The US has dominated the first software and technology wave, helping its economy expand more rapidly than the UK and Europe[1] and other regions since the financial crisis of 2008. The control of key technologies by the US and China now not only undermines the UK and Europe's economic growth and stability but also its strategic autonomy.

UK and European governments, policymakers, decision-makers, and business leaders need an urgent step change in technology capabilities in order to transition further and faster towards a dynamic digital-economy. If not, it is at risk of being left behind again with the rapid emergence of new transformative technologies such as AI, cloud computing, cybersecurity, quantum, et al (see appendix).

Whilst these new areas offer dynamic growth opportunities in their own right, they are also increasingly "transversal". They are becoming embedded in a number of industries, many of which the UK and Europe have traditionally led. They will change the very nature of how businesses in these sectors operate and compete, and therefore challenge our position in sectors where we are currently strong.

This paper investigates our current position and discusses the reasons for a generation of comparative underperformance in the software sector in the UK and Europe. It then covers the changing (multi-sectoral) competitive landscape with the emergence and adoption of a suite of new technologies, representing a generational opportunity for the UK and Europe's software sector.

Received wisdom is that having one large market to sell to, US software companies scale faster and assume market leadership quicker than European companies. Europe as a series of national markets, who's unique cultural qualities are an important strength, have also been a weakness for software firms aiming to scale-up across the continent.

[1]NB * Definition: in this paper by Europe we mean a geographic region and trading group of countries that includes the 27 states of the EU, plus Switzerland and Norway. When EU is mentioned it represents just the 27 member states, and eurozone is the economic block of 20 countries that have adopted the euro currency.

UK and European software businesses have grown more slowly as they manage the complexity, cost and friction associated with growing on a market-by-market basis. With the arrival of new transformational technologies, we re-evaluate the pan-European opportunity, and find many of the barriers to addressing it as a single market opportunity have been removed, representing a significant opportunity to achieve similar growth, scale, and success as our US counterparts.

Opportunity also exists for local software businesses, who may choose to stay in their national markets longer (like previous generations of US vendors, who scaled locally first). The pace at which we are digitising our economies and society is increasing. As such “niche” markets that continue to be uniquely national, often due to local legislation, or for regulatory reasons, continue growing in size and scale. The software firms that support them exist in a protected niche, unhindered by global competition that lack local knowledge. But their “niche” is expanding in front of them, through digitisation. With the right support these software companies will become sizable, whether for example, in B2B application software or Fintech. And as they do, they become core national and regional infrastructure, to be considered as an important platform in a “digitally integrated economy”.

Conclusion

The UK and Europe needs to support its local and regional software champions, whilst at the same time rapidly changing gears, leveraging new transformational technologies to achieve more dynamic economic growth across multiple sectors. We must do this by empowering our next generation of software founders to scale-up at pace, to create a new category of leading global software businesses built in the UK and Europe. This is important not only for growth in a digital-first economy, but also for our strategic autonomy and security.

Chapter 1 :

Software in Europe – An economic and strategic imperative for the next 10 years

The UK and Europe have been quietly struggling with a growing competitiveness crisis and technology gap for almost 20 years. Recent events within our own continent show us that a robust European region is needed more than ever. But the war in Ukraine and the subsequent energy crisis highlights the reality that resilience depends on a strong economy with a strategic autonomy that has been taken for granted for far too long.

Strategic autonomy was always understood to represent security and defence. But today the EU's definition is expanding and incorporates the economy and technology[2]. With the gathering importance of cybersecurity, robotics, semiconductors, and quantum computing in a digital-first economy and the exponential rise in the power of AI[3] and other software platforms, both the UK and Europe must catch up with other major regions on a number of these key technologies[4]. If it is unable to, we will not only be vulnerable in security and strategic autonomy, but also across each sector of growth and competitiveness, all of which will undermine our long-term resilience.

Consider the combined GDP of the EU, plus the UK, Norway, and Switzerland (given their economic scale and geographic proximity), as a trading block, versus that of the US. At the time of the Financial Crisis in 2008, GDP of our "European group" was $17.32 trillion and the US was $14.8 trillion. The rate of recovery after that and each subsequent crisis has been consistently slower in "Europe" than the US. In 2023 the IMF expects the combined GDP of the UK and Europe (as we've defined it) to be $23.1 trillion[5], compared to the US at approximately $27 trillion. And the gap is continuing to widen: the US's GDP growth was at 3.8% in Q2 2023 and 8.5% in Q3 2023.

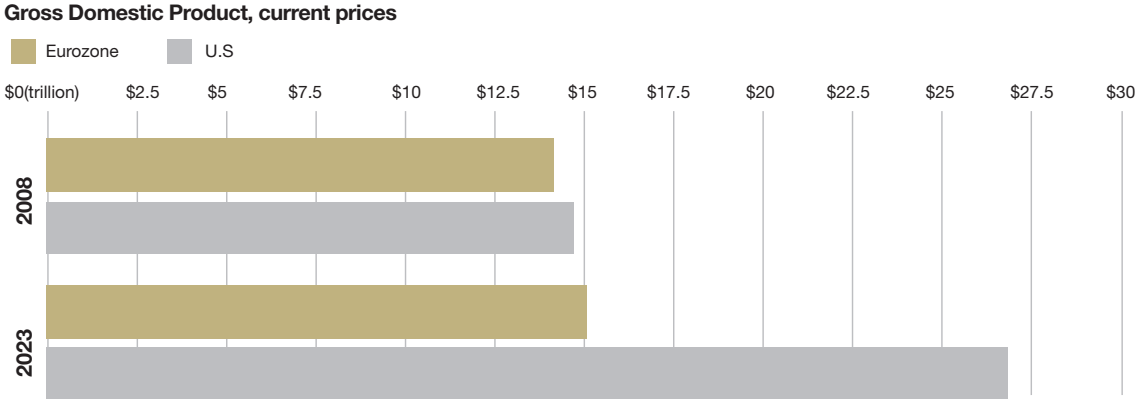

Figure 1: Source: IMF, comparing GDP between the eurozone (exc. UK) & US in 2008 and 2023[6]

[2] McKinsey Global Institute, Securing Europe's competitiveness: Addressing its technology gap. September 2023
[3] Technological vulnerabilities that threaten the European Unions 'Open strategic autonomy, and the EUs response, European Science media hub, March 2023. Contributor Monica Hoyos Flight, scientist: Alice Pannier, from the French institute of international relations
[4] "In a China, US dominated world, the EU has to spend more on technology if it wants to keep up" Euronews feature, by Cristian Gherasim, Analyst
[5] International Monetary Fund 6 International Monetary Fund
[6] International Monetary Fund 6 International Monetary Fund

There are many great companies in the UK and Europe that perform well but together these companies underperform compared to all other major regions.

According to the European Centre for International Political Economy[7] Italy's GDP per capita is just ahead of Mississippi, the poorest of the 50 states, while France is between Idaho and Arkansas, respectively 48th and 49th. Germany's performance is slightly better with GDP per capita around the same as Oklahoma (38th).

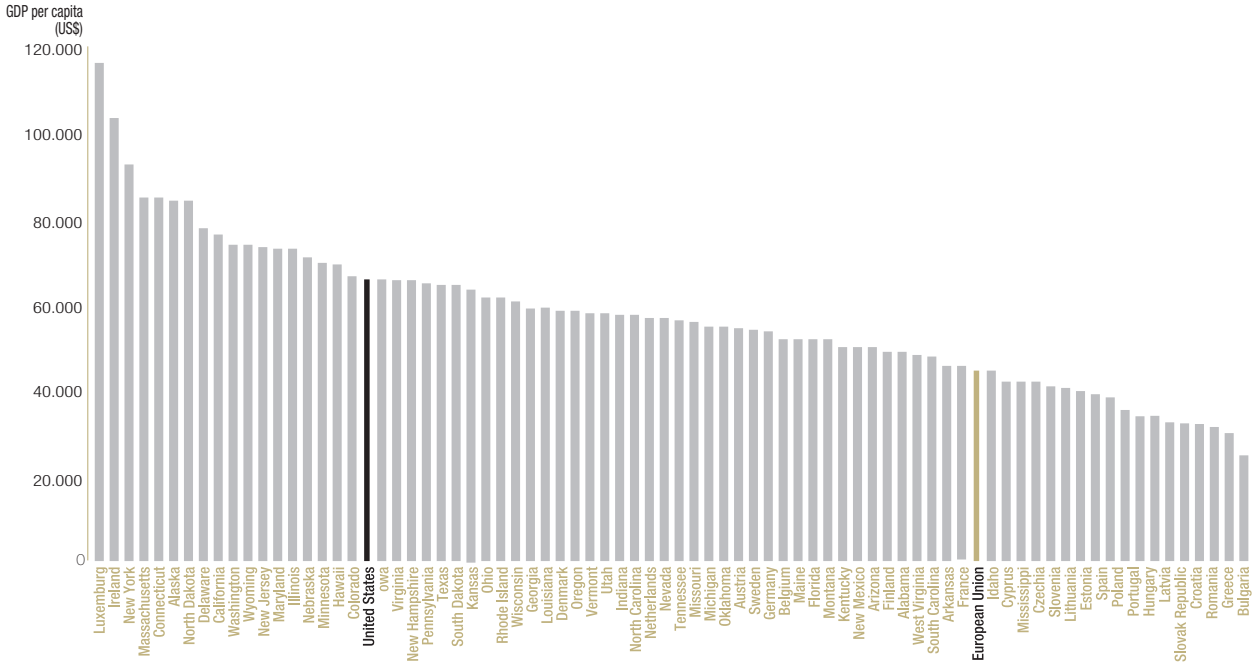

Figure 2: Source World Bank, US Census Bureau of Economic Analysis, author's calculations

In 2000, the European Council in Lisbon had set itself the goal of becoming the most competitive and dynamic knowledge-based economy in the world by 2010. But the UK and Europe missed the boat on the last technology revolution, lagging on value and growth. By 2010 we had seen the emergence, and increasing dominance of Amazon, Google, Meta, Apple, Microsoft, Netflix et al[8].

Today they are rewarded with enormous trillion-dollar valuations. Apple's valuation is $2.8 trillion, Google $1.75 trillion and Tesla $778 billion, for example[9]. European valuations lag far behind, leaving development capabilities significantly impaired compared to those of today's "tech" giants, where it appears that the winner takes all.

So, when the UK Prime Minister, Rishi Sunak, announces that he wants the UK to be the next "Silicon Valley" and makes a pledge to invest £1 billion in AI over the next ten years[10] [11] , and similar amounts for Quantum Computing development, or the EU pledges €2 billion for its "Digital Europe" programme[12], the US shrugs. In 2022 alone Amazon invested $73 billion in R&D, Google $39 billion, Meta $35 billion, Apple $28 billion, Microsoft $27 billion. To put this into perspective, the total expenditure on R&D that took place in the UK was $66 billion. Amazon spends more on R&D than the whole of the UK.

[7] Policy Brief – No. 07/2023 European Centre for International Political Economy, If the EU was a State in the United States: Comparing Economic Growth between EU and US States, By Fredrik Erixon, Oscar Guinea and Oscar du Roy, Director, Senior Economist and Research Assistant at ECIPE, respectively.
[8] Taken from European Centre for International Political Economy, If the EU was a State in the United States: Comparing Economic Growth between EU and US States, By Fredrik Erixon, Oscar Guinea and Oscar du Roy, Director, Senior Economist and Research Assistant at ECIPE, respectively.
[9] As at December 31st, 2023 • [10] UK government announces £1 billion investment in AI By Tom Macaulay Senior Online Editor, Computerworld
[11] https://www.gov.uk/government/publications/artificial-intelligence-sector-deal

By 2020 of the top 100 companies by value in the US, 39 were software or software-enabled businesses, up from 18 in 2010. Similarly, Asia had 25 software or software-enabled businesses in their top 100 companies, up from seven in 2010. The expansion of the software sector in the UK and Europe by comparison has been appallingly slow. In 2020 only seven out of the top 100 companies were software related, up from four, ten years earlier[13]. And in the UK, there is only one software company in the top 100 hundred publicly listed firms today[14].

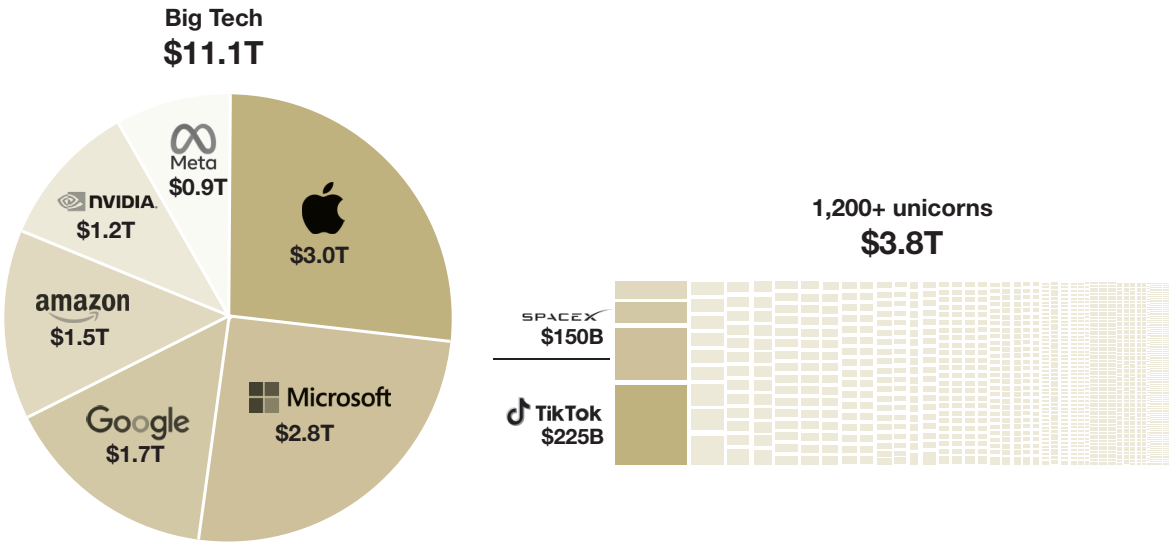

Figure 3: Valuation of Big Tech and Unicorn companies. Source CB Insights

As a result of the UK and Europe's industrial strategy, which has been prepared to trade-off weakness in one sector/specialism against competitive advantage in another, there is an acceptance that you can't be good at everything, and so we have often given up weakness in software, with the knowledge that we excel in sectors such as automotive, fashion, luxury goods, chemicals, and materials.

