

GP Bullhound Global Insights

GP.Bullhound

TECHNOLOGY PREDICTIONS

2022

TRENDS & INNOVATIONS SHAPING
THE GLOBAL TECH SECTOR

GP.Bullhound

DECEMBER 2021

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The view

FROM GP BULLHOUND

In its 15th year, our Technology Predictions report analyses how the latest trends and the leading visionaries in these ecosystems are shaping our future. Our methodology in selecting the coming year's predictions is shaped directly by our experience in working with the world's leading entrepreneurs and cutting-edge technologies, balanced with unique market insight gathered across our global network.

State of the Market

STATE OF THE MARKET

2021 has witnessed record-breaking growth in global technology M&A activity, driven by the need for companies to stay competitive and innovative during the unprecedented times we are in, which is considerably changing consumer habits. Companies are also rethinking their supply chains due to shifting geopolitical relations, trade wars, and environmental concerns.

Driven by critical component shortages, such as semiconductors, and internalisation of supply chains, the global supply chain landscape looks unprecedented. While the momentum of the tech world shows no sign of slowing, it is of tremendous importance to understand and navigate regulation wisely as it will continue to be the theme that factors how everything moves forward.

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At GP Bullhound we are proud to work with innovative, world-leading companies and their visionaries transforming innovative ideas into reality. We hope our 2022 tech predictions help you to navigate the opportunities and challenges to come.

TECHNOLOGY PREDICTIONS 2022

Over the course of almost two decades, GP Bullhound's Technology Predictions report has established a reputation as an industry-leading analysis of the trends and innovations shaping the global technology sector.

PREDICTION 1

CREATING A NEW ECONOMY



Creators taking the baton from gig

PREDICTION 2

THE RISE OF DECENTRALISED FINANCE (DEFI)

Broader institutional uptake to pave the way for mainstream adoption

PREDICTION 3

TECHNOLOGY SUPERCHARGING SUPPLY CHAINS

Supply chain crises force businesses to look to technology for new efficiencies



PREDICTION 4

THE NEXT ARMS RACE

ARM-based processors will power the artificial intelligence / machine learning revolution



PREDICTION 5

THE NEW VIRTUAL PLAYGROUND



Developing the next generation of interaction

PREDICTION 6

TECHNOLOGY DRIVING DIVERSITY, EQUITY AND INCLUSION

Software changing workplace demographics



PREDICTION 7

WEARABLES STRIKE BACK, POWERED BY ARTIFICIAL INTELLIGENCE

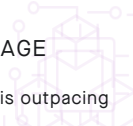


Wearables adoption extended

PREDICTION 8

THE GLOBAL SEMICONDUCTOR SHORTAGE

The proliferation of connected devices is outpacing supply chains



PREDICTION 9

ARTIFICIAL INTELLIGENCE AUTOMATING HEALTHCARE AT ALL LEVELS

Industry-leading solutions are leveraging artificial intelligence



PREDICTION 10

THE FUTURE OF PAYMENT

Buy Now, Pay Later (BNPL) is here to stay



Recap of GP Bullhound

2021 PREDICTIONS

The ultimate winner of 2021 was the consumer. From online shopping, payments and fitness, to how companies fought to understand and retain us, technology kept companies alive and permanently changing our behaviour patterns. Here's a quick look at what we got right.

YES

EDUCATION IN THE 21ST CENTURY

Edtech continued its surge in 2021 as schools realised the benefits of the optionality that digital learning provides to students and teachers. Large school districts such as Miami-Dade County in Florida signed high-profile deals with well-known edtech platform PowerSchool. Large enterprises have even supported schools to adopt more tech-based learning; US wireless network operator, Verizon, committed \$3bn+ to help schools increase connectivity and provide devices for students. Despite concerns about the Chinese government's restrictions on the local edtech market, broadly speaking, digital learning should continue surging given the format's clear benefits.

YES

THE NEW PATIENT DOCTOR RELATIONSHIP

Healthcare shifted the most of all sectors in 2020 due to healthtech, and continued its dramatic change in 2021, with increased buy-ins from health organisations worldwide to reap the benefits of tech-enabled healthcare. In the US, this was illustrated by Cleveland Clinic's partnership with IBM to enable high-performance computing, artificial intelligence, and quantum computing in healthcare. UK-based healthtech provider, Babylon Health, also announced a collaboration with Rwanda's National ID Agency (NIDA) to expand the reach of its primary care services in the country. These collaborations are expected to continue in the coming year.

YES

'I WANT IT NOW' E-COMMERCE

Online commerce continued to grow in 2021, up 9% from Q2 2020 to Q2 2021⁽¹⁾. Buy Online, Pick-up In Store (BOPIS) also continued to grow due to more e-commerce but also changing consumer sentiment. A Shipstation survey indicated that 62% of respondents now expect retailers to offer curbside pick-up, and 71% expect BOPIS to be permanently available. This shift in sentiment proves that the 'I want it now' e-commerce mindset is likely going to be a permanent commerce fixture.

YES

THE NEXT SOCIAL NETWORK

Largely driven by those aged 45-64, the number of hours spent gaming per week in the US hit 16.5 in 2021, up from 12.7 in 2019 and 14.8 in 2020⁽²⁾. In 2019, 65% of consumers in this age group played for c.9 hours per week; in 2020, 69% played for c.12 hours; and in 2021, 75% gamed for c.16 hours⁽²⁾. A large share of this gaming was on the Roblox and Fortnite platforms, which have built virtual worlds for individuals to connect, and Facebook is trying to replicate. The 'March Through Time' Martin Luther King Jr. event, built in Fortnite in partnership with Time Magazine, gathered over 8.1 million players⁽³⁾. More interactions are now virtual.

YES / NO

CONSUMERS TAKING CONTROL OF PRIVACY

Many US states have followed California, enacting wide-ranging digital privacy laws to protect consumers. This further stoked technology companies, such as Apple, to improve the privacy functionality on their platforms. In early 2021, Apple introduced an important update to its operating system that streamlines how developers of external apps, such as Facebook, track Apple's users. Those users must explicitly agree to have their data collected. Consumers still do not have full control, however, as other platforms, such as Google and Facebook, are not fully transparent on data practices, making the full privacy shift incomplete.

YES

SURVIVAL OF THE FITTEST

At-home fitness continued to grow in 2021, with a bit of a twist from 2020. Whereas many of the companies that saw explosive growth were hardware-based in 2020, such as Peloton, Mirror and Tonal, 2021 was the year of more comprehensive software offerings. Companies, such as FitOn, have developed platforms that address all areas of the body and are more affordable than large hardware purchases. This shift helped digital fitness continue its momentum from 2020 as consumers permanently look to digital mediums for fitness.

YES

CASH IS NO LONGER KING

Digital payments continued to surge in 2021, aided by changing consumer sentiment. Nearly 47% of consumers say they will not shop at a store that does not offer a contactless way to pay⁽⁴⁾. Digital payments also surged in 2021 due to an increased interest in Buy Now, Pay Later (BNPL). In 2020, BNPL accounted for 2.1% of all global e-commerce transactions. Led by extraordinary growth in Europe, this is expected to double by 2024⁽⁵⁾. Square's acquisition of Afterpay has strengthened the argument that BNPL will be a critical component of the payment infrastructure, increasing the volume of e-commerce globally.

YES / NO

THE FUTURE OF WORK

Many companies have learned how to construct optimal environments for their teams in a post-Covid world. Some companies, such as Amazon, learned that their organisation can function with employees completely remote, while others identified that their teams function better in person, such as Bank of America. While 2021 solidified the possibility of remote work, the future is likely to remain a hybrid of remote and in-person, as individuals and companies work to understand how to strike the right balance between employee satisfaction and maximum productivity.

YES

MARTECH ALL-IN ON CUSTOMER EXPERIENCE

The focus of martech in 2021 was the customer. This was demonstrated by the rapid growth and fundraising of platforms focused on customer experience automation, such as ActiveCampaign and Iterable. These platforms experienced tremendous growth due to an increasing need for companies to automate their customer experience and gain insights via artificial intelligence to retain and attract new customers. Large incumbents have also realised the need for artificial intelligence in their customer experience processes, as shown by Zendesk's acquisition of Cleverly.ai.

YES

EPIC'S ULTIMATE BATTLE ROYALE...WITH APPLE

The pressure on Apple continued in 2021 regarding its developer fees. Epic's lawsuit against Apple is undergoing the appeals process, but the initial judgement ordered Apple to allow developers to provide alternative payment rails for app users. This judgement, which is still pending as Apple requested a stay on the injunction, had a knock-on effect as Google lowered its developer fee to 15% for new developers from 30% for their first year of service. As the fight continues against large incumbents, the momentum seems to be in favour of the developers.

Note: 1) Statista (4 September 2021); 2) Makuch, E. (2021, 7 October) Time And Money Spent On Games... Gamespot. Retrieved from www.gamespot.com; 3) Park, G. (2021, 28 September) Epic Games believes the Internet is broken... The Washington Post. Retrieved from www.washingtonpost.com; 4) Caminiti, S. (2021, 17 August) Digital payments soared during the pandemic... CNBC Technology Executive Council. Retrieved from www.cnbc.com; and 5) The Global Payments Report 2021. Worldpay from FIS. Retrieved from www.worldpay.globalpaymentsreport.com



Technology predictions

2022

Our 2022 predictions focus on how software and artificial intelligence technology are dismantling some of the major traditional pillars of society, such as the workplace, how we bank and access healthcare, how we socialise, as well as how we meet the supply and demand issues impacting the space.

SNAPSHOT OF WHAT'S SHAPING TECH FOR 2022



THE EVOLUTION OF INTERACTION

We are no longer limited by geographies, or even our physical presence, the metaverse is the next universe to

- More immersive experiences for live events, family gatherings and shopping with friends
- Working from the metaverse is on the horizon, with Big Tech debuting their virtual workplaces, helping to achieve the hybrid office return
- Business opportunities, especially in marketing and branding, will create new industries; 2022-2023 could see beta versions or final products
- Non-fungible tokens in the form of clothing, art or other objects will resemble the next generation of designer / exclusive objects



ACCESSIBLE FINANCE AND HEALTHCARE

Tech innovation is challenging traditional markets, products and services

- Buy Now, Pay Later to reach \$995bn with 1.5 billion users by 2026, and later a trillion-dollar market, as tech and finance giants take residence
- Decentralised finance tripled in 2021 to \$90bn+ in total value locked, accelerating as it integrates with massive user-base sectors, like gaming
- Healthcare providers are looking to tech for better capabilities and tools, and accessibility to make data-driven decisions for their patients
- Wearables producers are using their proprietary data to develop powerful artificial intelligence engines, driving actionable insights for users on finance, health and security



THE CHANGING WORKPLACE

People want to control when, where and how they work

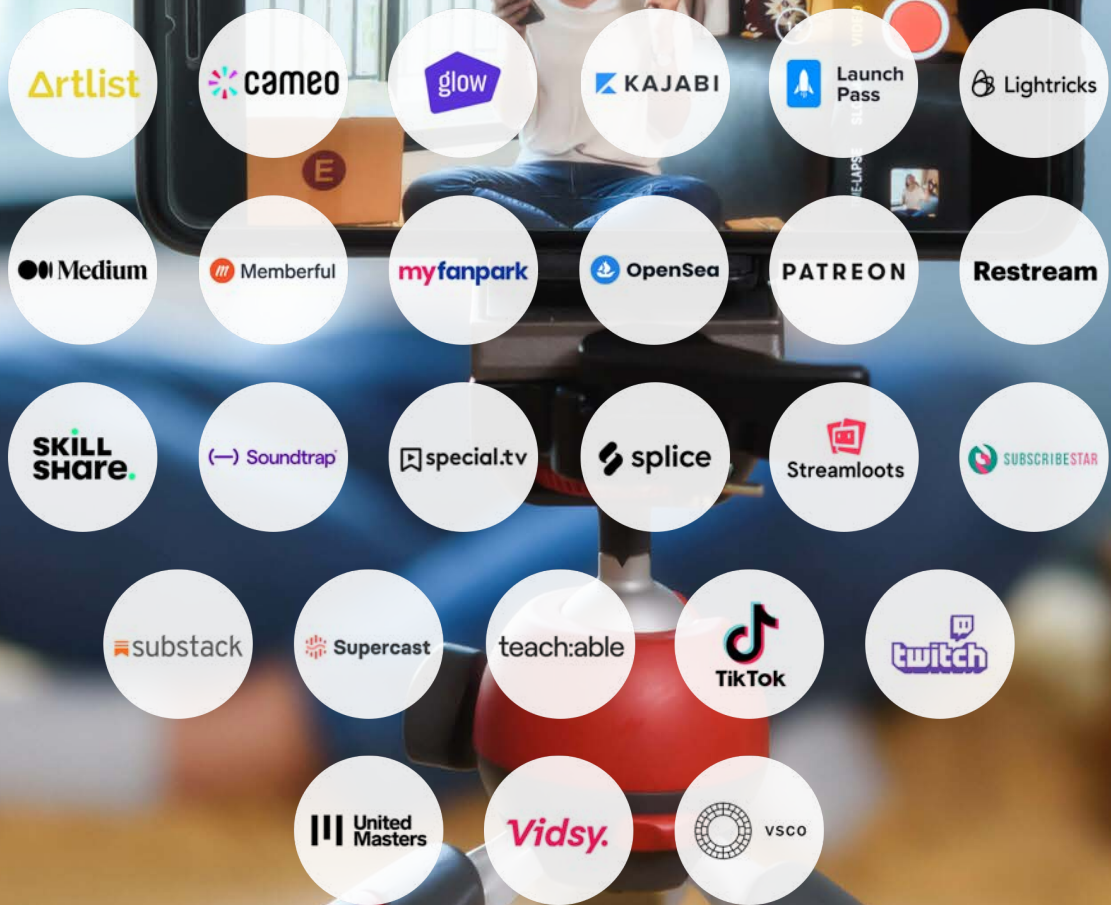
- The new creator economy is decoupling from platforms as creators seek to own their work; influencers earn as much as doctors, and non-fungible tokens are breaking records
- Data is power, and companies are utilising software and artificial intelligence to achieve better diversity, equity and inclusion, as well as accountability in the workplace
- Recruitment has historically been driven by employers, but the job market is tilting in job seekers' favour as they search for companies that share their values



MEETING EVER-GROWING DEMAND

Increased consumer demand is leading to innovation, but not without its challenges

- As more tech companies transition to the ARM platform, new software will be cheaper and easier to develop, and legacy software will be retrofitted
- Supply-chain software platforms have become a critical element for companies, and early adopters have the competitive edge
- The global semiconductor shortage continues with the proliferation of connected devices outpacing supply chains, and governments are stepping up to bolster chip production



Creating a new economy

CREATORS TAKING THE BATON FROM GIG

Globally, there are around 50 million influencers on YouTube, Instagram, Twitch, TikTok, and other social media platforms⁽¹⁾. Today's influencers are ushering in a new creator economy where they can create and monetise their own content served to fans through the many channels.



FLEXIBILITY IS KEY

The beauty of the creator economy is that influencers do not need work the traditional 9-5, even though the creator economy represented nearly 400,000 jobs in the US in 2020⁽²⁾. An Inzpire.me study revealed that Instagram influencers need just 42,575 followers to earn the average UK salary (£29,009), creating only eight posts and eight stories per month. Top influencers can earn more than 420x the average annual American income (\$121,760)⁽³⁾ – that is over 200x the median income for a physician (\$206,500)⁽⁴⁾. Further illustrating flexibility as an advantage, many micro influencers (between 10,000 and 50,000 social media followers) pursue their passion as a secondary occupation.

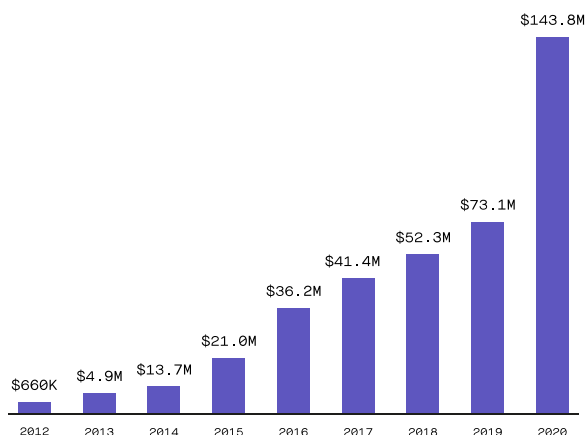
BRANDS RIDING THE CONTENT WAVE

Influencers are now empowered to create content that aligns with the interests and values of their fans, which garners interest from brands. These clear benefits from the creator economy should lead to an increase in the amount of content produced on these platforms.

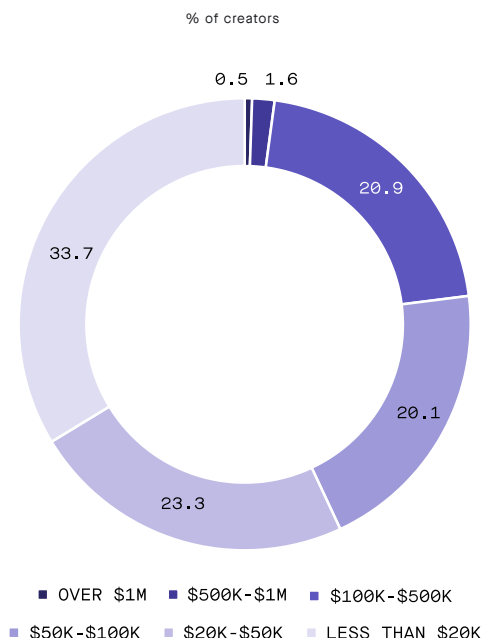
DECOUPLING FROM PLATFORMS

Another key component of the rise of the creator economy will be the decoupling from platforms. This has already begun, with world-renowned artist, Beeple, selling a non-fungible token for \$69m at Christie's⁽⁵⁾. As some work will be less conducive to non-fungible tokens than artwork, the decoupling from platforms will not be as evident near-term, but this trend is set to gain traction as creators begin to seek to own their work.

CREATOR ECONOMY SURPASSING \$100M IN EARNINGS



INFLUENCER EARNING POWER AS OF 2021



Sources: GP Bullhound Insights, CB Insights, Influencer Marketing Hub; Note: 1) Klein, M. (2020, 23 Sept) 50 Million Join The 'Creator Economy' Thanks To... Forbes. Retrieved from www.forbes.com; 2) Solsman, J. (2021, 6 Oct) YouTube study: 'Creator economy' supports... CNet. Retrieved from cnet.com; 3) Geysler, W. (2021, 24 Sept) An In-Depth Look at Influencer... Influencer Marketing Hub. Retrieved from www.influencermarketinghub.com; 4) U.S. News (as of 1 November 2021); and 5) Crow, K.; Ostroff, C. (2021, 11 March) Beeple NFT Fetches Record Breaking... The Wall Street Journal. Retrieved from www.wsj.com.



The rise of decentralised finance (DeFi)

BROADER INSTITUTIONAL UPTAKE TO PAVE THE WAY FOR MAINSTREAM ADOPTION

Decentralised finance (DeFi) is booming following two years of astonishing growth. Total Value Locked (TVL) which measures the value of cryptocurrency deposited as collateral, grew 14x last year, surpassing \$1bn in June 2020⁽¹⁾. The rapid pace of innovation in crypto custody and compliance is driving broader institutional uptake, paving the way for mainstream adoption which remains at an early stage relative to the wider crypto industry.

DEFI REDEFINING TRADITIONAL FINANCE

At the time of writing, over \$100bn is now locked across DeFi protocols on the Ethereum blockchain, with TVL growing 8x over the last year⁽²⁾. The rapidly expanding DeFi ecosystem of integrated protocols has attracted institutional capital in search of higher yields. In the last 12 months, over \$6tn in transactions were settled on Ethereum with more than half attributed to stable coins which have been a key driver of DeFi growth⁽³⁾.

DEFI TVL CONTINUES TO GROW

The Ethereum blockchain network on which most DeFi applications are built laid the foundations for a broad and thriving ecosystem of decentralised applications (or dApps) and developers⁽⁴⁾. By allowing anyone to create protocols that replicate existing financial services using public blockchains and smart contracts, community-run platforms such as Ethereum are enabling secure and permissionless financial transactions without the need for intermediaries.

Almost every area of the financial system, from borrowing and lending, to asset management, exchanges and derivatives, is being rebuilt with DeFi protocols replacing decades-old infrastructure. These decentralised financial applications are redefining traditional financial services and offering unprecedented levels of global transparency, interoperability, and equality of access.

OPPORTUNITIES AND CHALLENGES FOR BROADER DEFI ADOPTION

As with any emerging and evolving technology, adoption challenges exist including scalability, governance and regulatory risks. The explosive growth in non-fungible token sales has been a key driver of blockchain adoption, whilst also contributing to increased congestion and high transaction costs (or Gas Fees) on the network. A number of scalability challenges are being addressed by upgrades to Ethereum, including the planned switch to a proof-of-stake consensus mechanism, along with the introduction of shard chains to increase capacity and transaction speeds.

Other promising scaling solutions, which are now attracting strong VC interest, include Layer-2 rollups leveraging advances in zero-knowledge cryptography to execute transactions off-chain. In parallel, the growing popularity of 'Play-to-Earn' crypto games like Axie Infinity will be a key driver of broader mainstream adoption in the longer term.