Rightly so, we often play to our regional uniqueness. The Americans or Chinese cannot compete with Ferrari on design, flair, and iconic Italian sports-car history. Hermes and LVMH are French design flagships that are hard to copy. Patek and Rolex epitomise Swiss competence. But that's not enough in an increasingly digitised economy, as software becomes a foundational capability in all industries.

Our brilliance and competitive advantage in our strongest sectors are being eroded. Several new technologies have become, what are described, as "transversal"[15], adopted horizontally across more and more vertical markets or industries, providing each of them with similar competitive advantages[16]. This includes technologies such as cloud computing, applied AI, and quantum computing.

[12] "In a China, US dominated world, the EU has to spend more on technology if it wants to keep up" Euronews feature, by Cristian Gherasim, Analyst. 5 June 2023
[13] S&P Global, & McKinsey analysis
[14] Importantly these numbers would change if Private Equity owned software companies were included
[15] McKinsey Global Institute: Securing Europe's competitiveness. Addressing its technology gap Sept 22, 2023 By Sven Smit, Magnus Tyreman, Jan Mischke, Philipp Ernst, Eric Hazan, Jurica Novak, Solveigh Hieronimus, and Guillaume Dagorret
[16] Definition: What is transversal technologies, "technologies that have the potential to impact multiple industries and sectors." - Technologies.org March 2023

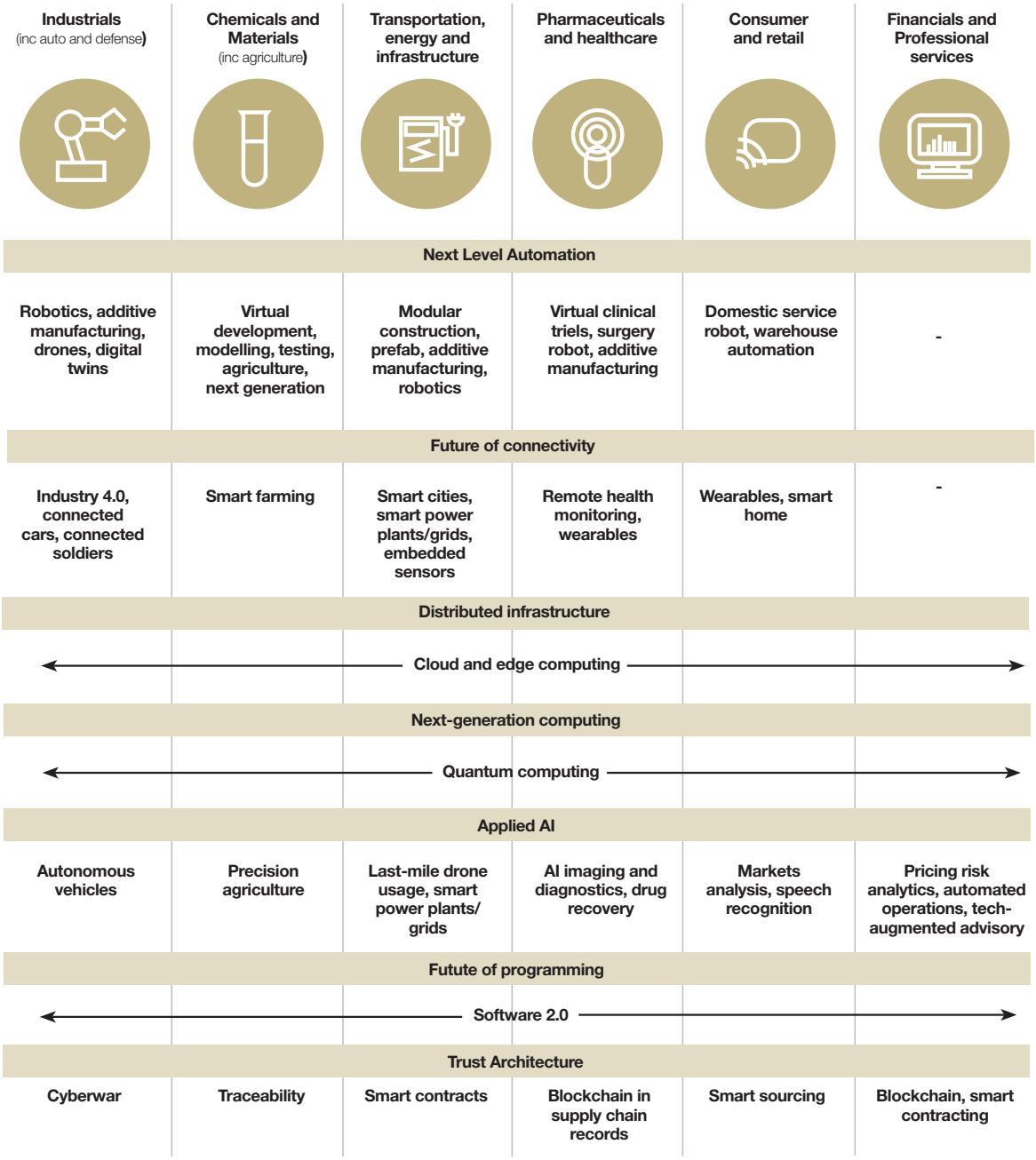

Figure 4: The future arenas of competition at the intersection of transversal technologies and sectors. Source McKinsey & Company

As an example, whilst Europe has been a leader in the automotive industry for a generation, we lag in the race towards autonomous driving. How should Mercedes[17], with its $74 billion market cap possibly compete with Tesla's $779 billion?

> *"Two European automotive companies are among the world's top three auto manufacturers. As of 2018, five of the top ten premium cars sold in the United States were European. However, US manufacturers account for close to 70 percent of all kilometres travelled by fully autonomous vehicles, mostly because of Europe's lag in AI, late regulation, and lack of funding." -* ***McKinsey Global Institute***[18]

[17] as at December 2023 - the most valuable European car company
[18] As 10, McKinsey Global Institute: Securing Europe's competitiveness. Addressing its technology gap

The UK and Europe's weakness in software during the first internet and software wave has left it lagging far behind in these "transversal" technologies, across all industries. And the stakes are high with $2-4 trillion of value-add opportunities up for grabs annually up to 2040. That's six times the cost of net zero transition, or 90% of Europe's social spending.

> *"The World Economic Forum estimates that 70% of the value created over the coming decade will be based on digitally enabled platform business models, due to the rapid digitalization of economies around the world. Collaboration can also unlock value – research shows that digital "ecosystems" are expected to account for more than 30% of global corporate revenue by 2025."*
> - ***World Economic Forum***[19]

The UK and European policymakers, decision makers and business leaders need a step-change in technology capabilities now, to go on the offensive. Especially given the "winner-takes-all" dynamics we have seen so far in the first software wave. And as those dynamics have emerged, scale, speed and software ecosystems have become increasingly important.

Conversely, today the UK and Europe suffers fragmentation and lack of scale, lack of ecosystems, less developed risk-capital funding and a regulatory environment that should be far more supportive of innovation.

[19] Transformation of Business: New Digital Business Models. World Economic Forum. The Digital Transformation of Business: New Digital Business Models | Strategic Intelligence | World Economic Forum

Chapter 2:

Diagnosing the UK and Europe's historical underperformance in software

Technology leaders have theorised for years as to why the UK and Europe have not emerged as a software superpower or why we don't have more substantial businesses of consequence in the region. Theoretically we have all the ingredients for success but haven't consistently managed to combine them into a winning recipe.

2.1 Talent

The UK and Europe have an excellent tertiary education system, with outstanding universities in both STEM subjects and within that Computer Science. For example, four of the world's top ten universities for Computer Science are based in the region (five are in the US, one in Asia)[20].

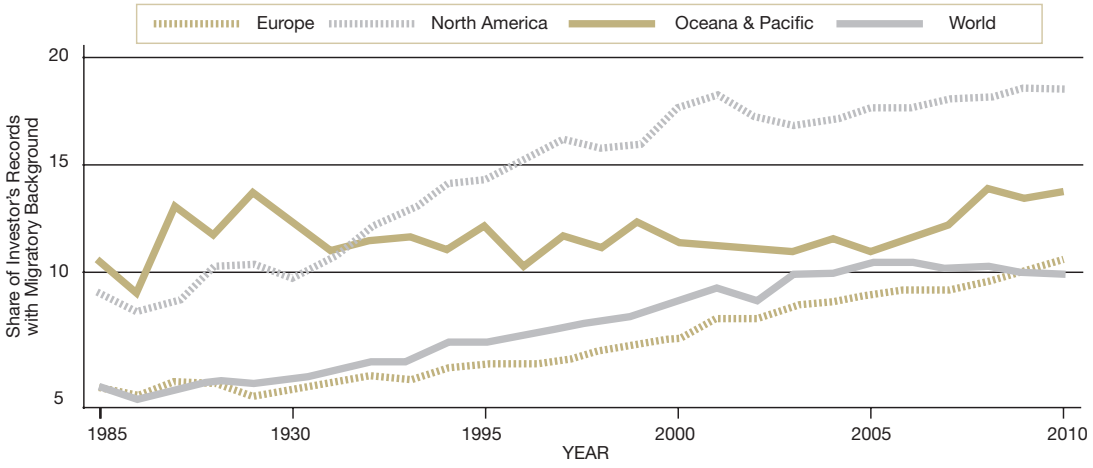

Figure 5: Share of Immigrant Inventors, 1985-2010. Source World Intellectual Property Organisation

The UK and Europe attract about 35% of the world's immigrant inventors, however about 60% move to the US [21]. Some European countries have programs to attract talent, including through skills-based immigration systems and talent visas. But the number of highly skilled workers given EU "talent-visas" in 2018 was nearly 80 percent lower than the number of people given employment-based immigrant visas in the US. And whilst countries like the UK, France and Germany do well in attracting migrant inventor talent, they are also losing key skills to other countries, resulting in a net negative position.

[20] World University Rankings 2022 by subject: computer science | Times Higher Education (THE)
[21] World Intellectual Property Organisation, Measuring the International Mobility of Inventors: A New Database. 2013. Ernest Miguelez Carsten Fink

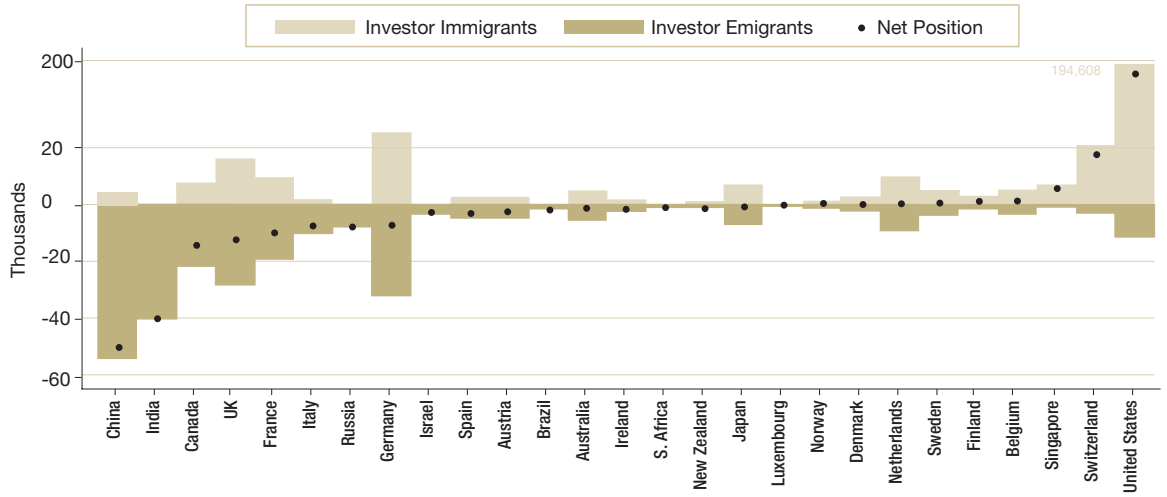

Figure 6: Net migration position 2001-2010 [22]

It is also worth considering the digital enablement of almost every sector of society (often through 'transversal' technologies). So that no matter what sector our graduates and school leavers work in they need to arrive prepared[23]. Computer Science is an optional subject in many countries, at secondary school. Our view is that if we want to lead in new digitally enhanced sectors, computer science should be a mandatory subject, on a par with English and Maths at secondary school[24]. UK school leavers are most likely to acquire skills in email/word processing/PowerPoint at GCSE, akin to the old shorthand and typing qualification of the 1960s/70s, rather than truly understanding the mechanics of Computer Science.

Finally, in a world where we know qualified talent is scarce, it is important to engage, excite, train, and develop every group in society. We have so much potential that is frankly overlooked, that if harnessed and directed in the right way would fill the talent gap many times over. According to a recent Forbes article female founders received only 2.1% of invested venture capital in 2022[25] and black women less than 1%. Discouraging a generation of female entrepreneurs from even starting the journey to build their own start-ups, or creating role models for the next generation of girls considering studying STEM and Computer Science at University.