INTERESTING FACT

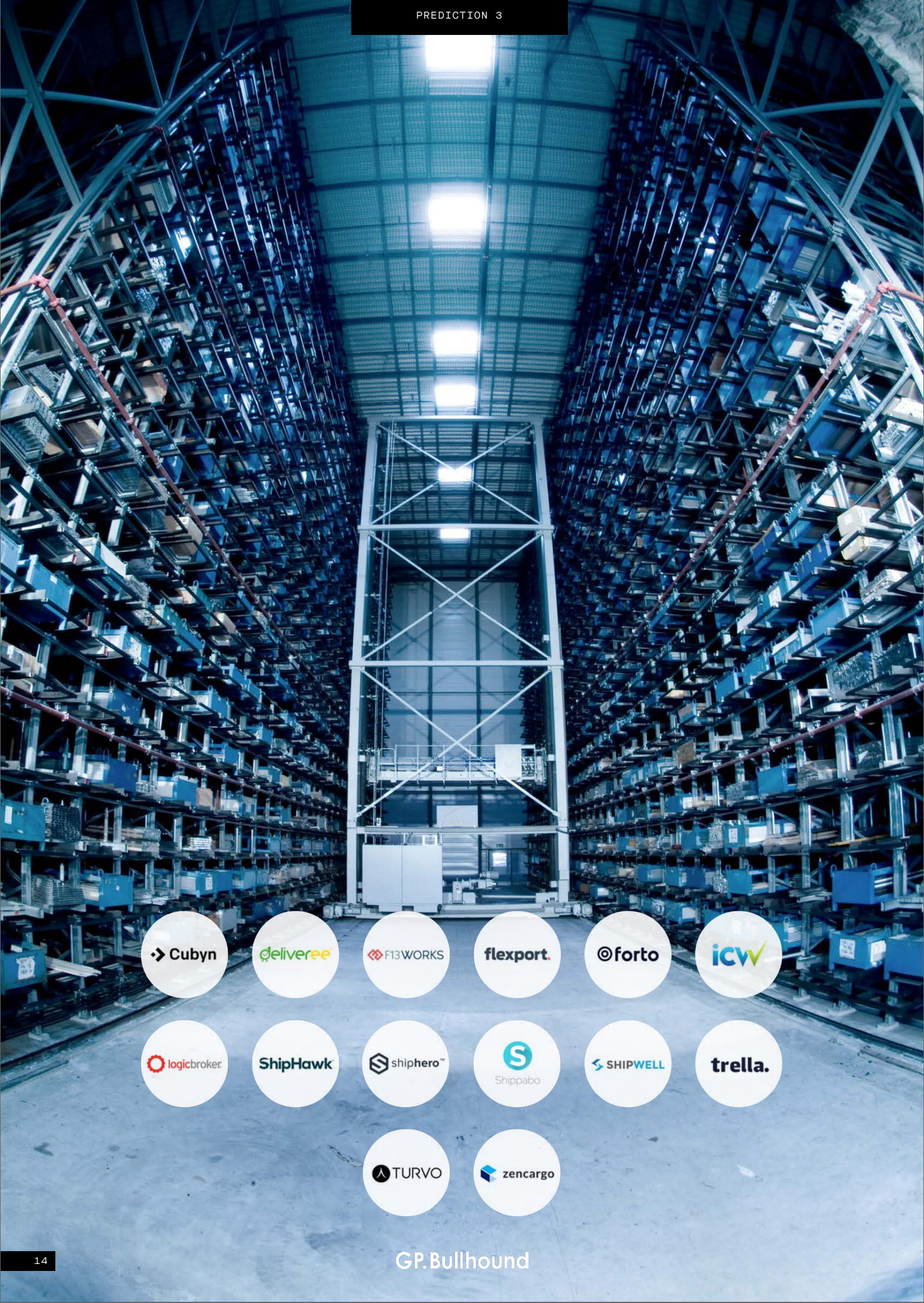
The term DeFi was born in an August 2018 Telegram chat between Ethereum developers and entrepreneurs including Inje Yeo of Set Protocol, Blake Henderson of Ox and Brendan Forster of Dharma

Other options considered:
Open Horizon, Lattice Network and Open Financial Protocols

DEFI TVL (USDM)



Sources: GP Bullhound Insights, GP Bullhound Insights report: Token Frenzy, Ethereum, and Defi Pulse; Note: 1) 2021 Global Crypto Adoption Index, Chainalysis, October 2021; 2) Defi Pulse (27 October 2021), 3) Messari



- Cubyn
- deliverree
- F13WORKS
- flexport.
- forfo
- icw
- logicbroker
- ShipHawk
- shiphero™
- Shippabo
- SHIPWELL
- trella.
- TURVO
- zencargo

Technology supercharging supply chains

SUPPLY CHAIN CRISES FORCE BUSINESSES TO LOOK TO TECHNOLOGY FOR NEW EFFICIENCIES

The Covid-19 pandemic severely impacted global supply chains. Companies are now struggling to restore pre-pandemic inventory levels due to raw input and labour shortages along with surging prices, forcing companies to turn to technology to better optimise their supply chains. As a result, supply chain software should see a surge of adoption in the coming year as its global market size is expected to grow to over \$20bn in 2022⁽¹⁾.

THE RACE FOR GOODS

Suppliers had to pause the production of goods in March 2020, and then consumers reduced their consumption following government-mandated restrictions on movement. Now, suppliers and consumers are trying to resume pre-pandemic supply levels, which has led to supply-chain bottlenecks.

PROBLEMATIC SUPPLY CHAINS

Companies have faced shortages and price increases of raw materials such as plastic, steel and resins necessary to produce goods. Shipping and labour shortages also have forced companies to look for ways to optimise supply chains through strategic sourcing and freight forwarding, which is provided through supply-chain software platforms.

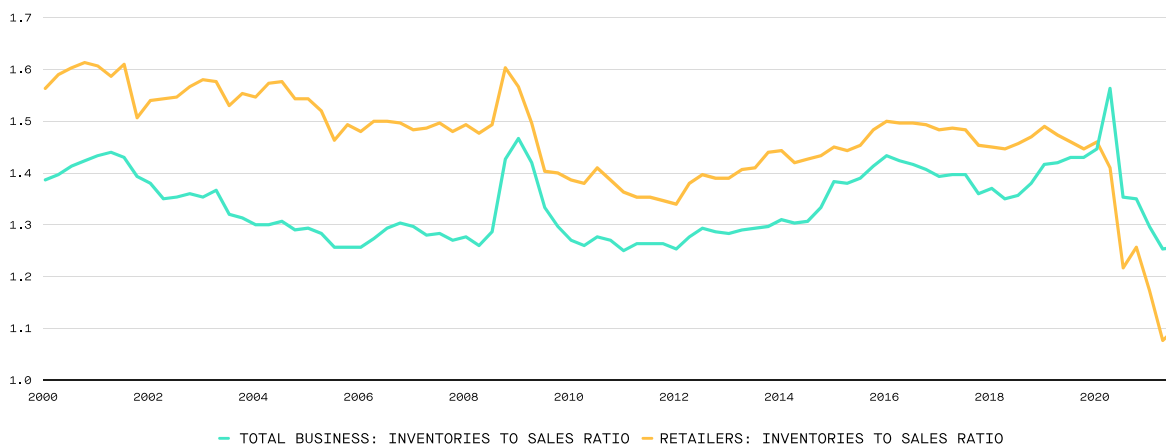
EARLY SOFTWARE ADOPTERS' LEG UP

Supply-chain software has become a critical element for companies to find potential issues and fix them before they turn into debilitating production problems. Additionally, these software platforms have been critical in helping companies strategically source raw materials effectively.

TECH TO THE RESCUE

Supply-chain software platforms will continue to gain traction across the global supplier base as they realise the necessity of an efficient supply chain. The clear benefits derived from insights in production abroad, to shipping goods locally, will be a competitive advantage by the early adopters. For example, health and wellness brand, TB12, has seen its fulfilment costs shrink by 25% since switching to ShipBob, a tech-enabled 3PL company⁽²⁾.

DWINDLING INVENTORY FOR BUSINESSES



Sources: GP Bullhound Insights, Federal Reserve Economic Data (as of 1 Nov 2021); Note: 1) Statista (as of 27 Oct 2021, Lopienski, K. (2021, 24 September) How to Measure Warehouse KPIs... ShipBob. Retrieved from www.shipbob.com



Expert view



PEYMAN ZAMANI
FOUNDER & CEO

Logicbroker is a leading global provider of cloud and supply chain automation software to enterprises, brands and retailers for running digital e-commerce businesses. Its best-in-class drop ship SaaS platform connects buyers, sellers and 3PLs, empowering them to increase both GMV and scale in the evolving e-commerce space.

Drop ship automation and curated marketplaces are a massive global market, expected to top \$5tn by 2022. The Logicbroker platform and expert team behind it deliver off-the-charts growth for retailers, brands and suppliers looking to grow their online business fast by extending their assortments without carrying inventory. What Logicbroker can do in days or weeks, their competitors do in months, years or never.

Software has become a critical investment for retailers and suppliers within their supply chains, particularly software that enables connectivity.

Our software delivers that connectivity and ensures visibility to products, inventory, orders and shipments, while securely processing a high volume of transactions in real-time.

The rapid adoption of e-commerce has caused massive ripples throughout the world over the last year and a half. Consumer behaviour continues to change. Retailers need to be innovative and respond with inventory availability not just through drop ship but through all other digital-enabled capabilities: buy online, pick up in store; buy in store, ship to home; curbside pick-up; ship from store; and other avenues. These are all necessary components of an omnichannel fulfilment strategy.

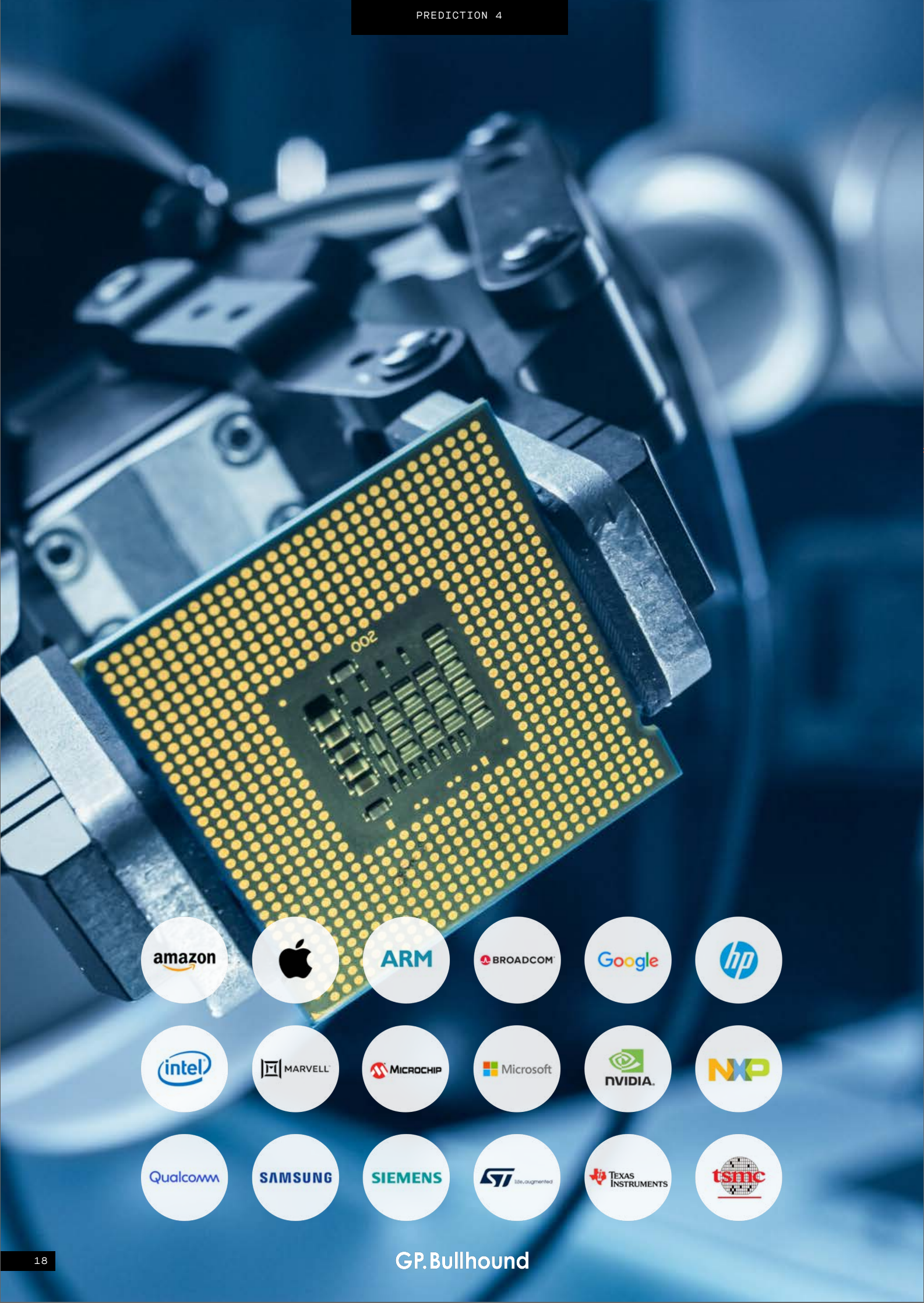
With US online sales set to reach a record high this year that was predicted to be reached in 2025, the tipping point has happened. It is not e-commerce anymore, it is retail, with the majority of retail sales expected to be digitally influenced. That is the only place to find retail growth. Digital sales growth, predictably, has trickled down to large suppliers who have had to adapt how they operate to fulfil needs and navigate supply chains.