2.2 Start-up promise not converted to Scale-up success.

Our governments have enthusiastically attempted to nurture and support their national and local "start-up" ecosystems or "hubs". They have done so with some success, but clearly more needs to be done to attract and retain more talent. The German tech start-up sector is estimated to be worth $470 billion, France and the Netherlands around $250-300 billion with the UK, according to government estimates being valued at around $900 billion-$1 trillion [26].

[22] World Intellectual Property Organisation, Measuring the International Mobility of Inventors: A New Database. 2013. Ernest Miguelez Carsten Fink
[23] Scale-up Institute (UK): Levelling up through digital, computing and technology skills
[24] with reference to the 2006 white paper: 2 minute warning, the demise of the European software industry, authors: Adam Hale & Leo Apotheker
[25] Breaking Barriers: Empowering Women Entrepreneurs In Venture Capital, Forbes Melissa Houston 6 November 2023
[26] UK tech sector retains #1 spot in Europe and #3 in world as sector resilience brings continued growth UK tech industry demonstrated its resilience in 2022, reaching a combined market value of $1 trillion, Department for Digital, Culture, Media & Sport and Paul Scully MP Published 21 December 2022

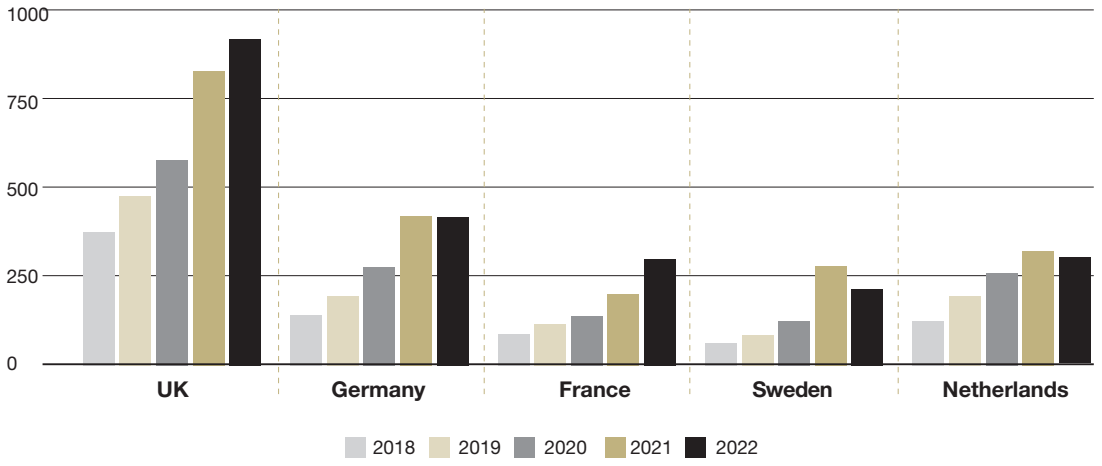

Figure 7: Value of leading start-up "hubs" in Europe. Source Dealroom.co

In fact, perhaps consequently, early venture funding rounds (of less than $5 million) in Europe attract as much investment in our software companies as the US [27].

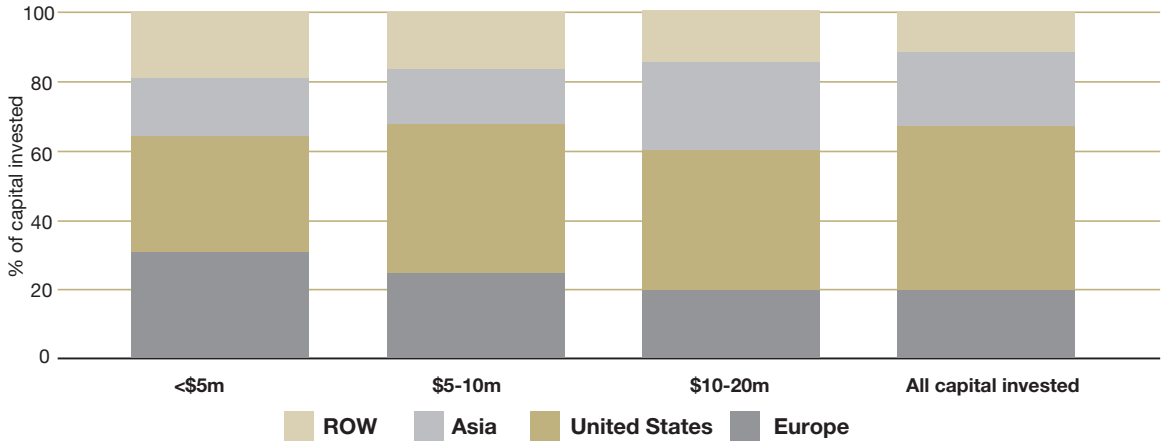

Figure 8: Amount of capital invested per region. Source Dealroom.co

Overall, the UK and Europe attract 20% of all funding, with the US at 45%, a better ratio than at any previous point in history, but still persistently lower than the US. The reasons are several fold and European venture funds are smaller and less able to fund follow-on investment rounds. The size of these funds also leaves them less inclined to make "riskier big bets" on potentially ground-breaking transformational technologies, with larger sums of money involved potentially skewing overall fund performance. In an increasingly globalised funding market US funds will invest in UK and European firms, to take on some of the slack. However, historically UK and European software businesses tend to scale more slowly and so need more financial support for longer, representing lower returns.

[27] Dealroom.co (note: all Dealroom.co data excludes Israel, and the following: biotech, secondary transactions, debt, lending capital & grants. 2022 data, shows data as at 31 October 2022)

Governments and investors will often proudly talk about the growing number of unicorns in the UK and Europe (tech businesses valued at greater than $1 billion dollars). But this is a mere stepping stone on the route to building a significant business, and valuations in the market can shift radically with availability of capital and investor sentiment.

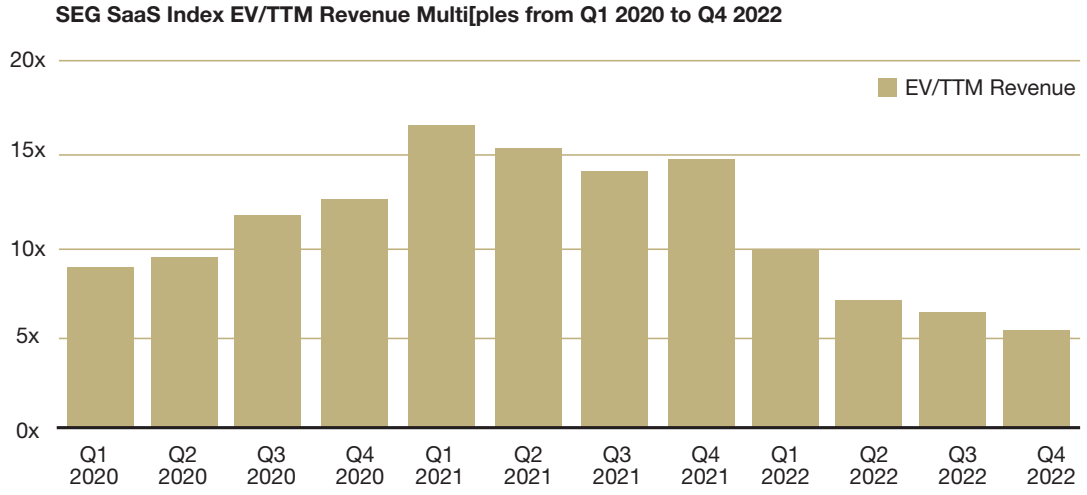

Figure 9: Software Equity Group, Quarterly and Annual SaaS valuations reports [28]

2.3 Slaying the unicorn myth.

For example, in early 2021, as a founder of a successful SaaS business, you could be considered a "unicorn" with $60 million of revenue, maybe less for an upper quartile performer, in a hot sub-sector. By the end of 2022 that same business would need revenue of $185 million to achieve the same "unicorn" status. But the business probably hasn't changed too much, other than continuing to grow.

And with these sorts of figures bandied about, there is an expectation that as companies leave their "start-up" phase and enter "scale-up" territory - starting at $10-15 million annually recurring revenue (ARR) they will be well supported and have little need of external help from government or surrounding ecosystems. Nothing could be further from the truth. A more robust approach to measuring success at converting promising start-ups into strong scaled businesses, would be to measure the number of software companies with revenue above $100 million of ARR, since this is a scale at which a business has the "muscle mass" to continue onwards and stake a claim at becoming a regional or global leader. Unfortunately, this is an area of significant weakness in Europe, with a dreadful track record of scaling software businesses from $10-15 million to $100 million and beyond. If governments continue to only focus on start-ups, they are only solving a decade-long problem, instead much of the focus should also be concentrated on converting early promise into scale-up success.

2.4 Crossing the "valley of vulnerability".

The rate at which software businesses scale from $10-100 million in the UK and Europe has been historically much slower than the same organisation in the US. According to Bessemer Ventures, a US venture firm, a good company can scale to $100 million in 12 years, a great firm could achieve this in 6-7 years. Analysis of Boardwave member data suggests it takes 9.5 years to scale to £50 million ($62.5 million) and 15 years to achieve £100 million ($125 million).[29]

[28] Reported by Finerva, "2023 Valuations & Multiples by Sector.". Originally from Software Equity Group Quarterly and Annual SaaS Valuations report 2023.
[29] Boardwave proprietary data, from 1,000 Founder & CEO members, Aug 2023. Adjusted to exclude those owned by Private Equity,

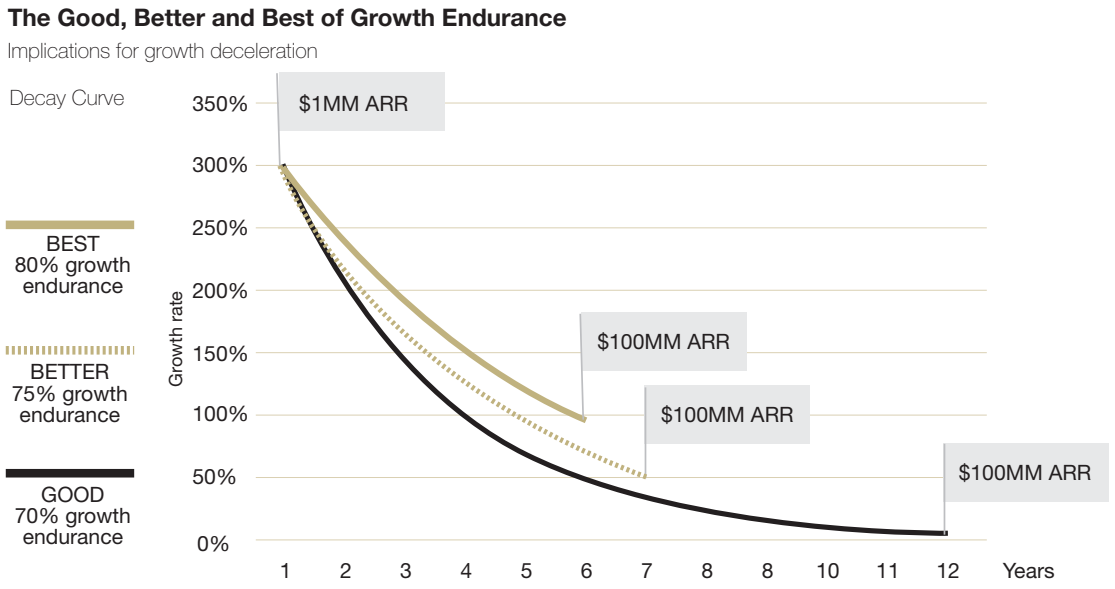

Figure 10: Scaling to $100m ARR, implications of growth endurance [30]

2.5 Fragmented local European markets

In the US, software companies that have achieved early stage "product-market fit", that solve real problems for businesses or consumers, can scale significantly, without friction, across a large American market. With a GDP of $27 trillion+, there is no need to tackle the complexity of entering new international markets until they are already sizable domestically. If a product works in LA, it will be just fine in Boston, Denver, Miami, New York, or Washington.

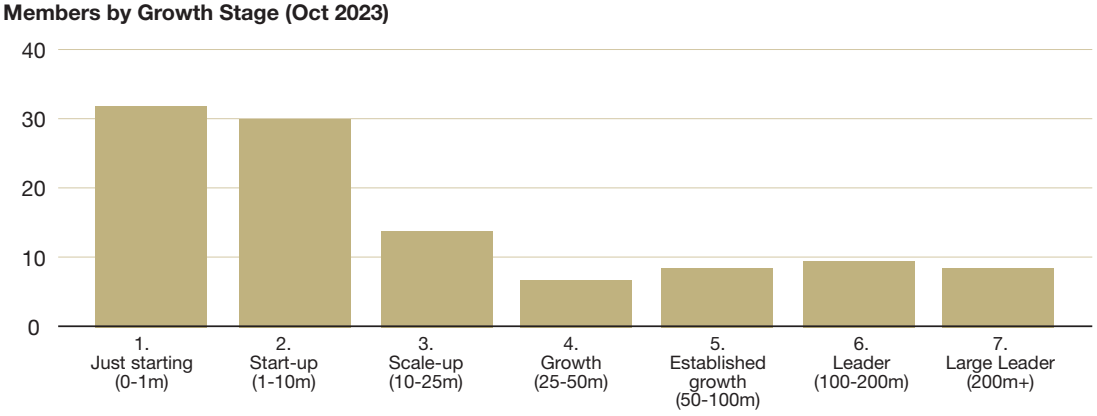

Figure 11: Anatomy of Boardwave's European membership reflects the structure of the European software market.

Unfortunately, historically (at least) the European market was fragmented along national lines. Software founders would achieve "product-market fit" locally in their own country, each of which being relatively small in comparison to a contiguous US market, before deciding to attempt a market-entry and expansion into the next country. Unwittingly, our European software founders started by building products that solve a 'local' problem in their own country, rather than solving a universal issue. As such after some in-country local success, the task of changing their product for the next market in Europe was a significant undertaking.

[30] Source: Bessemer Ventures, Scaling to $100 Million. The definitive benchmarking report on how cloud companies grow operationally efficient businesses and scale to $100 million in ARR (and beyond).BY MARY D'ONOFRIO AND ETHAN DING 9.21.21

For each new market they would then begin the exercise again from scratch, with a need for product translation and localisation. Companies would need to explicitly understand local culture and legislation, incorporate it into their products and have teams on the ground that would sell and support a product implemented for each local customer in each national market. Friction between one European market and another has been high, more capital intensive, and with significant challenges, to one market entry at a time. Consequently, this is a major factor in UK and European software companies scaling more slowly than those in the US.

If they aspire to be a global leader, today's founders would do well to think "global" (and transnational) or consider building "transversal" technology from the very start and solve business or consumer problems that are more universal, rather than unique to their own national market. This would make scaling less traumatic, less capital intensive, and with lower risk. This is an approach adopted, by necessity, by the Israeli software sector, with a tiny home market, who must think global from the very beginning. And something the US has been good at for many years.

Example – Typeform, thinking global at the start!
Typeform: Joaquim Lecha is CEO of Typeform, a Spanish scale-up that has reportedly achieved $100 million+ ARR in 10 years. Typeform is a "no-code" product that allows non-technical users to design simple applications and forms to collect data on the web, as well as embed these forms and logic within their website. It solves a universal problem, unconnected to its country of origin. A year ago, Joaquim moved with his family to Silicon Valley, to spearhead their efforts in the US, with the business remaining in Europe (for instance the engineering team is in Spain). Based on his early career experience as an "IT contractor" in Spain, with very little available work, Kim (Joaquim) ensured his product was horizontal and applicable to a global market from the beginning – removing constraints to growth in the local Spanish market.

The Glorious Exceptions
There are of course exceptions. In business software **SAP** the giant German enterprise software organisation, which remains one of the world's largest software companies, with revenue of $32.5bn and a market value of $137bn it has long term resilience but was founded in 1972. A time when the pace of technological advancement was slower, giving more time to get it right. And others such as France's **Dassault Systems**, **Hexagon** in Sweden, and **Amadeus** in Spain, mean that overall Europe has a strong position in "Industrial Software".

In the consumer space **Spotify** has been wildly successful with its 500 million users, $13 billion in revenue and $37 billion valuation. Other previous stand-out successes include **Skype**, and games maker **King** (Candy Crush)

2.6 Access to capital

It is only in the last ten years that access to risk capital in the UK and Europe has significantly improved. As we have said in early funding rounds, the UK and Europe attracts venture capital at similar rates as the US today.

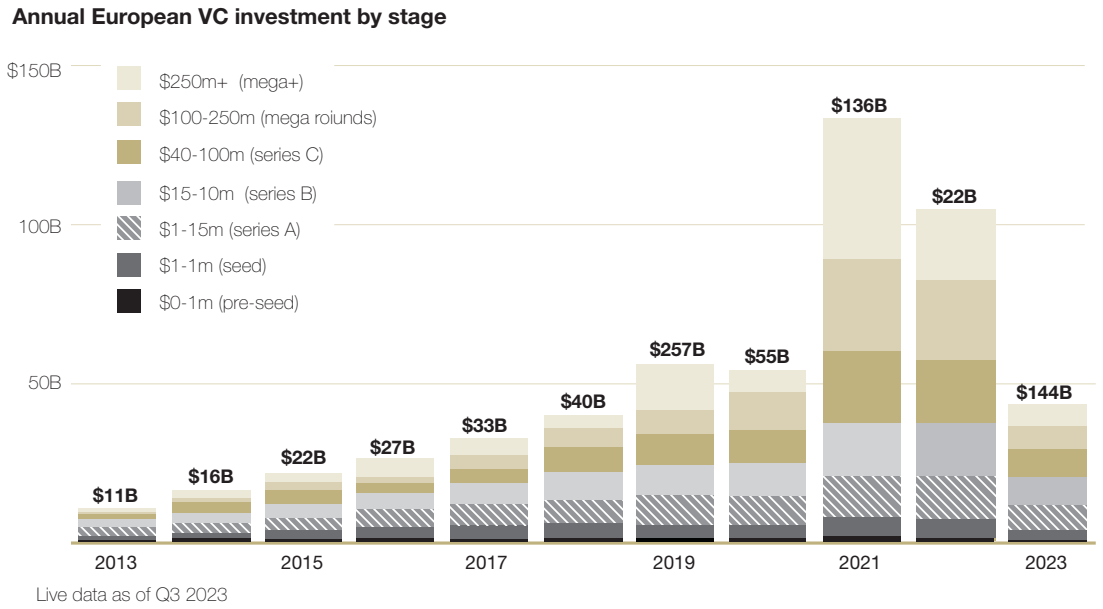

Figure 12: Annual European VC investment by growth stage. Source Dealroom.co

However, local venture funds, whilst growing in size, remain smaller than those in the US, and so follow-on funding may be more difficult to come by, especially as historically European businesses have scaled more slowly than their US counterparts.

Venture funding has become a global market and US venture funds will often step in to fill the gap, investing enthusiastically in early-stage UK and European businesses. But some prejudice still remains when they later evaluate the speed of scaling of their European investments alongside their other domestic portfolio, and find in favour of the local firms with greater velocity, who therefore scale more quickly with better returns.

With UK and European VCs now being more experienced and sophisticated than ever before, perhaps our focus should be on identifying larger pools of capital. This would enable larger fund sizes in the UK and Europe, who are able to make “riskier big bets” on new transformational technologies, with that risk averaged out across more investments in the larger fund.

2.7 Founder Risk Appetite

Received wisdom is that UK and European founders’ appetite for risk is lower than their US counterparts. But frankly, in the same situation, it is highly likely that their US colleagues would make similar decisions.

As discussed, today US software businesses scale 50% faster than equivalent UK and European businesses. Rate of scale (growth) is a key determinant of success as the journey to $100 million is shorter, potentially less capital intensive, and offers greater returns for investors. Founders are less inclined to fatigue or to seek liquidity, as they more rapidly build their business.

UK and European software firms that get beyond $10-15 million ARR enter the “vulnerability” stage. As previously stated, they have often scaled more gradually than US firms, solving local problems, in fragmented local markets, with friction associated with entering each new country, and consequently the weakened ability to raise follow-on funding to fuel their growth. Furthermore, with a lack of liquidity for both founders and investors (and a longer journey to travel than equivalent US businesses), with each passing year both occupy greater risk that their investment of time and money will be undermined.

It’s clear that some businesses simply don’t have the potential to become global leaders, and for them more modest profitable growth and remaining in their local market is a decent result, whether independently or in time acquired as part of a larger national or regional provider. In fact, as the economy becomes more digitised, staying local is a good strategy for growth and scale, but those businesses are unlikely to become global leaders.

For those companies with true potential, with fewer visible local role models, many of their founders lose confidence or they, and their team, become fatigued. Combined with lack of liquidity, they are often prepared to accept the “first half-decent offer” for their business that comes along. Generally speaking, that offer comes from a competitor or strategic acquirer (often US based, who sees the opportunity to expand their European footprint). Time and again this has been the story of high potential UK and European software companies over the last generation.

> **Example – Google Deepmind, success and failure at the same time?**
> ***Deepmind:*** *For instance, whilst UK based Deepmind’s sale for $500 million to Google in 2014 has been something of a success, with Google relying heavily on Deepmind’s talented engineers for its AI technologies. At the time it was four years old, having raised a Series A funding round from Founders Fund and Horizon Ventures. No doubt this was a great outcome for investors but is a further example of vulnerability in the scale-up phase of a European business that had so much potential.*

Many people will describe this as a culturally “lower appetite for risk” in the UK and Europe. But given: a more modest growth trajectory; a longer elapsed journey, representing incrementally increasing business risk each year; with lack of role models and ecosystem support and poor options for liquidity; our assertion is that, in the same scenario those US founders would have made the same or similar decisions.

2.8 Availability of scale-up ecosystems

Both the UK and other European governments have developed “hubs” or ecosystems of support for start-ups, to mimic the dynamics of Silicon Valley. They have had some success. However, this has not systematically translated into a host of successful scaled businesses. The approach seems to be universally that once a “start-up” becomes a “scale-up” they have been successful in the early incubation of their business, and now no longer need help. This is precisely the moment that those businesses and their leaders need greater (not lesser) support for their journey to $100 million ARR and beyond.

Many scale-up CEOs and founders are making key decisions for the first time, without access to others that have been there and done it before. Sharing their knowledge, wisdom, and best practice to avoid them making similar mistakes to their predecessors. Ecosystems are historically where Silicon Valley has excelled. Above all else, it has always been their strategic weapon and advantage over other regions of the world.

Silicon Valley is a small geography. Most people work in the software industry. Their culture is "open" to help one another. And people are well connected not only professionally but also via social ties, such as their children's schools, the gym, restaurants, clubs, and the local community. All of which leave them far more inclined to help a fellow CEO/founder than their more isolated European colleagues who are thinly spread across a continent and are fragmented by language, culture, distance, geography, size, scale, and portfolio.

> **Example – PayPal as a "founder factory"**
> ***PayPal:*** *In 1998 a group of 19 people started PayPal. By 2003 they had IPO-ed and then subsequently sold the business to eBay. From that team, three of them went on to start-up and build YouTube (Chad Hurley, Steve Chen, Jawed Karim), two more LinkedIn (Reid Hoffman, Keith Rabois), and several were also involved in Tesla (Elon Musk et al). One large successful business (the reason why you need global leading software companies in your region in the first place) was a place for people to work together, gain experience and decide to spin-off and start the next big thing together. Colleagues helping with capital, advice, support, or guidance along the way. By now, the original team at PayPal has been involved in many of Silicon Valley's subsequent success stories.*

In Silicon Valley there is a natural recycling of capital but also recycling of experience – ensuring each new start-up inherits the collective experience and wisdom of the last, avoiding making the same mistakes again. And this repeated for every successful Silicon Valley scale-up that becomes a global leader, creating a "flywheel effect", churning out one global leading company after another. Where success begets success, with each new global leader becoming a factory for the next set of innovative founders[31].

[31] CSIS Centre for Strategic & International Studies: The Lessons of Silicon Valley: A World-Renowned Technology Hub. Gabrielle Athanasia Published February 10, 2022

Chapter 3:

The UK and Europe's opportunity to be a software superpower

The last chapter was about all the reasons why UK and European software has been a relative backwater on the world stage, unable to consistently convert early start-up promise into global leadership. It would be all too easy to convince ourselves that it's the way it is and use history to predict the future.

However, much has changed, and a confluence of factors give the UK and Europe the opportunity to catch up and build more world-beating global software companies, and a broader stronger industry. In this chapter we look at three vectors through which software companies can create a successful expansion strategy, whether that's businesses going global via Europe first (***Continentals***), going global via the US first (***Voyagers***), or staying local and going deeper regionally (***Natives***):

3.1 Scale across Europe, at pace: The Continentals

As discussed, US software companies have had an advantage of being able to sell into a single market locally, and scale substantially before considering the added complication of "going international". If "Europe", with its $23 trillion GDP, were a single market that you could sell your software in, that benefit would be substantially removed. Today with the right focus, for the first time, it can be. Whilst it would be foolish to suggest that all our cultural differences suddenly melt away, there is a significant flattening effect occurring. Consider the following:

Cloud computing: Cloud computing enables us to build a software product once and, independent of our customers location, they can access it via the web from any connected device. Previous generations of software platforms required our software companies to employ local staff to install, configure and customise each implementation of their software at each customer site. Whether it's Microsoft Azure, Amazon Web Services (AWS) or other platforms, we have access to computing power and infrastructure without ever leaving our desks.

Centralised marketplaces, like the Apple Appstore or Google Play, also provide ubiquitous global distribution channels for our technologies to reach a larger global audience of customers and consumers.

Translation and Localisation: One complication we have had is translation and localisation of software to cope with the needs of each European region. A second transversal technology, AI, removes this pain with its ability to translate software code, and UI/UX (User interface / User experience design), almost instantaneously into any language. Nuances and changes needed in the product, in terms of market requirements (for example, to support some local legislative requirement or cultural norms) can also be done more efficiently with the help of AI as a co-pilot. Furthermore, there are significant opportunities to reinvest the productivity gains that AI-assisted software engineering can deliver, in areas such as feature development for new markets, more quickly.

Nearly 60% of software engineers expect AI to improve productivity by more than 20% over the next two years.