We have several customers, including Samsung, Fossil and Hasbro that have global footprints and we have launched their automated drop ship and marketplace solutions in APAC, the EU and North America.

There are commonalities that new consumers want to buy digitally and need their purchases shipped to their homes, not because of the Covid-19 pandemic, but because it is more convenient.

Every virtual and in-person conference I attend, there is always a session about the 'future of e-commerce'. I cannot predict the future, but to thrive in retail, e-commerce needs to be a top strategy. Pay attention to your consumers and brands and collect great data to make decisions about your e-commerce strategy execution.

If you are an e-commerce veteran like me, the next decade will be one of the most exciting times in e-commerce – it will be the only growth answer for all retailers. I am very excited to see more innovations and fortunate to be able to continue leading Logicbroker to be a part of this incredible decade.



The next ARMs race

ARM-BASED PROCESSORS WILL POWER THE ARTIFICIAL INTELLIGENCE / MACHINE LEARNING REVOLUTION

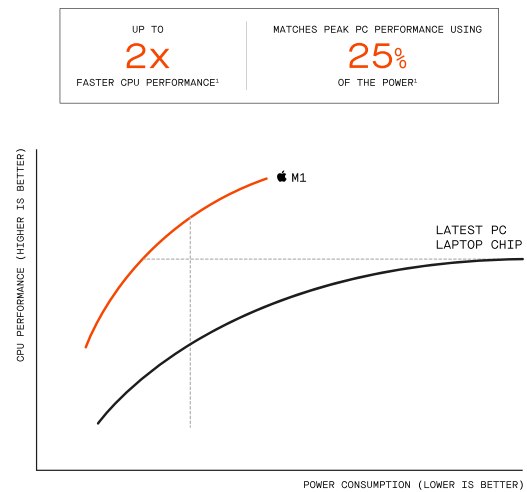
For decades, Intel's x86 processors have dominated the fixed-machine landscape, while ARM processors have been limited to use in mobile devices. Due to the use of RISC, ARM-based chips are much more efficient and versatile than their Intel counterparts, bringing distinct advantages for applications like artificial intelligence / machine learning and the ability to be deployed either in mobile or desktop devices. As more tech companies transition to the ARM platform, new software will be cheaper and easier to develop, while legacy software will need to be retrofitted.

APPLE IS A FIRST MOVER

An increasing number of companies are shifting devices to ARM-based processors, with some opting to develop their own competing CPUs, such as Apple's M1 chip included in the latest MacBook Pro. Google and Microsoft are also developing their own ARM-based processors for use in personal devices and cloud servers.

By developing their own CPUs, tech companies can more effectively implement artificial intelligence algorithms within their products. Custom accelerators can be optimised to run each device's software stack more efficiently, enabling more real-time intelligent decision-making.

ARM EFFICIENCY GAINS OVER X86 PROCESSORS



ARM CAN EXPAND THE POTENTIAL OF ARTIFICIAL INTELLIGENCE / MACHINE LEARNING

The range of uses for ARM technology is as broad as the applications for artificial intelligence / machine learning, with industries such as healthcare and transportation most likely to benefit in the near term. Given the versatility and energy efficiency of ARM processors, the physical applications cover the entire array of IoT devices. ARM-powered devices will be able to run advanced artificial intelligence algorithms on the edge to process more data and make better inferences. To date, their use has mainly been limited to improving smart phone functions, such as facial recognition, fingerprint scanning, and voice-activated commands. Future uses could make autonomous vehicles safer, improve the functionality of wearable medical devices, and make faster inferences in countless other fields.

NVIDIA TO INVEST HEAVILY TO SUPPORT ARM

In 2020, NVIDIA, an American multinational technology company, announced a \$40bn agreement to purchase Cambridge-based Arm, a leading developer of RISC CPUs. The transaction is undergoing various government competition authority reviews. If approved, NVIDIA's ability to produce chips at scale will likely provide opportunities to take on high-profile contracts, which should lead to broader customer adoption.

Sources: GP Bullhound Insights, Apple, and Nvidia



- ACTIVE THEORY
- amazon
- Apple
- AUTODESK
- coherence
- Decentraland
- EPIC GAMES
- Meta
- Microsoft
- MINECRAFT
- nextech AR
- NVIDIA
- ROBLOX
- Tencent 腾讯
- SANDBOX
- unity
- zoom

The new virtual playground

DEVELOPING THE NEXT GENERATION OF INTERACTION

The metaverse is a world of interconnected virtual communities where people meet, work and play, using virtual reality headsets, augmented reality glasses, smartphone apps or other devices. It is set to provide an environment that can change the way we interact, live life and could fully serve as reality for others. Business opportunities, especially in marketing and branding, will create new industries as users shift their focus from the web to the more immersive experience the metaverse can provide. We can expect beta versions of the metaverse to release in 2022 while some companies are promising a product by 2023.

A NEW APPROACH TO ADVERTISING

Advertisers will operate within the metaverse by offering and sponsoring immersive experiences. An example of this is how Epic Games's Fortnite held live concerts and Warner Bros. premiered the trailer of its sci-fi film, Tenet, at a Fortnite in-game movie drive-in.

WORK FROM THE METAVERSE

Society has come to embrace the shift to remote- and online-enabled worlds. Facebook recently announced its dedication to the metaverse and has rebranded to Meta. Additionally, both Facebook and Microsoft have debuted their early versions of what working from the metaverse might look like.

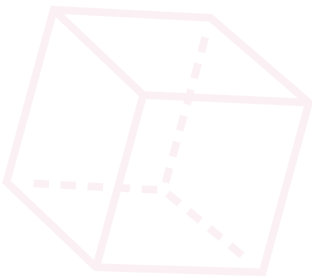
Facebook has shown early designs for Horizon Workrooms that will utilise the Oculus Quest headsets. Microsoft has shown a virtual workspace that will integrate classic Microsoft apps such as PowerPoint. Currently, 70% of employers are talking about a hybrid office return post-pandemic, which should further the opportunities for metaverse-enabled workplaces⁽¹⁾.

DIGITAL DESIGNER

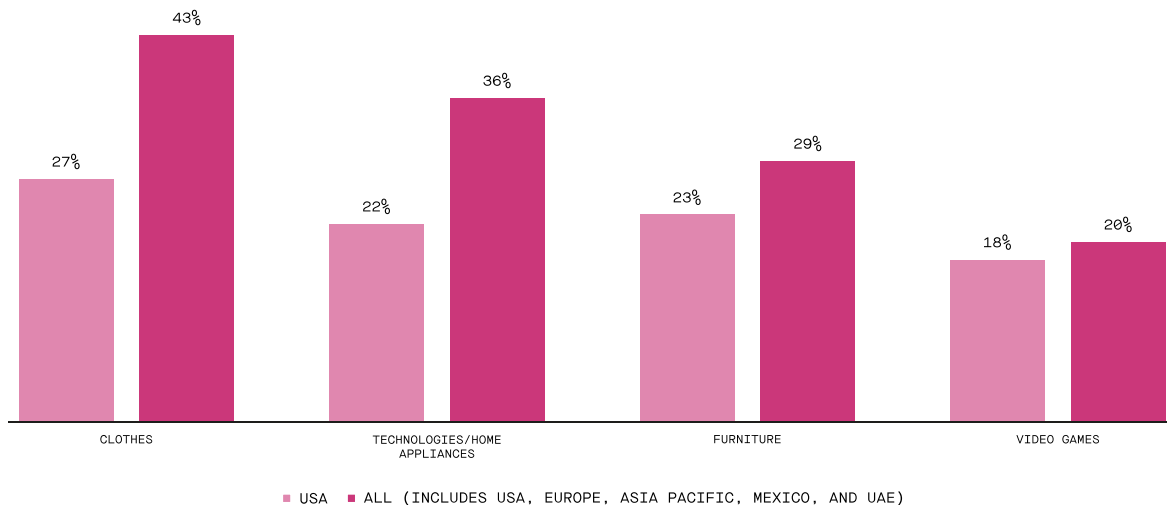
Today's features in VR / AR will likely be adapted to function in the metaverse. Online shopping is growing each year and in a recent survey 43% of respondents were excited about VR / AR applications in shopping that will allow them to virtually try on clothes⁽²⁾. As such applications are built, we could see a metaverse where users try on clothes in a store with friends.

DECENTRALISED WORLDS

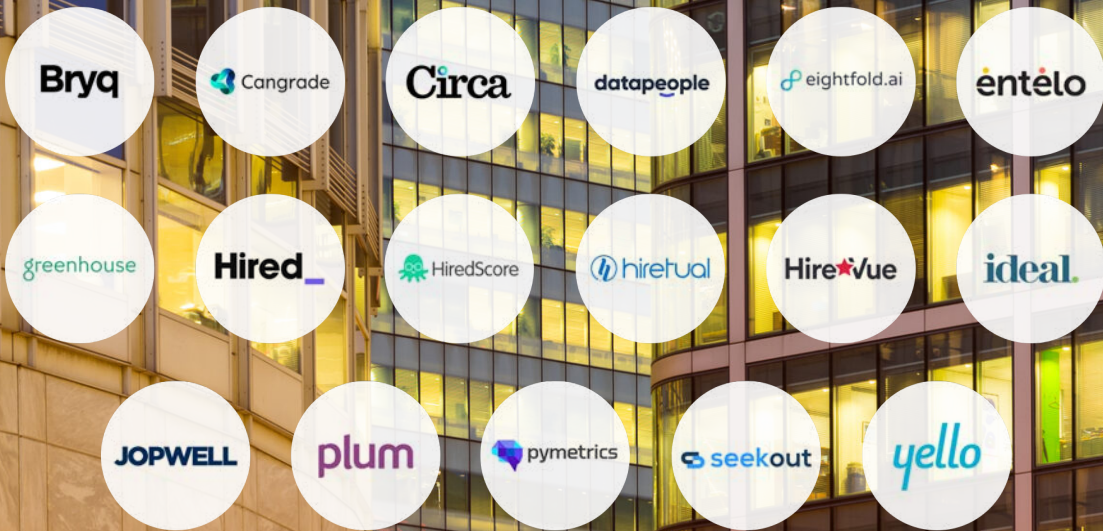
The metaverse will likely be enhanced by exclusive content such as non-fungible tokens on Blockchain. Non-fungible tokens in the form of clothing, art or other objects will resemble the next generation of designer / exclusive objects. Digital assets are already being created, bought and resold in games like Roblox for in-game currency or cryptocurrency as seen in Decentraland, a blockchain-based virtual reality platform.