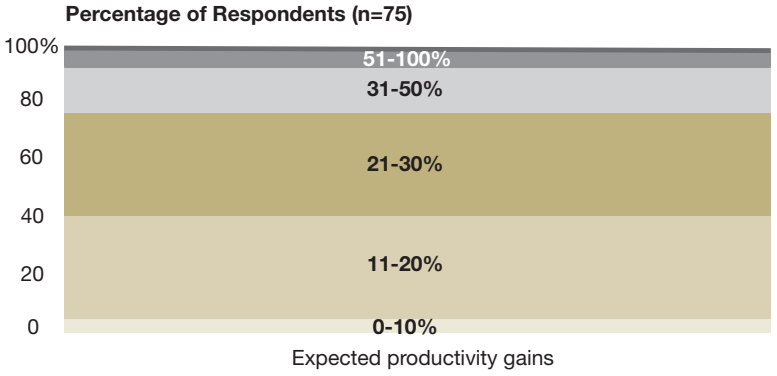

Figure 13: Bain Consulting, Tech Talent Survey 2023[32]

Sales Channel: Until the pandemic, in the B2B software world, high value "enterprise" products would be sold by salespeople hired in each local market, at great expense. And the decision-maker within the buying organisation would expect face-to-face dialogue and to build a relationship and trust before committing to purchase your product. Lower value products, perhaps sold to SMEs, were already being sold over the phone via multilingual centralised call centres. With the benefit of being able to create a team with a common approach to selling, all sitting together in the same place.

Since the pandemic, attitudes towards selling via video (Zoom, Cisco Webex, Microsoft Teams, Google Meets etc) have changed. And so, the buyer no longer expects a salesperson to visit. It may be that the buyer works from home or in hybrid mode, and hence it's more convenient to take a sales call virtually. Now we can deliver far more sales effort from one multi-lingual location for enterprise selling, the way we have done for lower value transactions in the past. The team we hire with local language skills will still typically have lived in the target market and understand the local market nuances that remain, but the advantages of centralisation are significant.

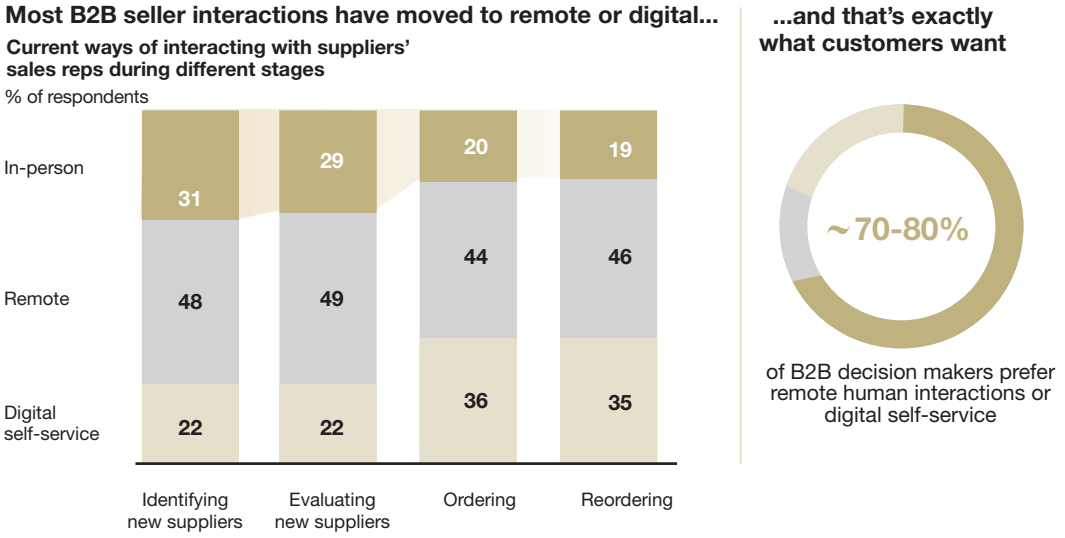

Figure 14: These charts show how COVID-19 has changed B2B sales forever [33]

[32] Bain Consulting: Generative AI: AI will change how work gets done and the talent mix necessary to make it happen. By Jay Bhatnagar, Jonathan Frick, and Arun Ganti. September 18, 2023

[33] Mckinsey: These eight charts show how COVID-19 has changed B2B sales forever. Oct 2020. Arnau Bages-Amat is a partner in McKinsey's Tokyo office, Liz Harrison is an associate partner in the Charlotte office, Dennis Spillecke is a senior partner in the Cologne office, and Jennifer Stanley is a partner in the Boston office.

Example – Salesforce as a European pioneer?

Salesforce*: was an early pioneer of "centralised selling", starting their business in Europe by building a multilingual call centre in Dublin in 2003. A low-cost distribution channel, without the need for infrastructure in each country they sold into. Salesforce would only consider opening a local office in a new European country once they had breached an agreed number of customers in that locality. They did so at the time, to enable them to sell the bigger deals that in those days needed to be handled by a local sales rep. The benefit the new team on the ground in each country had been a local base of customers to reference, making further sales easier than starting from scratch. Those Dublin based sales people benefited from teamwork, consistent training, certification and development and an ability to ensure high quality consistent sales message delivery. They removed the overhead of commuting to the client's site to sell face-to-face. With each passing year the deal value threshold between "CSRs (phone-based sales) and Field sales consistently went up, as the organisation became increasingly confident that the deal value they could sell over the phone went up.*

According to Boston Consulting Group (BCG) research, remote/hybrid interaction in the B2B sales process is here to stay, and offers a range of benefits, with higher value to both the buyers (better response times) and sellers (eliminating travel time and use of data)[34]. Sales reps can be 2-3x more productive over the phone/video vs traditional field sales. Salespeople become "product experts", with more collaboration between reps. AI-assisted selling also has a role to play, with 30%+ increase in sales reps lead management capacity, 50% jump in lead to sales ratio, 2x lift in cross selling and upselling. And overall 2x lift in sales reps' productivity[35]. And change is not just restricted to B2B sales, in retail 19.5% of total global retail sales are through e-commerce, up from 13.6% in 2019[36].

Overall, consumers spend more time online than ever before, accelerating the growth of e-commerce and digitally influenced sales. Remote/hybrid sales working practices are here to stay. Offering high value to both **buyers** (e.g. better response times) and **sellers** (e.g. elimination of travel time, use of data).

Demand Generation: traditional methods of generating leads from your target customers have changed. Sending mail through the post ends up in the bin, email in junk/spam, and outbound phone calls from "unknown" numbers don't get answered. Modern marketing is about delivering high quality content, and thought leadership, online. And optimising your website with SEO (search engine optimisation), as well as using SEM (search engine marketing) and social channels. When your ideal customer decides to search the web for a solution to the problem you solve, they will find you through their own online search/research. Digital marketing requires limited physical presence near the geography and customers you are targeting. Once more AI has a role to play as an assistant in creation of high-quality content, and customising and translating each campaign or your website to meet the needs of each local market or customer.

Today, more than ever before, it is possible to consider expanding your business internationally across Europe, with far less friction and cost traditionally associated with that approach. Rather than incrementally moving through one geography at a time, using transversal technologies like cloud and AI, you can consider Europe a more cohesive ($23 trillion GDP) market with lower barriers to entry from one geography to another. In today's tech industry where scale and speed are the key to success, this will reduce the vulnerability of our indigenous software sector and help convert the early promise of our European start-ups into businesses of consequence on a global stage.

[34] BCG: Executive Perspectives. The Future of Sales and Marketing Is Here. Feb 2022.
[35] BCG: Get Your B2B Sales Team Ready for the Power of Generative AI. SEPTEMBER 11, 2023, By Stephen D'Angelo, Bryan Gauche, Audrey Hawks, and Matt Ward
[36] BCG: Executive Perspective: The Future of Sales & Marketing, Feb 2022

We already see this change beginning to take shape. One example is Typeform who we've already touched upon. There is a new breed of software founders, who have made a conscious choice at the very start to build "horizontal" apps out of the UK and Europe and address the market as 'one', very quickly garnering European customers, followed by other regions including the US. Examples like Fonoa who streamline the entire financial transaction, so their clients can scale in a borderless economy, and manage sales tax, VAT, and GST obligations seamlessly through their API, globally. Andreas De Neve's Techwolf, who help enterprises establish an automatic, instant, and always up-to-date Skills Intelligence for their employees and Peter Lord's Codat, who's business data APIs for lending and accounting automation connect banks and fintechs to all the financial systems their customers use. These companies have Fortune 100 clients before reaching $10 million in sales, whilst having their HQ firmly in Europe. (There are still some areas which remain "local" problems to solve, with local solutions – see 3.3 "Natives")

3.2. West is Best: Scaling into the US market first: The Voyagers

For businesses that have global aspirations and the potential, alongside rethinking their approach to Europe, it's worth also evaluating the alternative of taking their successful domestic business and expanding across the US prior to European expansion. Afterall, if you intend to be a successful global business, ultimately you will need to make a success of the US market at some point.

> **Example: Stripe – the one that got away.**
> ***Stripe****: Irish brothers John and Patrick Collison, decided from the start that the US was the place to build their business, and founded Stripe in Silicon Valley in 2009. Today it has dual headquarters in Dublin and San Francisco. But this was a missed opportunity for Europe, as the company today is essentially a US business. Though John and Patrick still serve as the company's president and CEO respectively. In 2011, the company received a $2 million investment, including contributions from Elon Musk, PayPal founder Peter Thiel, Irish entrepreneur Liam Casey and VC firms Sequoia Capital, Andreessen Horowitz, and CV Angel [37]. Today Stripe is a global leader in payment processing and provides "Financial Infrastructure" for the internet. "Millions of companies of all sizes use Stripe to accept payments, send pay-outs, automate financial processes, and ultimately grow revenue". [38]*
>
> *In 2011 the European venture market was far less mature, and there were far fewer successful founders like Musk and Thiel, recycling their capital and experience here to the next generation. Ultimately Stripe was a loss for Europe, but had they started now, perhaps they would have chosen to build the business locally. Stripe is still a private company, as of March 2023. After raising a $6.5 billion funding round, their valuation sat at $50 billion.*[39]

Going to the US first has often been a preference of some venture investors, who consider this approach lower risk than expanding across a constellation of smaller EU states, especially given the track record of US software companies to scale more rapidly at home.

However, success is relative, it is very hard to name any true leaders, from the UK or Europe, that successfully took this approach in the last 20 years becoming significant, whilst the Americans have clearly dominated. That's not to say that expanding into the US market first is the wrong decision, for some businesses it will be exactly the right thing to do.

[37] Wikipedia, as at January 8th 2024. https://en.wikipedia.org/wiki/Stripe,_Inc.
[38] Sripe home page : company mission
[39] Stripe nearly halves valuation to $50 bln following $6.5 bln raise, Reuters March 10th 2023

Example: Xero, international rollout, stalled at US border

Xero*: Whilst heralding from New Zealand, Xero – the online bookkeeping SaaS company, had similar challenges to their European counterparts. A small home market and therefore a need to grow internationally at an early stage in its evolution. It chose, first of all, to successfully conquer Australia its closest larger market. Then to expand into the English-speaking geographies of the UK and US. Xero is a success by almost every measure. In its half year results, to November 2023, its revenue grew 21% to $800 million, and EBITDA to $206 million, with 3.95 million subscribers worldwide.*

However, on closer inspection they have done exceptionally well in ANZ and UK, and largely disappointed in the US market. In the US Intuit is a fearsome competitor and has used all the tools in its significant armoury ($14.37 billion revenue, and $165 billion public market valuation) to keep Xero at bay. And they have succeeded, with Xero's North American revenue and subscribers at $47 million (6% growth) and 396,000 respectively at the half year point. In contrast, in the UK, half year revenues were $216 million (+23%) with one million subscribers. Nevertheless, Xero is a story of success with an AU$16 billion valuation.

And just as new technology has helped create a flatter Europe, it has done somewhat the same in the US market too (though it was 'flatter' to start with). Here again we see changes in market dynamics, which we explore in Chapter 4, before coming back to discuss what still needs to be done to create the best possible opportunity for our UK and European software companies to become businesses of consequence or true global leaders, in a digital-first economy.

Horizontal applications like Typeform, Fonoa and Techwolf are already expanding their US footprint, alongside the likes of Felix Van de Maele's Collibra, the data intelligence platform.

Examples: Colibra & Celonis, burgeoning global leaders

Collibra*: Felix Van de Maele started in his bedroom in Brussels in 2008, as he left University. He is now based in New York, overseeing their US expansion plans. The company was named one of Forbes' Cloud 100 companies in 2023, the definitive list of the top 100 most valuable cloud businesses, appearing at number 47* [40]*. The business is reported to have a $5.3 billion valuation, with revenue well in excess of $200 million.*

Celonis*: In 2011, Alexander Rinke, Bastian Nominacher and Martin Klenk had an idea and $15,000. The German trio, based in Munich, took that money, and founded Celonis, which uses process mining to scan a company's existing 'log data' to detect and visually represent its inefficiencies and bottlenecks. Based in Munich and now also New York, with over 3,000 employees and with Alex in particular spending much of his time in the US, Celonis counts PepsiCo, Johnson & Johnson, and Dell among its 1,750 customers. And has built partnerships with Servicenow and IBM. The company raised $1 billion in 2022 ($600 million of it as a credit facility) and a further $400 million extension, mostly from US investors and the Qatar Investment Authority, to boost its valuation to $13.2 billion. Revenue was reportedly north of $400 million in 2021* [41]*. With an historic track record of doubling revenue each year, even if growth were more modest, they are much larger today, with market speculation about an IPO around the corner.*

[40] Forbes, August 8th 2023
[41] Billion Valuation, Making It New York's —And Germany's — Most Valuable Start-up, Forbes June 2021

3.3 Stay Local: As "Software eats the world"[42] local markets get big: The Natives

Building strong local software champions is something both the UK and Europe does well. But these businesses must continue to receive support, enabling them to flourish and maximise the opportunity before them. Given the continuing and accelerating digitisation of society, the target addressable markets of these local or regional champions has continued to expand in front of them, allowing them to continue to grow into substantial businesses with significant valuations. Consider the following examples:

Niche B2B Software Sector: In those sub-sectors that remain highly regulated (and which are unlikely to be harmonised) and therefore different at a national level, Europe has built a strong presence, with significant national or regional software companies. Example companies that have done well in these B2B niches include Visma ($19 billion valuation, started in Nordics, but increasingly multi-regional via M&A), The Access Group ($9 billion valuation, predominantly UK), Exact Software (Benelux), Cegid (France and Spain via M&A), TeamSystems (Italy), IRIS Software ($4 billion valuation, predominantly UK). All are owned by growth minded Private Equity companies, (of which Hg[43] were the first to seize the opportunity)[44], who continue to invest successfully in these types of businesses, with good recurring revenue, growth, and EBITDA characteristics. Their niches require deep understanding of local regulation and are therefore protected from US firms who have been unable to compete. This 'protection' has allowed them to avoid the 'growth at all costs' dynamic seen in other areas and build substantial, profitable businesses at a more modest rate. And their prospects remain good, as the more local markets they serve expand through the unstoppable force of digitisation of our economies and society.

> **Example – IRIS Software**
> ***IRIS Software****: For instance, IRIS Software's core business is in providing applications to Accountancy firms to produce the Accounts and Tax returns for their clients. It has significant institutional knowledge in this regard, and strong relationships with the UK tax authorities. It has subsequently expanded into related adjacencies such as Payroll and Education Software – both have similar characteristics. Based on recent investor activity the business is currently valued at $4 billion.*

These companies and many others like them do well in areas where European countries are likely to remain uniquely different, with their high barriers to entry.

> ***Note****: Though with the introduction of "transversal" technologies changing the very way many industries and vertical markets will operate, the opportunity for more Vertical Application software companies to become "continental" and scale across Europe and the US, rather than staying local is increasing rapidly.*

They often have a connection to local government, and GovTech is a continuing European opportunity. In this arena it can be argued that the US is fragmented, old fashioned and under invested. Leading European nations have come a long way in this regard, automating data interchange between citizens/companies and public authorities. Examples of GovTech where the UK and Europe will continue to lead:

- e-invoicing
- electronic tax return, both companies and individuals
- nationwide VAT reconciliation, reporting and calculation
- paperless only exchange between authorities and the public
- European-wide police and immigration management

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[42] "Software eats the world", quoted from "Why software is eating the world", Marc Andreessen's paper of August 2011.
[43] Revolut investor cuts book value by 40% - Molten ventures' move follows similar decision by asset manager Schroders in April, Financial Times, June 15, 2023, Author: Siddarth Vankataramakrihnan
[44] Dealroom fintech database, Dealroom.co., quoted in "Europe's Fintech Opportunity", Oct 2022. By Mckinsey & Co

These sectors are unlikely to deliver global software companies, their reliance on uniquely local requirements takes care of that but will continue to create a series of quite large and profitable scaled-up cloud business software companies in the $100 million-$1 billion revenue range and commensurate valuations typically in the $1-10 billion range. Whilst these software companies may use some of the aforementioned transversal technologies, as parts of their platform, Europe will continue to compete with the US on their efficient management of their more egalitarian societies.

Fintech: Europe has developed a strong Fintech sector, with businesses that are either national or regional. Fintech is a great example of a choice of market where the opportunity exists to build a large business locally, before considering international expansion. And once they "conquer" their home market, built "muscle mass" and a business at scale, some aspire to be true global champions.

> **Example – Revolut**
> ***Revolut****: The UK based neobank, has revenues of $1.2 billion, and expects to grow to $2 billion in its current financial year, as it becomes increasingly global. After its July 2021 $800 million Series E funding round, its post-money valuation stood at $33 billion. Even given today's economy and more modest software valuations, it's valuation would still be higher than many firms in the FTSE100*[45]*. It operates in 30 countries and has 35 million customers worldwide as of October 2023.*
>
> ***Klarna*** *(Sweden) has a more modest valuation but is still growing at 17% with last year's revenue at $1.6 billion.*
>
> ***Wise*** *(formerly Transferwise) headquartered in the UK and Estonia, has global aspirations. Founded by Estonian businessmen Kristo Käärmann and Taavet Hinrikus in London in January 2011, it provides foreign exchange technology. As of March 2023, its revenues reached $1 billion. Its stock is publicly traded in London with a valuation of $11.5 billion.*

In the payments space, Netherlands based Adyen is a leader, with $1.44 billion revenue in 2022, and significant profit margins and good growth. It is listed on the Dutch stock exchange Euronext Amsterdam, with a $37 billion market cap.

As of June 2022, from a value creation perspective, fintechs in Europe had a combined total valuation of around $475 billion. That's more than the combined valuation of Europe's seven largest listed banks put together[46].

As stated, there are significant factors flattening the European market, which represent a new opportunity to address Europe much more as a single market, which should not be ignored. But there are some niches that will inevitably remain local, where we can continue to do well.

[45] Revolut investor cuts book value by 40% - Molten ventures' move follows similar decision by asset manager Schroders in April, Financial Times, June 15, 2023, Author: Siddarth Vankataramakrihnan
[46] Dealroom fintech database, Dealroom.co., quoted in "Europe's Fintech Opportunity", Oct 2022. By Mckinsey & Co

Chapter 4:

Silicon Valley – A victim of its own success?

Many of the benefits that Silicon Valley-based businesses enjoy are beginning to break down. It can be argued that it is becoming a victim of its own success. Today, it is far less attractive to base your scrappy start-up business in Silicon Valley than it used to be.

With high quality educational establishments – and a deep pool of existing software engineering talent – many of the best engineers and "migrant inventors" have traditionally moved to Silicon Valley for advancement or to build their business. But such is the demand for software engineering skills in the Bay Area that it has driven costs to a point of being prohibitively expensive for all but the giant tech companies.

Unsustainable Cost Structures: As reported in Business Insider, a software engineer at Google can make more than $300,000 a year; senior software development engineers at Amazon earn $300,000; Apple pays more than $400,000 for Senior Directors; and Uber senior engineers are paid $345,000. At Open AI, research engineers may be paid a $370,000 base salary. These costs also go up further when these businesses expense stock option plans for their teams. Such is the "sucking" sound from these big tech companies, it is almost impossible for scrappy start-ups to compete on compensation, even with decent venture funding. Not only that, but such is the demand for talent, that even paying these wages does not buy loyalty and average tenure across the region for these roles is just over 2 years.[47] [48]

If we contrast this with the cost of engineers in Europe, a software engineer in the UK could expect a salary of $75,000. And salaries vary across Europe, with engineers in Southern and Eastern Europe paid the least. For example, an engineer in Portugal could expect an opening salary of $22,500. Average tenure is also significantly longer for European engineers, helping protect your institutional knowledge for longer. Europe offers a lower cost base for building a high-quality business.

New flexible working styles: The pandemic introduced us to new working styles, like "working from home", and subsequent hybrid working. This flexibility and the recent rounds of layoffs in big tech make Silicon Valley a less attractive proposition. A new generation of software engineers, who can now work almost anywhere, are choosing to be based around "new tech hubs".[49]

These post-pandemic attitudes to work, in combination with the high cost of labour in Silicon Valley, are leading software founders to spread their wings and start-up or move to other regional "hub" locations. Their business has far greater flexibility on choice of location, with tech clusters now in places such as Texas, Colorado, Utah, and Miami amongst others. But they could just as well be in Paris or Berlin.

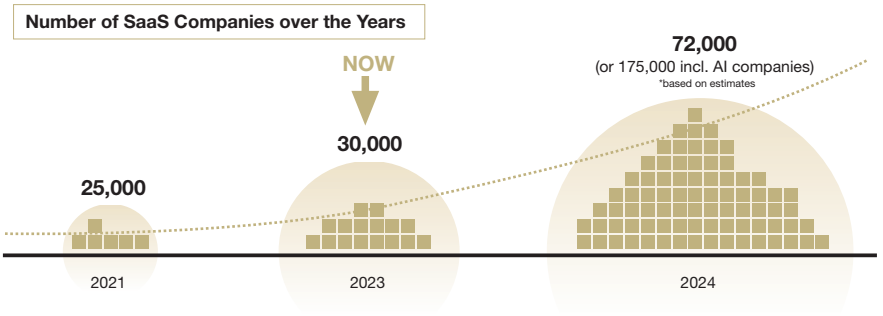
[47] Business Insider. Big Tech salaries revealed: This is what developers, engineers, and product managers make at Google, Apple, Meta, and Amazon. Aug 23, 2023
[48] https://codesubmit.io/blog/software-engineer-salary-by-country/ & https://digg.com/data-viz/link/cost-of-living-us-states-european-countries-compared-mapped-qL9sShYEEr
[49] Washington Post WORK: REIMAGINED Where are all those tech workers going? A Silicon Valley exodus is shaking up the landscape. Layoffs, remote work and pandemic-era changes are reshaping where workers live and tech gets made.By Danielle Abri April 14th 2023

Rank	Metro	% Growth 2020-2022	2022 Investment
1	**Miami**	278%	$5.39B
2	**Chicago**	231%	$10.2B
3	**Denver**	123%	$3.75B
4	**Philadelphia**	93%	$5.25B
5	**Bridgeport, Conn**	92%	$1.21B
6	**Houston**	91%	$1.43B
7	**Austin**	77%	$4.95B
22	**Silicon Valley**	19%	$74.9B

Metro areas analyzed were those with more than $1 billion investments

Figure 15: The fastest growing US tech hubs for venture capital investments by percentage growth during the pandemic. [50]

Whilst there is benefit in geographic proximity, these new "hubs" don't currently have the scale of Silicon Valley. As such, European efforts to create the same conditions in London, Paris, Berlin, Amsterdam, and Milan compete equally the more distributed these US companies become. For those European firms choosing to scale in the US ("**Voyagers**") it is worth considering these changing dynamics when you choose where to base your US "hub".

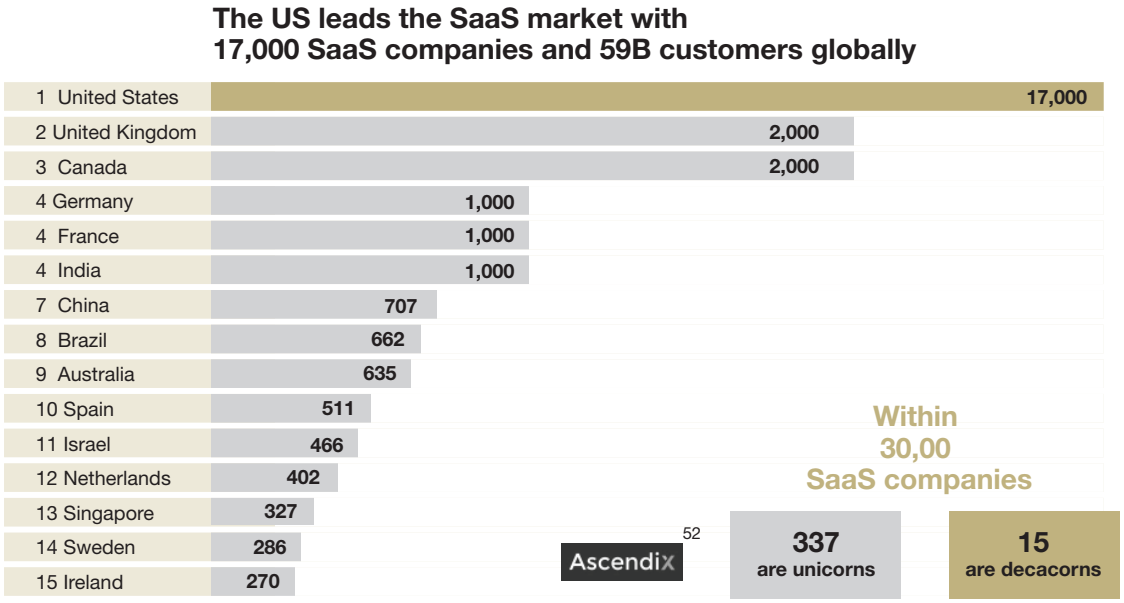


footnote [51]

The "clutter" problem, how to break through: There are a magnitude more software companies in the US today than 10 years ago, there is similar growth in Europe, but from a far lower base. But the number of organisations that are "buyers" of these technologies has hardly changed. So, no matter how compelling your product or proposition, how do you break through all the noise and clutter in the market, to get the attention of your prospective customers? Especially when they have fatigued from all the outreach of your competitors over recent years. Buying behaviours are changing as a consequence.

[50] Washington Post WORK: REIMAGINED Where are all those tech workers going? A Silicon Valley exodus is shaking up the landscape. Layoffs, remote work and pandemic-era changes are reshaping where workers live and tech gets made.By Danielle Abri April 14th 2023 Data sourced from: PitchBook-NVCA Venture Monitor

[51] Ascendix: How many SaaS companies are there in the world, May 2023



Similar characteristics exist in some European markets, but not anywhere close to the challenges faced in the US. Significant investments in high quality digital marketing techniques in the US are vital to be heard above the noise. Remaining in the UK and Europe may be a better option than becoming one of many trying to make a dent in the US market.

Regulatory restrictions: Policy and regulation in the US is seen as a light touch compared to the UK and Europe, which is something we must learn from. It is one of the reasons cited as to why the US has been historically more successful than the more regulated UK and Europe. But in some key technologies, entrepreneurs and investors believe that the balance is shifting.