CUSTOMERS ARE EAGER FOR ONLINE SHOPPING VR INTEGRATIONS



Sources: GP Bullhound Insights; Note: 1) Rosenbaum, E. (2021, 8 July) The latest numbers on how many workers... CNBC. Retrieved from www.cnbc.com; and 2) Marketing Charts (June 2021)



Technology driving diversity, equity and inclusion

SOFTWARE CHANGING WORKPLACE DEMOGRAPHICS

As the demand for diversity, equity, and inclusion (DEI) is on the rise across public and private sectors, artificial intelligence- and machine learning-driven algorithms are starting to drive unbiased recruiting solutions. These are creating more opportunities for marginalised candidate groups and helping companies make data-driven choices.

DATA IS POWER

The increasing amount of candidate data encourages advanced software solutions to power DEI-enabled recruiting. The \$26bn online recruitment market⁽¹⁾ is a vast universe of data with approximately over 770 million self-reported profiles just on LinkedIn⁽²⁾ and more than 2.5 billion multi-sourced profiles on People Data Labs⁽³⁾.

UTILISING SOFTWARE TO ACHIEVE DEI IN THE WORKPLACE

Sourcing companies are now empowered to utilise the world of candidate data to create DEI-enabled analytics tools. With only 24% of tech workers being women in GAFAM⁽⁴⁾ (Google (Alphabet), Amazon, Facebook (Meta), Apple, and Microsoft), Big Tech and other male-dominated industries are looking to level the playing field by using predictive analytics alongside artificial intelligence- and machine learning-enabled software.

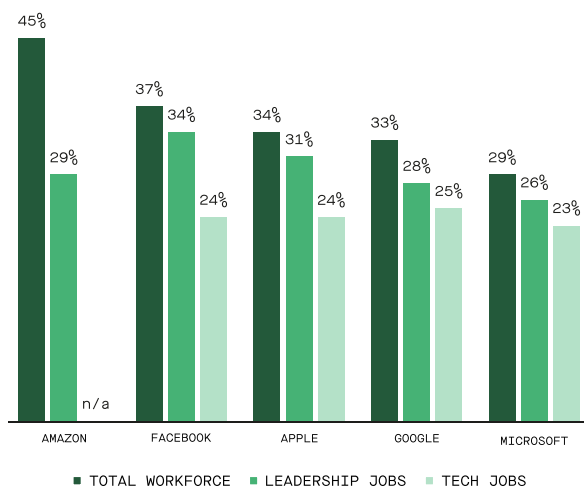
To achieve DEI recruiting homogeneity, companies are seeking unbiased, blindfolded hiring methods. On average, candidates from marginalised cohorts list 16% fewer keywords than unmarginalised cohorts in their profiles⁽⁵⁾. Companies like Entelo are training in-house artificial intelligence capabilities to detect underrepresented candidates and predict underlying skills.

SOFTWARE-DRIVEN ACCOUNTABILITY FOR EMPLOYERS

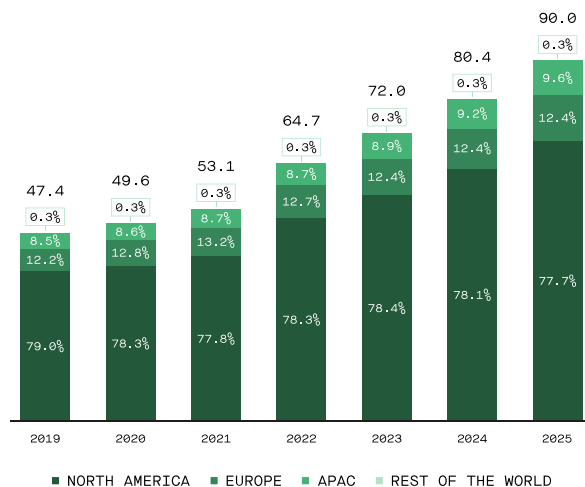
Another frontier of DEI-enabled technology will be applicant-facing predictive analytics that focus on organisational culture fits. Populated with extensive pre-hire and post-hire data, artificial intelligence-enabled analytics tools will make predictions about an applicant's future fit and performance in a company. This way, an applicant can make data-driven choices when selecting employers and, potentially, help companies to diversify their workplaces.



WOMEN IN BIG TECH



GROWTH OF HR TECHNOLOGY AROUND THE WORLD



Sources: GP Bullhound Insights and Statista; Notes: 1) Research And Markets Global Online Recruitment Market (2021 Edition); 2) LinkedIn; 3) People Data Labs, The Future of Recruiting; 4) Richter, F. (2021, 1 July) Women's Representation in Big Tech. Statista. Retrieved from www.statista.com; and 5) Savant, S. (2019, 9 Aug) The Beginner's Guide To... Entelo Engineering. Retrieved from engineering.entelo.com



Expert view



LIZ WESSEL
CO-FOUNDER & CEO

WayUp is the number one solution for employers who are serious about increasing diversity in their organisations. Since our launch in 2014, we've created a community of nearly seven million students and recent grads across the US that span nearly every campus and university in the country.

We want early-career candidates of all backgrounds to easily find opportunities at top companies, and we want to empower employers to move the needle on sourcing talented, diverse workforces. We're a double-sided platform, but the goal of both sides is the same: to meet the best match possible and to open their eyes to opportunities (or people) that they otherwise wouldn't have found.

Unlike many traditional marketplaces, where one side is looking for the lowest price point, and the other side is looking to make the most profit, our marketplace is aligned with similar goals, which makes our job a lot of fun.

Our customers are leaders across talent acquisition, campus recruiting, and diversity and inclusion, from startups to Fortune 500 companies. They use WayUp to either source, attract, or engage with diverse talent, or to gain analytical insights into their recruitment processes to uncover any unconscious biases.

Within our database (which grows at an average rate of 17,000 new candidates each week), over 71% of candidates self-identify as being in a demographic group that most companies consider 'underrepresented minorities'.

While most companies tend to blame their lack of diversity on not having enough diverse applicants, the problem is more than just that – we notice that parts of their process unfairly help one demographic group over another.

We've experienced rapid growth – tripling our customer base in just the last 18 months. This growth speaks to the commitment that many employers are (finally!) making to drive necessary change and establish more diverse workforces.

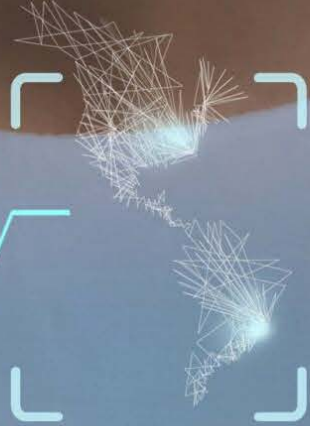
In terms of what makes us unique, outside of our focus on diversity, equity and inclusion (DEI) and our matching system, since the merger of WayUp and Yello, we are also the first end-to-end DEI recruitment platform offering everything from sourcing to branding, to interview scheduling, an event platform, as well as CRM and ATS integrations.

There are also many other aspects that differentiate us from our competitors – whether it's our candidate-first experience or the fact that our diversity data is self-reported by our users, making it fully compliant with the US Equal Employment Opportunity Commission and the Office of Federal Contract Compliance Programmes.

The future of DEI is all about data, where employers will seek to understand the gaps they currently have in their recruitment and retention efforts.

With all of the above being said, I don't think using WayUp is enough at all. Once you hire diverse talent, it's important for employers to focus on including that talent into their companies in a way that candidates of all backgrounds have an equal chance of being promoted.

Vernā Myers once said, "diversity is being invited to the party; inclusion is being asked to dance"... I love this quote, and while WayUp can help employers tremendously with hiring more diverse workforces, I hope employers also realise that hiring is only the first step in ensuring an equitable workplace for all.



- AliveCor
- Apple
- ATHOS
- AUGMEDIX
- fitbit
- GARMIN
- Google
- htc
- HUAWEI
- LG
- MATRIX
- Microsoft
- misfit
- medicsen
- OURA
- proteus
- SAMSUNG
- Siren
- SONY
- VUZIX
- WHOOP
- WITHINGS
- xiaomi

Wearables strike back, powered by artificial intelligence

WEARABLES ADOPTION EXTENDED

Beyond the extended adoption of wearables, including fitness tracking, health analytics, smart watches and many more, key providers are leaning towards software rather than hardware.

DATA BECOMES THE PRODUCT

Wearables producers are no longer staying hardware-only. They are encouraged to invest and develop powerful artificial intelligence engines to drive actionable insights for their users. With the global IoT analytics market expected to reach \$59bn by 2021 at a 31% CAGR⁽¹⁾, wearables producers are realising the value of the universe of proprietary data that they are sitting on. By utilising artificial intelligence-enabled software, wearables companies can now provide granularly detailed data analytics and even produce predictive analyses about health, physical performance, and more to users.

AN END TO LARGE, FRONTLOADED HARDWARE COSTS

Companies have faced shortages and price increases of raw materials such as plastic, steel and resins necessary to produce goods. Shipping and labour shortages also have forced companies to look for ways to optimise supply chains through strategic sourcing and freight forwarding, which is provided through supply-chain software platforms.

VIEWS ON PRIVACY HAVE CHANGED: ONLY IF IT'S USEFUL

Users are getting more familiar with monitoring and using the data and insights to make decisions about many aspects of their lives like health and physical performance. As the familiarity for data collection grows, the public may become more supportive of providing information but also more cautious about who they consent to. Selectivity about data consent seems to have increased due to media-present topics like security breaches, third-party data trade and hacking.

THE LION'S SHARE

Specialised companies like WHOOP and Fitbit, and larger generalists like Apple and Samsung, are fighting for the lion's share of the wearables market. Even though large generalists such as Apple, Samsung, Huawei and Xiaomi take up about 50% market share⁽²⁾, the rest of the market is highly fragmented with specialised players. A new segment of niche wearable producers is set to emerge in areas of finance, healthcare and security as a result of increased complexity in user preferences.

WEARABLES' END USER SPENDING BY TYPE

DEVICE TYPE	2019	2020	2021	2022
SMARTWATCH	18,501	21,758	25,827	31,337
WRISTBAND	5,101	4,987	4,906	4,477
EAR-WORN	14,583	32,724	39,220	44,160
HEAD-MOUNTED DISPLAY	2,777	3,414	4,054	4,573
SMART CLOTHING	1,333	1,411	1,529	2,160
SMART PATCHES	3,900	4,690	5,963	7,150
TOTAL	46,194	68,985	81,499	93,858

Sources: GP Bullhound Insights and Gartner (January 2021); Note: 1) Market Research Future (2021, 18 August) IoT Analytics Market Size to Reach... GlobeNewswire. Retrieved from www.globenewswire.com; and 2) Statista (1 Nov 2021)



The global semiconductor shortage

THE PROLIFERATION OF CONNECTED DEVICES IS OUTPACING SUPPLY CHAINS

The Covid-19 pandemic has pressured global semiconductor supply chains, impeding the production of goods ranging from cars and computers to appliances and toothbrushes. As semiconductor usage continues to increase, such shortages could become a recurring problem and limit the capabilities of supporting software.

SUPPLY CHAIN SHORTAGE: A WORSENING CRISIS

Following years of supply-chain constraints related to the US-China trade war and increased consumer demand for technology products, the pandemic dealt another blow to supply chains.

The most recent main driver of the disruption has been the pandemic-related lockdowns of chip production facilities, leading to the depletion of stocks.

THE WIDESPREAD IMPACT

Cars, gaming consoles, and gaming PCs have been hit the hardest by the shortage. Car manufacturers worldwide have been forced to shut down factories, causing the price of used cars to increase by 30%⁽¹⁾.

The shortage has also slowed category leaders' roll-outs of next generation gaming consoles, while high-end graphics cards for gaming computers have surged in price on the resale market. Software companies may ultimately have to adapt to the new semiconductor market. For instance, Tesla is rewriting some of its software to accommodate alternative chips.

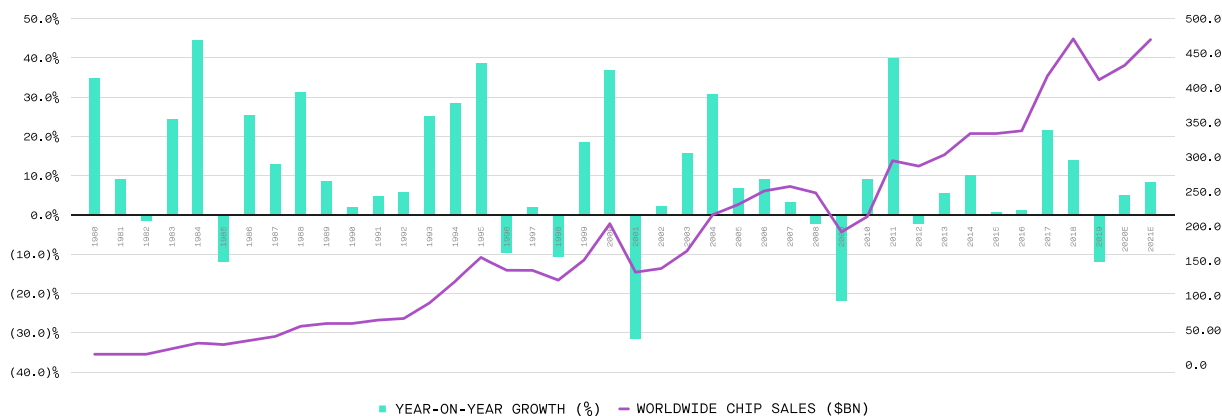
RESPONSE FROM LAWMAKERS AND MANUFACTURERS

In the US, the proposed CHIPS for America Act includes \$52bn to support domestic chip manufacturing, research and development, and supply chain security.

In the EU, lawmakers are working to pass the European Chips Act to bolster European chip volume by linking together the EU's semiconductor research, design, and testing.

Taiwan's TSMC, the world's largest chip manufacturer, has pledged \$100bn over the next three years to boost production. Rival Intel announced a \$20bn plan to expand its advanced chip-making capacity.

CHIP SALES GROWING BUT PRODUCTION NOT KEEPING UP



Sources: GP Bullhound Insights, and AJ Bell Youinvest (January 2021); Note: 1) Blanco, S. (2021, 5 June) Used Car Prices Rising Fast... Car And Driver. Retrieved from www.caranddriver.com



- 98point6
- amwell
- babylon
- BCB medical
- behold.ai
- binah.ai
Health. Care. Anywhere.
- BioSymetrics
- BRIGHT-MD
- CAMBRIUM
- Carbon Health
- DEFINITIVE HEALTHCARE
- InformAI
- OWKIN
- REMEDY
- SAVANA
- SENSELY
- SUBTLE MEDICAL
- Teladoc HEALTH
- tytocare
- vara
- iz.ai

Artificial intelligence automating healthcare at all levels

INDUSTRY-LEADING SOLUTIONS ARE LEVERAGING ARTIFICIAL INTELLIGENCE

Software in healthcare is quickly shaping the future of how service is provided and the capabilities and tools physicians have at their fingertips. The sudden need for remote processes due to the pandemic has shifted the focus of delivering healthcare in a virtual or data-driven manner. Consumer and physician trust in recent technology advancements has paved the way for the acceleration of artificial intelligence healthcare innovation.

DEFINITION

An electronic health record (EHR) is the systematised collection of the digital versions of patients' paper charts in real-time, making information available instantly and securely to authorised users across different health care settings.

PATIENT-CENTRIC ELECTRONIC HEALTH RECORD (EHR)

EHR has long been an inefficient data warehouse that has seldomly been updated to improve patient outcomes. With the rise of artificial intelligence, the EHR's vast amount of data has created an opportunity to implement artificial intelligence models to help care providers make better decisions for their patients.

Due to the large number of factors at play when analysing someone's historical health information, technology is able to more accurately make the right diagnostics and predictions. The next evolution of artificial intelligence healthcare lies in structuring the wide range of unstructured data in EHR systems to develop new artificial intelligence models that can make even more complex care assessments.

INPATIENT CARE TECHNOLOGY

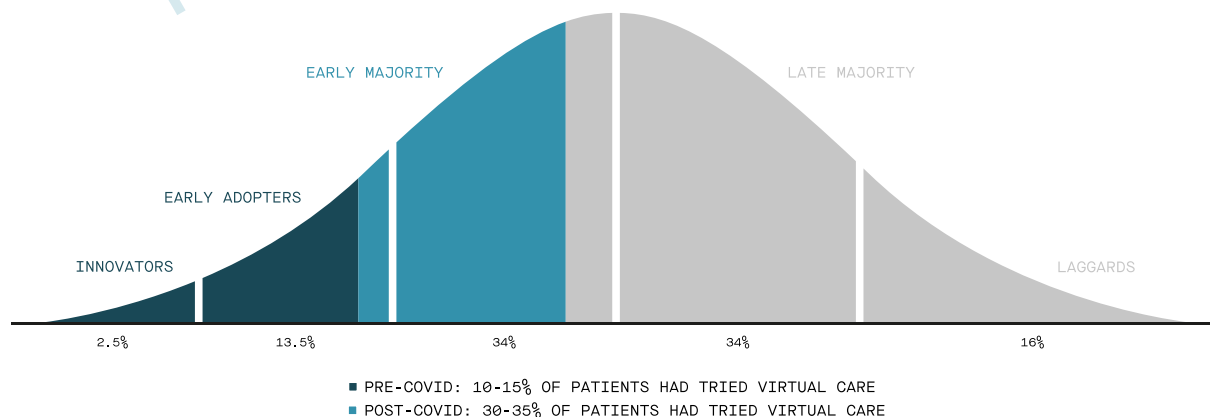
Companies have faced shortages and price increases of raw materials such as plastic, steel and resins necessary to produce goods. Shipping and labour shortages also have forced companies to look for ways to optimise supply chains through strategic sourcing and freight forwarding, which is provided through supply-chain software platforms.

REMOVING THE PROVIDER

Asynchronous solutions utilising artificial intelligence in the form of software platforms and hardware offer clear benefits by their ability to be used remotely. The abilities these solutions carry are fundamentally changing the way care is delivered remotely.

Prior to the Covid-19 pandemic, virtual care was used by 10-15% of patients compared to 30-35% after the onset of the pandemic. The early success of artificial intelligence-backed healthcare will drive investments and resources to further the development of mass-market care solutions.

VIRTUAL CARE ADOPTION REACHING THE MASSES



Sources: GP Bullhound Insights; Note: 1) Bierbower, J. (2020, 13 Aug) Navigating The Next Phase of Telehealth Adoption. Bright MD Blog. Retrieved from www.bright.md.com



Expert view



JASON KRANTZ
FOUNDER & CEO

When I launched Definitive Healthcare in 2011, our initial platform was relatively simple and focused solely on understanding the hospital landscape. Over the years, we have built out data and analytics to provide an extremely robust, 360-degree view of the entire healthcare ecosystem.

Within a few years of our founding, we began to see interest from big players in the life sciences space, who realised that leveraging our platform to guide their commercialisation strategies could give them a significant competitive advantage.

The ideal client for Definitive Healthcare is any company that wants to sell into, or compete within, the large and complex healthcare industry. Our clients range from life sciences companies, which are looking to sell their drug, therapy, or device to healthcare providers, to healthcare IT companies and even provider organisations looking to expand their physician network.

Additionally, we sell to diversified companies, which sell to a broad range of industries, but understand that healthcare is a large market, and the complexity of the market requires healthcare-specific commercial intelligence.

The amount of healthcare data has exploded. In fact, the healthcare industry generates 30% of the world's data volume

There is no way we can draw meaningful insights from all the data without support from artificial intelligence. At Definitive Healthcare our team of data scientists built our AI engine to ingest, cleanse, link and analyse vast amounts of data to create powerful new intelligence and analytics. We've built AI in our platform to examine and query vast data sets quickly, helping our customers uncover the intelligence they need to get their product to market. AI helps us give our clients answers rather than just data.

Over the last 10 years we have built increasingly sophisticated algorithms to help our clients better understand the rapidly changing healthcare landscape. For example, we recently launched a new feature within our PhysicianView product: claims-based specialty designations.

Traditionally, a provider's specialty is based on self-reported taxonomy codes that may not accurately reflect the procedures they perform or the patients they see. Our new designation uses AI to examine claims data to understand a provider's specialty better, allowing our customers to size and segment their markets more precisely.

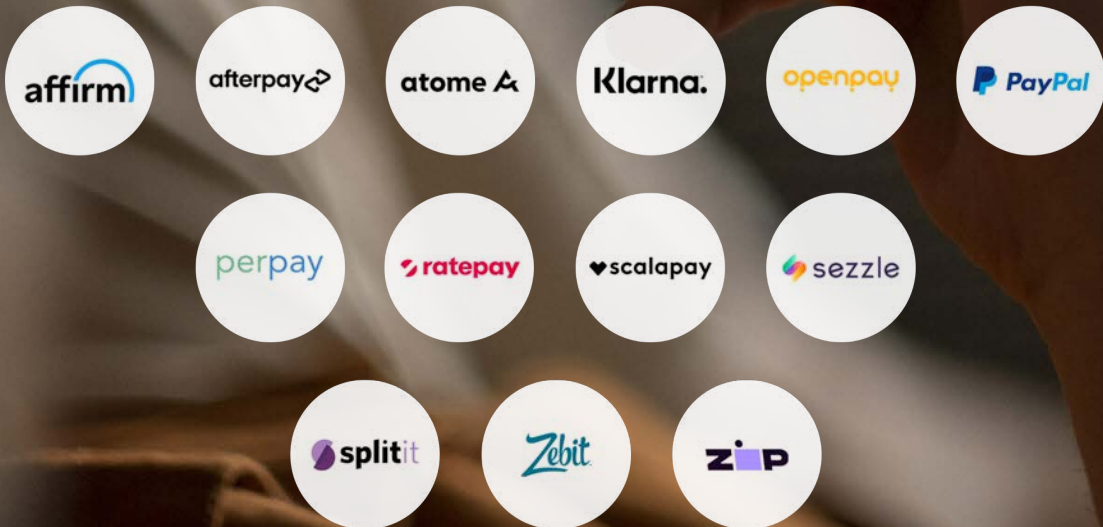
We're seeing AI being used across the entire healthcare ecosystem. Companies are exploring new and exciting ways to leverage the technology to augment the work being done by those in the healthcare industry – from aiding with diagnosing and reading imaging, to speeding up drug development by analysing data, to improving the patient experience and performing AI-assisted robotic surgery. Given the growing labour shortages, the ability to utilise AI to make providers more efficient is becoming even more important.

Next year, I think we'll continue to see more AI healthcare companies entering the market. The impact of this will be widespread. We will see AI utilised in life sciences to aid with bringing treatments to market faster, and we'll see an increasing focus on ensuring we're creating ethical algorithms and confronting bias inherently built into AI technology.

The amount of healthcare data will continue to grow, particularly as more people own wearable and connected devices, making AI an imperative for anyone who wants to derive meaningful intelligence from the data.

I'm sure we'll also see new AI tools focused on infectious disease to aid with our ability to predict spikes of the virus and better prepare for future pandemics.