> **Example: Andreessen Horowitz – investing in Europe**
> ***Andreessen Horowitz****: Highly respected US venture capital firm Andreessen Horowitz, a major cryptocurrency and blockchain investor, is setting up its first international office in London at a time when US regulators (Securities and Exchange Commission) have increased scrutiny of the sector* [53]*. The firm will work with universities in the UK and support the development of blockchain technology (the foundational technology behind digital currencies) start-ups. This is a great opportunity for the UK and Europe to lead in blockchain, a key "transversal" technology area, that underpins several sectors beyond crypto, as long as we can take advantage of the opportunity.*

It would be an overstatement to say that the US software market is losing all of its historical competitive advantage. Although it appears, given their significance to the economy, there is a consolidation of power behind a small number of the very largest technology and software firms, who control most of the latest software platforms (e.g. Microsoft's role with OpenAI). This changing landscape for start-ups and scale-ups presents UK and European software founders with an opportunity to be nimbler and more competitive.

[52] Ascendix : How Many SaaS Companies Are There in the World. May 26, 2023
[53] Andreessen Horowitz to open its first international office in London. Reuters. June 11, 2023

Chapter 5:

Road to 2034 – Conditions needed for the UK and Europe to win

The key to building a world-beating software sector in the next decade remains our ability to support and nurture businesses to scale successfully, whether they expand across Europe, into the US and into becoming global leaders, or remain local in an expanding niche. We believe that, with recent changes in the UK and European and US market dynamics for software companies, UK and European software companies have a generational opportunity to scale as quickly as their US and Asian counterparts, with no greater risk. But we must act now if we are to catch up, much longer and it will be too late.

So, what else do we need to do to underpin this opportunity, and crystalise its benefits for our economic gain and strategic autonomy as a region?

Retaining and attracting talent: The UK and Europe need to be net importers of talent. We currently lose at least as many talented emigrants (who we have trained through our world class universities) as we receive immigrants from elsewhere. To date, this is an area of strength in the US, who are a net importer of talent into our sector. Expansion of "talent-visa" programmes in the UK and Europe will help, as will campaigns to promote the capabilities of our most successful tech companies, and virtues of our tech "hubs" abroad. Additionally, we must improve the skills of school leavers in computer science, so no matter their career choice they are equipped to work in the digital economy of the mid 21st century. And increase locally available talent by supporting and nurturing citizens no matter their gender or ethnicity, who's latent potential is significantly underrepresented.

Incentivising UK and European companies to invest in R&D and software technologies: Earlier in this paper we explained that across all sectors UK and European companies invest 40% less in R&D and technology for their business than US firms. Consequentially growing more slowly and delivering lower returns. UK and European governments must do much more to encourage our non-tech industries to invest in their own R&D and innovation, as well as invest in software and technology to improve productivity and remain competitive. This will immediately help them drive productivity up and take advantage of "transversal" technologies. This is both defensive against new players who use these technologies to undermine the current market leaders, and offensive in being the disruptor not the disrupted. And it would deepen the size of the local "target addressable market" for our UK and European software sector, as more is spent on business modernisation and innovation, to allow our software companies to match the growth rates of their US counterparts. Some governments have tried to tackle this through tax incentive schemes, such as the UK. However, they have been subject to historic abuse, and as such a more robust system needs to be put in place, with these schemes expanded, rather than being withdrawn or watered down.

Increase pools of risk-capital to support scale-ups: As we have already said, UK and European venture funds, whilst growing, are generally smaller than their US counterparts. The US simply has more experience and has been doing this longer, and hence, with a good track record, attracts more capital. Consequently, smaller European funds will have more difficulty to continue investing in promising businesses whilst they scale up (growing from $10-15 million ARR to $100 million). But growth capital has become more globalised, and so US investors will now often fill some of the gap, for the very best businesses.

[51] Invest Europe: Record capital under management for European private equity, venture capital industry in 2022: exceeds €1 trillion. 21 Sep 2023

More capital was invested in the UK and Europe during a period of cheap money but, with a weakening economy and higher interest rates, venture investors have less appetite for risk. Which is ironic, as a good business in 2021 is probably still a good business in 2024. As a consequence, it is now harder for many software leaders to secure venture investment in their businesses.

> But the money is there, and must eventually be invested, as the economy picks up and software businesses shift from the high risk, "growth at all costs" model they were originally prompted for, to "sustainable growth, with profit" that investors now prefer. Venture firms have $53 billion[54] of dry powder earmarked for Europe which is a component of the combined VC and Private Equity dry powder in 2022 of €348 billion.

However there appears to be a paucity of UK and European growth capital with the required level of risk appetite to make the big bets that are needed to invest in exciting new breakthrough technologies, which for instance have "transversal" potential, as the US have. They may begin as promising but highly speculative and end up being transformational or "transversal". Traditional investors need to be prepared to make bigger bets and must take more risk. Larger funds would allow them to do this whilst spreading the risk across the portfolio.

> **Example: Investing in "transversal" European AI**
> ***Helsing****: Take Germany's Helsing, an example of a European ai champion. Helsing is a new type of defence company, who believe that software, and AI in particular, will be the key to protecting our democracies. They raised €100 million in 2021 from Daniel Ek – the CEO of Spotify, through his investment vehicle, Prima Materia, an organisation that builds and develops new companies for the long term. And when they went to raise a 'B' round they had to go to the US, in the form of Boston-based General Catalyst, alongside Saab as a strategic investor. Raising €209 million on a €1.5 billion pre-money valuation. In neither investment round did they raise any money from "traditional" European venture capital firms. Although Daniel Ek is a fantastic example of one generation of software founders recycling their capital, and experience, to the next. Exactly what happens in Silicon Valley and the reason why Europe needs more global leading software firms, like Spotify, that become "founder factories".*
>
> ***Aleph Alpha****: There are other examples. Aleph Alpha, also based in Germany, is working to crack explainable and verifiable AI - one thing, other models are currently lacking. In its 2023 'B' round it raised $500 million, investors were all German, but from unexpected sources included Schwarz Group (Principally known for retailing, they own LIDL, but are now investing in Cloud Computing), SAP and Innovation Park Artificial Intelligence (educates the public about AI, offering accessible learning and discussions) - this being their first investment.*
>
> ***Mistral AI****: Was founded in 2023 and is based in Paris. It hit the headlines for raising a €105 million seed round, briefly after they formed the company. They then went on to raise a €385 million Series 'A' round in December, led by Lightspeed Ventures and Andreessen Horowitz, both Silicon Valley based investors. Early versions of their generative AI models are already available, they focus on building a family of open models, using Open-Source licensing to enable their users access for free to contribute ideas. Mixtral is a powerful and fast model adaptable to many use-cases, it matches or outperforms Llama 2 70B on all benchmarks, speaks many languages, and has natural coding abilities.*

[54] Invest Europe: Record capital under management for European private equity, venture capital industry in 2022: exceeds €1 trillion. 21 Sep 2023

For the start-ups, these deals give them the cash they need to train advanced AI models as well as affording access to the essential but scarce computing power they will need. These technologies are expensive to develop, but their potential impact is profound. Accepting the risk, we must do more to champion, support and fund these types of businesses locally in the UK and Europe.

UK and European governments want and need champions in defence (Helsing) and Ai-LLMs (Mistral) amongst others, but they have had to raise money from US funds, even though their UK and European identity is core to their mission. Not all product sectors are as 'hot', or as expensive to develop as AI, but significant potential remains untapped, for all but the very best businesses.

Governments can help make capital more freely available to these firms. As an example, the recent changes in the UK in the way pension funds invest their capital, called the "Mansion House Compact", calls on pension funds to invest 5% of their funds in unlisted companies by 2030, roughly £50 billion per annum. With UK pensions consolidation, an expectation of greater capital allocated in riskier investments will provide better returns to pension holders. Making this capital available, through regulatory reform, will make more money available to Pension Funds to invest in Venture Capital funds as they are developed, and hopefully level-up the size of the VC firms funds versus the US, and the type of business they are able to invest in, with the ability to make bigger bets on potentially transformational technology.

Partial liquidity for founders and their investors in scale-up mode and protecting key technologies: We expect the rate of scaling of UK and European software companies to increase towards the pace of those in the US, over the next few years, given changes in technology and market we have discussed. When that happens on a systemic basis it will likely attract more venture capital on a similar scale to the US software sector, either International and US funds investing in UK and European software, or by local VCs having greater success, therefore increased ability to raise larger funds, being able to follow-on invest, at a quantum higher than today.

But there will still be businesses with significant promise that take more than a decade to scale past $100 million. A trend towards faster growth will attract venture capital to Europe, to be invested, but some vulnerability remains. The "very best" will find a route through (particularly a select but growing group of serial founders) but many others, still with good potential, need more support. If a form of partial liquidity were available from UK governments or the EU to enable founders to mitigate their financial risk and continue to build their business for longer, we would see more companies reach their full potential. We would also own more technology breakthroughs locally, rather than them being consolidated into a US business. We must attempt to protect key technological advancements and this approach would assist. Allowing Europe to catch up.

Compensation culture: US and Silicon Valley reward loyal employees with employee stock option programmes (ESOPs), that are potentially lucrative upon exit of that business. Tax liabilities are deferred until the value of those options are crystallised. This is a significant incentive and one which European software companies need to compete.

Following lobbying from "NotOptional"[55], a pan-European initiative, kick started and funded by Index Ventures, the German government made recent changes in Stock Options and the way they are taxed in Germany. This is an attempt to boost their tech sector and provides an example for other European countries. Under the new German rules on ESOPs, taxes on employees' stock options will be deferred until the point of sale so that staff aren't faced with the prospect of being taxed on their shares as soon as they receive them, often many years before they see any return.[56]

[55] NotOptional: https://www.notoptional.eu/en/
[56] CNBC: Germany approves financial reforms to help its tech industry compete with Silicon Valley. Ryan Browne. FRI, NOV 17

It is also true that compensation culture for Executive Management teams of publicly traded technology businesses is significantly different in the UK and Europe than it is in the US. Local public market investors scrutinise the pay of executives and cap their earnings potential. This is a significant factor, when management teams do consider going public, and doing it in the US v Europe. And adds to the reasons seasoned software CEOs move to the US.[57]

Ecosystems of support: European governments have nurtured start-ups for a number of years (and should continue to do so), resulting in some successful ecosystems and start-up "hubs". This level of support needs to extend to the scale-up phase of business, rather than fall away once it becomes a scale-up ($10-15 million ARR). This will protect the investments made in start-ups, which are said to be worth $1 trillion in the UK, $470 billion in Germany, $250-300 billion in France. Without this support, these companies will remain vulnerable to being acquired by others.

It is incumbent upon leaders in these sectors to be more organised themselves, without requiring financial support from government. Founders and CEOs of European software firms are fragmented along historical lines and isolated by geography, distance, language, culture, size and sometimes investor portfolio. This leads them to making decisions in isolation without referring to people who have done it before. But technology makes it much easier to create communities of common interest. So rather than being consolidated into a small geographic space – as founders are in Silicon Valley where they operate in a community that openly shares knowledge, expertise, best practice and recycles both capital and experience from one business to the next – the same benefits can accrue using modern communications technologies in a far larger and more diverse geography.

As an example, **Boardwave** is an independent "social enterprise" that's built a networking community for European software founders and CEOs. It has been designed to create a community that shares knowledge and experience, and members mentor each other to create the same community conditions across Europe that traditionally exist in Silicon Valley. From a standing start, within 18 months, it has grown its membership to 1300+ CEO and founder members (currently 70% UK, 30% EU) from all growth stages. It is enthusiastically financed by a consortium of 90+ partners that include some of the region's largest Venture Capital and Private Equity firms. Similar initiatives, in each country and across the region should be encouraged and supported.

The need for a "European NASDAQ": US exchanges that are characterised by deep, liquid markets with a broad spectrum of technology-savvy investors, sell-side brokers and analysts that bring deep domain knowledge, not just to technology or software in general, but also to each specific sub-sector. Not only does a thriving and sophisticated public market provide a natural exit for private investors who have helped nurture software companies to the point of being publicly listed, it is also an excellent vehicle for compensation, critical scrutiny, competitive analysis, and benchmarking, as well as a fantastic marketing tool.

We lack such a market in Europe, and small regional (or national) subscale public markets in various countries are not the answer.

The absence of such a public market is one of the reasons why European software entrepreneurs sell while still being private, and therefore, for those that have the potential, miss the opportunity to become world leaders. Our current market structure has led numerous successful UK and European software and technology firms who were able to IPO to the US to list on the NYSE or NASDAQ.

[57] Financial Times: LSE Chief wants higher UK exec pay to retain listings, Anjli Raval, May 2023

"I have directly experienced challenges of investor governance in PLC businesses. I clearly recall a roadshow where we toured UK investors who consistently requested dividends whilst US investors in contrast emphasised the need to use the cash to make more acquisitions and drive growth. And huge constraints in listed companies to pay competitively with other global tech companies - a listed business based mostly in the UK with listing in London, forced to benchmark pay against UK general norms, for want of tech comparators and not being able to use US benchmark data" - ***anon****.*

Europe needs its own version of the US Securities and Exchange Commission and a unified stock exchange to raise enough money to meet the challenges confronting the region. Estimates from the European Central Bank suggest that we will need to raise an additional €125 billion per year for our digital transition, plus huge sums to tackle issues such as "deglobalisation, demographics and decarbonisation"[58].

Note*: The UK's position in this area is complicated by Brexit, it clearly would no longer be able to build such a European public market, even though it would have been a natural candidate, given its success as a financial centre in London. However, there are emergent signs that it is making changes aimed at keeping tech businesses in the UK, rather than listing in the US. As such we might see some UK centric approach to supporting the tech sector, with continental Europe tackling the issue independently.*

European Industrial Strategy: We can no longer rely on an industrial strategy that trades strength in one area of the economy to "carry" weaknesses in others. This strategy has led to sustained weakness in the technology and software sectors, with focus on our historically stronger leading industries. Transversal technologies are rapidly changing these industries in which Europe is strong, eroding our advantage. Our ability to compete in our areas of strength will be rapidly undermined without some control of the underlying transversal technologies that are now powering them.

Software and technology must become the growth platform upon which we build our economy, hence protecting and underpinning the advancement of our leading industries.

[58] Financial Times: Europe needs its own SEC, says Christine Lagarde. ECB president says consolidation among the region's exchanges would plug a substantial funding gap. Martin Arnold, November 17, 2023

Conclusion

The role of transversal technologies such as cloud computing, applied AI, software 2.0, blockchain, quantum computing, and the metaverse (see the Appendix, for a more complete list) look set to rapidly transform and redraw the boundaries of many industries and our society as a whole. The UK and Europe is lagging behind, in a transformation that is likely to be at least as significant as the last Industrial Revolution, but is happening now, at warp speed.

UK and European governments, policy makers and decision makers, need to recognise this **now** and not trade competitive strength in one sector (e.g. fashion, automotive etc) for weakness in any other; specifically, the software sector. This approach has led to an era of underperformance in software in the UK and Europe, which has left us weakened and vulnerable. And will subsequently lead to a destruction in competitive advantage and value in sectors of historical strength.

Right now, there is a moment in time, when we can still play to our strengths, catch-up and build a world-leading software sector, over the next 10 years. The opportunity is fleeting, and unless we grab it immediately it will be gone.

A stronger tech and software sector in its own right would help drive economic growth across the UK and Europe. Between 2011 and 2021 the tech sector grew at 1.9x the rate of the rest of the economy, 2016 to 2021 2.6x and 2018 to 2021 3.4x. The SaaS software market is predicted to grow at 11.7% CAGR from 2020 to 2026, reaching a global value of $307 billion.

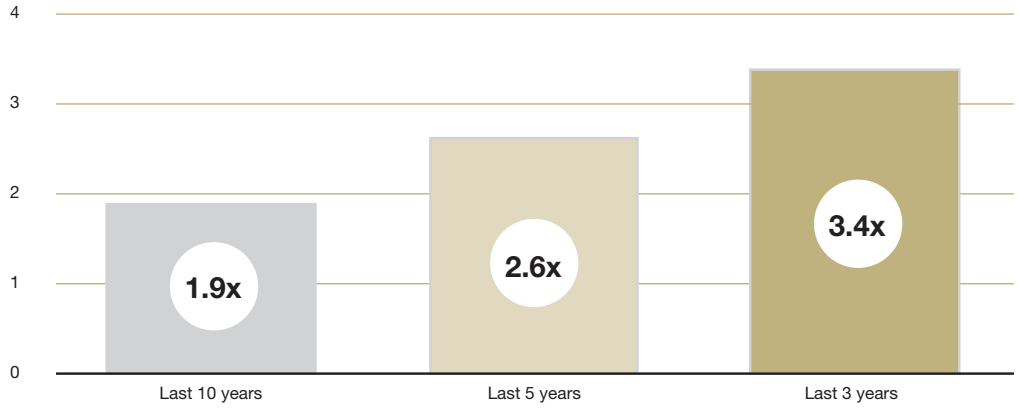


Fig 16: Techeurope report 2022 [59]

There are direct and immediate tangible benefits to the economy from supporting software companies to scale. With the flattening of national European boundaries, through the adoption of foundational transversal technologies, many European software companies have access to the full $23.1 trillion “European economy” – with lower levels of friction and incremental costs, and as if it were one contiguous market – for the first time. This substantially levels the playing field with US firms, who rely on their large domestic market to grow.

[59] TechEurope 2022: Last three years refers to 2018-21, five years refers to 2016 to 2021 and ten years is from 2011 to 2021

Software leaders also need to step up and be bold and grow in confidence. Google didn't ask to roll out its products in 192 countries, it just did it – and with a product that had universal benefit to the consumer. European ecosystems of common interest (**like Boardwave**) are vital to educate, mentor, and support our scale-up founders and CEOs. This will give them the confidence to take the same approach as US firms like Google and grab the new UK, European and global opportunity with both hands. If this is combined with continued support for our expanding local software providers, we can have an industry of quality in breadth and depth.

However, the greater opportunity (and threat) lies in the transversal adoption of new technologies across all sectors, to enable each sector to compete in their own right in a world where "products" are a blend of physical and digital.

If the UK and European leaders allow other regions to control these and other future pivotal technologies, and don't make a step change in supporting our next generation of software companies as they scale-up, we stand to lose an economic opportunity of a lifetime believed to be worth $2-4 trillion[60] a year. To put that into perspective, that's six times the gross amount needed for the UK and Europe to achieve net zero emissions by 2050, and 30% to 70% of the UK and Europe's forecast growth between 2019 and 2040. By the World Economic Forum's estimates, it's 70% of the value created in the coming decade, and, far more importantly, underpins our strategic autonomy.

[60] Transformation of Business: New Digital Business Models. World Economic Forum. The Digital Transformation of Business: New Digital Business Models | Strategic Intelligence | World Economic Forum

Appendix 1

Table of Transversal Technology Areas, with expected growth and current leading suppliers[61]

Transversal Technologies	Description	Main Suppliers (2023)	Current/ latest mkt size	Most recent est.	Predicted growth	CAGR	Time-frame
Cloud Hyper Scalers	Compute power available instantly via the web. Suppliers have the financial muscle to buy massive, centralised computing power, for others to subscribe to	AWS(US), Azure (US), Google (US), Meta(US), Apple(US), Alibaba(China), Huawei (China), Baidu (China)	$172bn	2022	$2189bn	37.80%	2030
Cloud Computing*[62]	Software as a Service, instantly available. At application level, platform, infrastructure	AWS(US), Microsoft Azure (US), Salesforce (US) $500bn 2023 $1600bn 18.80% 2030	$500bn	2023	$1600bn	18.80%	2030
Software 2.0 (No code)[63]	Order of magnitude gains in software engineering productivity. No code= simple apps by non-programmers.	No Code: Airtable (US), Zapier (US), Bubble. io (US) $15bn 2023 $68.3bn 24.10% 2030	$15bn	2023	$68.3bn	24.10%	2030
Software 2.0 (Low code)[64]	Order of magnitude gains in software engineering productivity. Low code: Sophisticated apps by developers with productivity benefit	Low code: OutSystems (US), Mendix (US), Appian (US), Salesforce (US), Servicenow (US), Microsoft (US)	$16bn	2021	$160bn	28.80%	2030
Blockchain[65]	Trust architectures: Healthcare. Finance and Banking, Supply Chain Management. Government, Cybersecurity, Media (NFTs), Agriculture.	IBM Blockchain (US), AWS(US), Oracle (US), Huawei (China), Accenture (ire) Wipro (India), Infosys (India), TCS (India), SAP(Ger), Intel (US), ConsenSys (US), NTT Data (Japan)	$7.4bn	2022	$94bn	66.20%	2027
Ai[66]	Has the power to disrupt society, and most sectors based on current definitions. eg Coding assistants, improve software developer productivity, quality of code, using Co-Pilots or Coding AI assistants. Translation	Microsoft GitHub/OpenAI (US), Google (BARD/ Gemini) (US), Meta (LLAMA2 - Opensource) (US)	$100bn	2021	$2000bn	39.50%	2030
Quantum Computing[67]	"Infinite" compute power - solves a new class of problems and has the power to support next gen AI. Also, Geopolitical implications	IBM (US), Google (US), Microsoft (US), Amazon (US), Alibaba (China)	$713mn	2022	$6.5bn	47.90%	2028
Metaverse & Virtualisation[68]	Supersedes the browser, as a new interface to web. Examples often cited: eCommerce, Retail, Fashion, Games, Entertainment, Industrial, Manufacturing	Meta (US), Microsoft (US), Apple (US), Google (US), AWS (US), Tencent (China), Bytedance (China), Netease (China), NVIDIA(US), Decentraland (US), Unity (US)	$22.79bn	2022	$238bn	39.80%	2030

[61] Boardwave's own research
[62] Precedence Technology research
[63] TechTarget, August 2023
[64] TechTarget, August 2023
[65] Blockchain Market , March 2023
[66] Statista Oct 2023
[67] https://blog.bccresearch.com/quantum-computing-industry#:~:text=According%20to%20 BCC%20Research%2C%20the,span%20spanning%20 2023%20to%202028.
[68] Forbes: https://www.forbes.com/sites/forbesbusinesscouncil/2023/01/09/leadership-in-the-metaverse-era/?sh=2f20b73b3dea

About the Author

Phill Robinson, Founder & CEO - Boardwave

Phill is an experienced and accomplished Chairman, CEO and Non-Executive Board Member, in the software industry. Phill was CEO of Exact, a large multinational software business, headquartered in the Netherlands until the end of 2020, prior to that he was CEO then Chair of IRIS Software in the UK, for seven years. Now plural, he remains a Non-Executive Director of Exacts Supervisory Board and Chairman of the Remuneration Committee.

Phill is the Founder of Boardwave, a networking platform for European software CEOs, non-execs, chair people and their investors. Phill is also Chairman of the Livingbridge Software Advisory Board. He is an advisor to KKR, and several other Private Equity firms.

In Phill's earlier career he was part of the European Management teams of several successful US software companies, helping to expand beyond the US, into the UK and rest of Europe. He moved to Silicon Valley in the noughties, where he was promoted by Marc Benioff, to become the CMO of Salesforce.

In 2017, Phill was diagnosed with Young Onset Parkinson's Disease. Phill was appointed the first Chair of the Development Board at Cure Parkinson's, in May 2021, and is now also a Trustee. Phill's focus is to raise the profile of Cure Parkinson's and the money needed to enable the world's leading neuroscientists to rapidly accelerate research into new treatments, with the potential to slow, stop or reverse Parkinson's.

Phill holds a BSc (Hons) in Computer Science from Coventry University, in the UK.

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Parkinsons Blog:	www.stirrednotshaking.com

Sources

Smit, Sven; Tyreman, Magnus; Mischke, Jan; Ernst, Philipp; Hazan, Eric; Novak, Jurica; Hieronimus, Solveigh; and Dagorret, Guillaume. (2023) 'Securing Europe's competitiveness. Addressing its technology gap', McKinsey Global Institute report, 22 Sept

Hoyos Flight, Monica; and Pannier, Alice. (2023) 'Technological vulnerabilities that threaten the European Union's 'Open strategic autonomy, and the EUs response', European Science Media Hub, March

Gherasim, Cristian. (2023) 'In a China, US dominated world, the EU has to spend more on technology if it wants to keep up' Euronews, June

Erixon, Fredrik; Guinea, Oscar; and Du Roy, Oscar. (2023) 'If the EU was a State in the United States: Comparing Economic Growth between EU and US States', European Centre for International Political Economy, July

Macaulay, Tom. (2018) 'UK government announces £1 billion investment in AI', Computerworld, April

(2022) 'What is transversal technologies', Technologies org, March

Transformation of Business: New Digital Business Models. World Economic Forum. The Digital Transformation of Business: New Digital Business Models | Strategic Intelligence | World Economic Forum

World University Rankings 2022 by subject: computer science | Times Higher Education (THE)

2006 white paper: 2-minute warning, the demise of the European software industry, authors: Adam Hale & Leo Apotheker (available from authors)

Miguelez, Ernest; Fink, Carsten. (2013) 'Measuring the International Mobility of Inventors: A New Database.' World Intellectual Property Organisation

D'Onofrio, Mary; Ding, Ethan. (2021) 'Scaling to $100 Million: The definitive benchmarking report on how cloud companies grow operationally efficient businesses and scale to $100 million in ARR (and beyond)', Bessemer Ventures, September

Athanasia; Gabrielle. (2022) 'The Lessons of Silicon Valley: A World-Renowned Technology Hub', CSIS Centre for Strategic & International Studies, February 10

Bhatnagar, Jay; Frick, Jonathan; and Ganti; Arun. (2023) 'Generative AI: AI will change how work gets done and the talent mix necessary to make it happen', Bain Consulting, September 18

Bages-Amat, Arnau; Harrison, Liz; Spillecke, Dennis; Stanley, Jennifer. (2020) 'These eight charts show how COVID-19 has changed B2B sales forever', McKinsey & co, October 2022

'The Future of Sales and Marketing Is Here', Boston Consulting Group. Feb 2022

D'Angelo, Stephen; Gauche, Bryan; Hawks, Audrey; Ward, Matt. (2023) 'Get Your B2B Sales Team Ready for the Power of Generative AI.' Boston Consulting Group, September 11

Big Tech salaries revealed: This is what developers, engineers, and product managers make at Google, Apple, Meta, and Amazon', Business Insider, Aug 23, 2023

Abri, Danielle. (2023). 'Where are all those tech workers going? A Silicon Valley exodus is shaking up the landscape. Layoffs, remote work and pandemic-era changes are reshaping where workers live and tech gets made', Washington Post, April 14
'Record capital under management for European private equity, venture capital industry in 2022: exceeds €1 trillion', Invest Europe, 21 Sep 2023

Browne, Ryan. (2023) 'Germany approves financial reforms to help its tech industry compete with Silicon Valley', CNBC, 17 November

Rawat, Adarsh. (2023). 'Quantum Computing Market: A Comprehensive Overview', BCC Research, October 17

Scale-up Institute (UK): Levelling up through digital, computing and technology skills

Vasiliu Feltes, Ingrid. (2023) 'Leadership in the Metaverse Era', Forbes, January 9

SEG 2023 Annual SaaS Report, 2023
UK tech industry demonstrated its resilience in 2022, reaching a combined market value of $1 trillion, Department for Digital, Culture, Media & Sport and Paul Scully MP Published 21 December 2022

Figures

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