At Definitive Healthcare, we plan to find new and innovative ways to leverage AI to deepen our understanding of the healthcare market and deliver better healthcare commercial intelligence to our customers.



The future of payment

BUY NOW, PAY LATER (BNPL) IS HERE TO STAY

BNPL is disrupting both the payment and e-commerce industries, given its rising popularity among consumer and merchant groups. Consumers see BNPL as a great alternative to credit cards and merchants have started to realise the tremendous benefits of providing BNPL payment options. The increasing number of tech and finance giants moving into the BNPL space through different channels is likely to accelerate BNPL growth to a potentially trillion-dollar market.

CONSUMER SPENDING BEHAVIOUR IS SHIFTING

The historically preferred cashless purchase method, credit cards, has seen little growth in the US in terms of card ownership and circulation since 2000⁽¹⁾, and credit card spending and debt have declined since 2020⁽²⁾. Consumers are quickly moving away from credit cards to BNPL to avoid high interest rates and debt, while still being able to access products that they would otherwise not afford paying upfront for. This is especially prominent among younger generations, as 26% of Millennials and Gen Z, respectively, use BNPL plans to make purchases⁽³⁾.

MERCHANT'S FAVOURITE PAYMENT OPTION

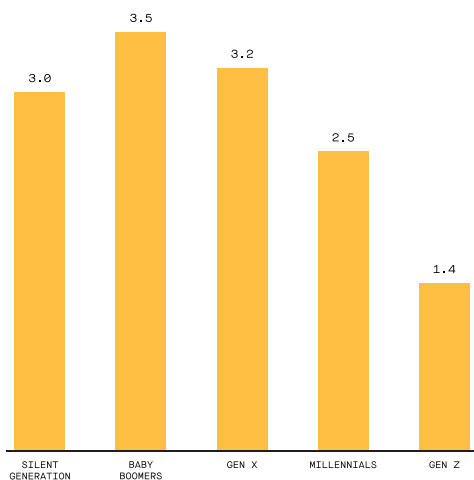
More merchants are providing BNPL payment options as they realise the benefits of BNPL in driving average order values, conversion rates, and acquiring new customers. For example, a leading BNPL service provider, Affirm, showed that merchants adopting Affirm on average saw an 85% increase in average order values, 20% repeat purchase rates, and can acquire customers from its over 6.2 million user network⁽⁴⁾. This trend is expected to continue as more merchants, especially small businesses, shift towards omnichannel; 68% of small businesses say BNPL facilitates sales that otherwise would not be completed⁽⁵⁾.

THE NEW BATTLEFIELD

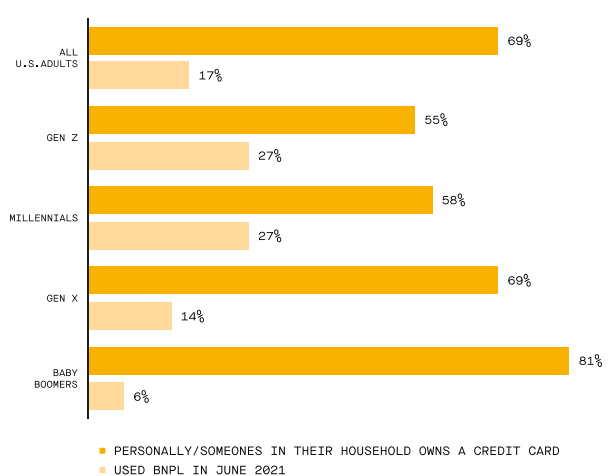
The BNPL market is rapidly evolving and growing as more tech and finance companies are moving into this space through acquisitions, partnerships, and their own BNPL offerings. In 2021, Square acquired Afterpay, Amazon partnered with Affirm, and Apple announced that it would provide its own BNPL products. BNPL spending globally is expected to reach \$995bn and the number of users to exceed 1.5 billion by 2026, versus \$266bn and 340 million in 2021, respectively⁽⁶⁾.

YOUNGER GENERATIONS MOVING AWAY FROM CREDIT CARDS TO BNPL

AVERAGE NUMBER OF CREDIT CARDS BY GENERATION



BNPL VERSUS CREDIT CARD USAGE IN THE US



Sources: GP Bullhound Insights; Note: 1) Shift Processing Credit Card Statistics, Aug 2021; 2) Adams, R. and Bord, V. (2020, 21 Oct) The Effects of the COVID-19 Shutdown. FEDS Notes. Retrieved from www.federalreserve.gov; 3) Principato, C. (2021, 20 July) Outlining the Potential Growth of BNPL Services. Morning Consult. Retrieved from www.morningconsult.com; 4) Affirm SEC Filings. Retrieved from www.investors.affirm.com; 5) Pymnts (2021, 20 Oct) New Data: Buy Now Pay later Options... Retrieved from www.pymnts.com; and 6) Businesswire (2021, 14 June) Juniper Research: Buy Now Pay Later Spend to Reach... Retrieved from www.businesswire.com

The past, present and future

A LOOK BACK AT OUR CRYSTAL BALL OF PREDICTIONS

We predicted eight in ten trends for three years in a row. But our trends don't just look at the year ahead, they also endure – more than a decade ago we were one of the first to predict a surge in mobile payments and digital blockchain technology – both of which have transformed and continue to integrate into our lives with a real impact.



2010

THE YEAR OF BEHAVIOURAL RE-TARGETING ✓

E-commerce to focus on lowering acquisition costs, and growing brand awareness / conversion rates

CLOUD COMPUTING DRIVES GREEN IT INITIATIVES ✓

Cleaner cryptocurrencies and digital blockchain technology for industries to increase transparency

VIRTUAL CURRENCIES & MICRO-TRANSACTIONS EXPAND BEYOND GAMES ✓

Customers increasingly conceiving to buy certain goods online rather than at local stores

E-BOOK APPLICATIONS TO EXPLODE ON MULTITUDE OF DEVICES AND CHANNELS ✗

Tablets to offer the best user experience and lead to mass adoption of e-book applications

CONSOLIDATION WITHIN THE SOLAR PHOTOVOLTAICS SUPPLY CHAIN ✓

To be one of the key Cleantech themes of the year

✗ AUGMENTED REALITY IS BECOMING A REALITY

With smartphones growing, consumer penetration, augmented reality applications to gain momentum

✓ MOBILE APPLICATIONS BECOME A MAINSTAY

Mobile apps to be more established and a meaningful channel for software distribution

✗ THE RETURN OF THE TABLET PC

New tablet PC innovations to make stand-alone e-readers obsolete over time as categories converge

✗ AFFORDABLE ELECTRIC AND HYBRID VEHICLES REACH BROAD DEMOGRAPHICS

Gaming companies target user retention with realistic graphics, culturalisation and community management

✗ INDUSTRY SHAKEOUT IN ONLINE MUSIC DISTRIBUTION

2010 to mark the maturing of the current renegade digital distribution of music content market

2011

GOOGLE'S ANDROID DISTANCING APPLE'S IOS ✓

Android to distance itself from Apple's iOS platform in terms of market share

SOCIAL SHOPPING, DATING AND GAMBLING WILL THRIVE ON MOBILE ✗

Services that revolutionised everyday life of millions of users to massively hit the mobile space

MOBILE AND SMART GRID APPLICATIONS OPEN THE DIGITAL HOME ✓

Home control system suppliers leveraging next-gen devices to help control and manage home equipment

THIN FILM MAKES A COMEBACK AND VCS TO EXIT TO STRATEGICS ✗

Massive consolidation driven by the entry of industrial players with their capital and manufacturing might

GAMING MOVES INTO THE CLOUD ✓

The interactive entertainment industry to continue to move into the cloud

MOBILE PAYMENTS SET TO SURGE ✓

New payments providers emerging along with established players increasingly diversifying offerings

AR APPLICATIONS TAKEOFF ON LOCATION-BASED SERVICES FOOTPRINT ✗

LBS devices to reach critical mass, driving widespread popularity of AR applications

PRIVACY BECOMES A TOP PRIORITY FOR SOCIAL NETWORK USERS ✗

Need for privacy to drive users to separate social networks into core life functions

SHORT MESSAGING FORMAT TO GAIN SUPPORT AND MOMENTUM ✓

More use of short messaging format on the Internet, at the expense of blogs and long format emails

NEW GENERATION OF BUSINESS INTELLIGENCE & DATA ANALYTICS APPS ✓

Companies attacking the big data problem to see success in both the fund raising and M&A markets

2012

RECOMMENDATION ENGINES GET PERSONAL THROUGH SOCIAL MAPPING ✓

Set to integrate user-specific preferences and social mapping; recommendations curated just for you

RUSSIAN INTERNET TO EXPORT NEW SOCIAL MODELS ✓

Russian Internet to export new social models; expect activity in this respect

VOICE RECOGNITION BOUND TO DISAPPOINT - AGAIN ✗

Broad market utility and adoption will again fail to materialise due to remaining technical constraints

SMART WALLET BREAKS THROUGH ✗

After so many false starts, we expect the smart wallet to finally take hold

LIGHT-EMITTING DIODE (LED) PRICES WILL COLLAPSE ✓

Prices for LEDs to plummet as competition intensifies to satisfy demand for energy-efficient lights

HARDWARE AND CONTENT CONVERGENCE WILL ACCELERATE ✓

Hardware manufacturers to partner with software and content providers to create better user experiences

WINDOWS PLATFORMS PICK UP NEW MOMENTUM ✓

Microsoft Windows platform to see new momentum in 2012, materialising after Windows 8 release

SOCIAL RECRUITING HITS THE MAINSTREAM ✓

Social recruiting to gain significance as companies turn to social networks and media to discover talent

A RE-BIRTH OF THE SECOND SCREEN - THE TV ✓

New feature sets to transform the TV into a fully interactive device; a new era of differentiated TVs

2013

COLLABORATIVE CONSUMPTION BECOMES THE NEW ECONOMY ✓

Economic system built from network technologies for creation of exchange platform for different assets

THE RISE OF CURATED AND PERSONALISED CONTENT ✗

Content is king holds true, but getting right message to the right person at the right time is a major trend

CONSOLIDATION TO CONTINUE, LED BY 'BIG FOUR' ✓

Major buyers to pursue tech M&A for diversification and revenue growth

MICROSOFT TO DOMINATE NEXT GAME CONSOLE CYCLE ✗

Fight between Xbox 720 and PS4 to be won by Microsoft

IP ARMS RACE INTENSIFIES IN 2013 ✓

After the 1990s web-browser war and the 2000s Internet search war, IP arms race to intensify in 2013

✓ DISRUPTION OF EDUCATION TO ACCELERATE

Disruption of education system by technology and free online resources to continue to build momentum

✓ GESTURE AND TOUCH CONTROLS EMERGE AS STANDARDS

The way we interact with computers has moved beyond the computer mouse

✗ VIDEO CALLING GOES CORPORATE

Although still a novelty today, video calling to grow strongly within the corporate world

✓ GAMIFICATION - AN EXPLOSION OF INNOVATION

Gamification marketing efforts engage users in game-thinking and game mechanics to raise brand loyalty

✗ WEARABLE TECH - THE HEALTH APP BREAKS THROUGH

Wearable technology applied to health and fitness to make its way into the mainstream

2014

EYE TRACKING REACHES CONSUMER MASSES ✗

Mass consumer applications of eye-tracking technology to hit the market in 2014

SMART MACHINES MARKET TAKING-OFF ✗

SmartThings and IoT to penetrate market; innovations, investments and acquisitions to continue

SOCIAL MESSAGING MARKETS TO CONSOLIDATE ✓

High number of users make these apps attractive to strategic partners searching for growth

MARKETPLACES TO GO VERTICAL ✓

Vertical marketplaces to be more prominent than horizontal marketplaces on increased investment

CURVED SMARTPHONES TO FLOP IN 2014 ✓

Big players tackle consumer pain of high price points and lack of perceived value of the curved design

✓ BREAKTHROUGH IN INDOOR LOCATION, COMMUNICATION AND MARKETING

Large retailers leading the way for beacon technology implementation.

✓ SHOPPING GOES 'CLICK & MORTAR'

E-commerce retailers such as Birchbox, Bonobos and Amazon opened retail stores

✗ THE BATTLE OF 'WHERE' TO UNFOLD

Map applications to proliferate and develop features like lane navigation, restaurant reservation, ETA, etc

✓ ADVANCED DATA ANALYTICS CLIMBS TO TOP OF CORPORATE AGENDA

Big data and data analytics applications to become attractive to businesses

✓ CLOUD STORAGE PLATFORMS GO MAINSTREAM

Cloud storage to increase due to time and money saved in IT management and fewer internal resources

2015

INTERNET OF THINGS TO MOVE FROM SMART TO INTELLIGENT ✓

IoT to turn intelligent by harnessing insights from actionable data uploaded to the cloud

MAJOR LANDSCAPE CHANGES IN THE WORLD OF PAYMENTS ✓

Cleaner cryptocurrencies and digital blockchain technology for industries to increase transparency

END-TO-END SERVICE DISRUPTION GOES BEYOND UBER AND AIRBNB ✓

End-to-end consumer experiences using a fusion of software and labour to penetrate consumption spend

CONTINUED EMERGENCE OF ONE-STOP SHOPS IN AD-TECH ✓

Consolidation as larger players diversify into digital advertising segments and acquire pure-play ad-tech.

STRONG WAVE OF TECHNOLOGY & PRODUCT EXITS ✓

M&A led by large players targeting consumer experience, electronics, one-stop-shop digital tools

✓ NEW MEDIA OUTLETS TAKING-OFF

New media brands producing engaging content in various delivery formats to attract mass audiences

✗ SAAS ADOPTION PERMEATES THROUGHOUT THE ENTERPRISE

Increased adoption of cloud SaaS enterprise applications to increase productivity and efficiency

✗ 3D PRINTING MOVES FROM PROTOTYPING TO END-PRODUCTS

To enter larger, less price-sensitive industries where products are lighter, versatile and durable

✓ RETURNED FOCUS ON CUSTOMER LONG-TERM VALUE IN MOBILE GAMING

Gaming companies target user retention with realistic graphics, culturalisation and community management

✓ COMPREHENSIVE CYBERSECURITY PROTECTION TO BECOME THE NORM

Big data security options, and multi-factor and biometric authentication to permeate consumer apps

2016

VIRTUAL REALITY BECOMES REALITY ✓

Virtual reality to revolutionise media, sports, gaming, entertainment, and education

AUTOMOTIVE INDUSTRY RIPE FOR INNOVATION ✓

New car operating systems to spur growth, dominated by third-party software and technology players

ALTERNATIVE LENDING CONTINUES TO SHINE IN FINANCIAL TECH SECTOR ✗

From early innovation in Fintech for mobile payments and cryptocurrencies, to alternative lending

DIGITAL VIDEO BECOMES MORE MEASURED TO KEEP GROWING UP ✓

To be the largest video format; tech/media-focused platforms to adjust to capture video audience

DRONES TO FLY INTO HEADWINDS OF UNCERTAINTY ✓

Promise of drones undeniable, but drones functioning responsibly at mass scale to remain unproven

✓ 'QUANTIFIED SELF' TRANSITIONS FROM NICHE TO MAINSTREAM

Hardware and software startups to create products and services to track vital health information

✓ GAMING GIANTS FORTIFY POSITIONS, GOBBLING UP CHALLENGERS

Consolidation to continue and smaller independent developers to build their user base until acquired

✓ DESKLESS WORKERS AT FOREFRONT IN ENTERPRISE MOBILITY SHIFT

Seismic technology paradigm shifts in recent years, leading to growth in enterprise mobile app companies

✗ CYBERSECURITY CONTINUES SOUL SEARCHING

Advanced cybersecurity solutions for the enterprise to become ubiquitous and a 'must have'

✓ TECH UNICORN HUNTING NOW IN SEASON

Some to lose 'mythical' status as growth slows, fundamentals weaken & unrealistic expectations rise

2017

THE NEXT GENERATION OF AI ✓

AI has made waves since Alpha Go toppled Lee Sedol, 18x world Go Champion; high investment, it's staying

E-SPORTS TAKES CENTRE STAGE ✓

Rapid growth of e-sports to continue, becoming a billion-dollar industry driven by huge fan base

THE DAWN OF VR/AR CONTENT ✗

With VR/AR at hype cycle peak and hardware ahead of content, software to drive next platform

SOCIAL MEDIA TRANSFORMATION ✓

In a flat world of consumer technologies, Western and Asian social media giants to offer similar features

TECH IPOs SET FOR TAKE OFF ✗

Global uncertainties have hampered performance for IPO markets, but these to rebound in the coming year

✓ CORDLESS CONTENT ANYWHERE AND EVERYWHERE

Millennials leading change in how media is consumed; cable networks fight the rise of over-the-top services

✗ FINTECH SHIFTING TECTONIC PLATES

Traditional financial institutions to disrupt themselves to stem the impact of 'banks 2.0'

✓ DRIVERLESS CARS STILL REQUIRE HUMAN DIRECTION

As cars are more connected, large tech players to enter market

✓ SAAS SOFTWARE REIGNING SUPREME

Mobile workforce has led to mass adoption of SaaS. Fragmented market to see some consolidation

✓ YEAR OF THE EUROPEAN DECACORN

European unicorns to continue demonstrating resilience versus Asian and US counterparts

2018

AN UNSEASY FUTURE FOR POLITICS AND TECH ✓

Tech firms to come under scrutiny for the content they allow on their platforms with specific regard for politics

TRANSLATION TECHNOLOGY TAKES HOLD ✗

Translation technology to enjoy widespread consumer adoption due to advances in machine learning

MOBILE TRUMPS TV IN CHINA ✓

Mobile phone usage to overtake TV consumption in China

OVER AND OUT EMAIL ✗

Information workplace communication tools to overtake email, YoY growth in corp email to cease

REGULATORS RULE ON BOOM AND BUST OF ICOs ✓

Regulators to look at booming ICO market and create definitive guidelines and regulations for the space

✓ INTERNATIONAL LABOUR ARBITRAGE FLOURISHES

Companies to abandon traditional tech hubs in favour of smaller and up-and-coming places

✗ THE UNLIKELY COMBACK OF THE SOFTWARE SUITE

Companies to spend large amounts on IT platforms to aid their digital transformation efforts

✓ CYBER SECURITY EXPOSURE AND ADOPTION

There will be widespread consumer adoption of digital security in light of hackings in 2017

✗ AUGMENTED REALITY ADAPTS FOR EARLY ADOPTION

AR to enjoy a rapid increase in consumer adoption due to improvements in technology

✓ INDUSTRY 4.0

Factories to embrace artificial intelligence and robotics, spurring the fourth industrial revolution

2019

DIGITAL BANKING CONTINUES TO RISE ✓

Consumer adoption of digital banking tools as digital transactions continue to increase YoY

EMPLOYEE ENGAGEMENT GOES HIGH TECH ✓

HR to embrace AI and data analytics to make capital management more efficient

ARTIFICIAL INTELLIGENCE IS THE END OF REPETITION, NOT LIFE ✓

AI to improve working conditions and create more flexible ways of working

LAST MILE DELIVERY GOING THE DISTANCE ✓

More retailers to focus on improving last mile delivery solutions to keep pace with vendors like Amazon

END OF THE BOYS CLUB ✗

Corporate initiatives for gender balance through improvements in accessibility to female entrants

✓ APP DISTRIBUTION MOVING AWAY FROM APPLE AND GOOGLE

Apple and Google to see widespread backlash from developers fed up with their commission fees

✓ RETAIL TECHNOLOGY GETS SMARTER

Traditional retail to embrace innovative technologies to usher in the new age of retail

✓ CONSUMER SUBSCRIPTION SET TO ECLIPSE ADVERTISING

Subscription models win versus traditional advertising as concerns of data misuse continue to mount

✓ A BREAK-UP OF AN ADVERTISING DUOPOLY

Brands to break up large advertising hold of Google and Facebook with own end-to-end services

✗ CRYPTOCURRENCY WILL GROW UP

Institutional capital to flow to cryptocurrencies as blockchain activity continues to increase

2020

THE WAR IN STREAMING FILM AND VIDEO ESCALATING TO A FRENZY ✓

Consumers using multi-platform for premium content; large incumbents offering bundled premium services

VERTICALISED AI SOLUTIONS TO SOLVE REAL BUSINESS CHALLENGES ✓

Until AI models can integrate into existing systems / architecture, purpose-built AI tools to solve needs

APPLE A13 BIONIC SETS THE PRECEDENT FOR ON-DEVICE AI / ML ✓

Apple rules computing power and graphical capabilities, but the competitive gap has narrowed

CORPORATE SOCIAL RESPONSIBILITY TAKES CENTRE STAGE ✓

Fast growth for CSR software, boosted by increasing awareness and greater adoption of CSR initiatives

THE EDGE OF TOMORROW ✓

Importance of running data-intensive processes on devices, with significant business outcomes

✓ RELATIONAL DATABASES MAKE WAY FOR DATA LAKES

Data lakes clearly demonstrating supremacy over relational databases and other legacy products

✓ AI/ML SHOWING QUANTIFIABLE RESULTS IN MARKETING

Adoption of AI technology to more accurately target consumers and improve ROI is set to continue

✓ GAMING EMBRACES THE ERA OF SUBSCRIPTION AND STREAMING

Streaming and subscriptions to become the default way games are consumed and purchased

✓ 5G LANDGRAB: THE RACE FOR COMMERCIAL DEPLOYMENT OF 5G

5G touches all of the communication ecosystem, and devices and networks are racing to lead

✓ EVERYTHING AS A SERVICE

The benefits of an as-a-service model are clear and becoming widely adopted

Methodology

This report is based on the expert insights of GP Bullhound's worldwide team alongside detailed analysis of investment trends across the global technology landscape. It is intended to provide our predictions for the digital economy in 2022.

Each year, we present a transparent assessment of our predictions from the previous report to maintain a high level of scrutiny on our own research. Conceptually predicting tech of the distant future is in many ways simpler than predicting near-term advancements, but our challenge is identifying which technologies will see the greatest progress and market adoption in the coming 12 months.

Historically, we have highlighted significant trends standing the test of time; e.g. our predictions for IOT, wearables and collaboration tech, as well as critical trends in cybersecurity, cloud and edge computing. Many will continue to evolve, eventually forming the foundation for future tech in years to come.

Corporate responsibility

ENVIRONMENT & SUSTAINABILITY

- CSR group and carbon footprint program to mitigate environmental impact
- Reduction of energy consumption and waste generation
- Digitalisation of communications and materials, Data Life Cycle Management and server virtualization
- Sustainable procurement

LABOUR & HUMAN RIGHTS

- 20 nationalities represented within our global team
- Championing diversity, respect, education and equal chances for all
- Employee benefits include parental leave, flexible work, healthcare coverage, training and mentoring, and company stock ownership
- Cultural Board and Diversity & Inclusion groups to enhance company culture and gender diversity

ETHICS & COMPLIANCE

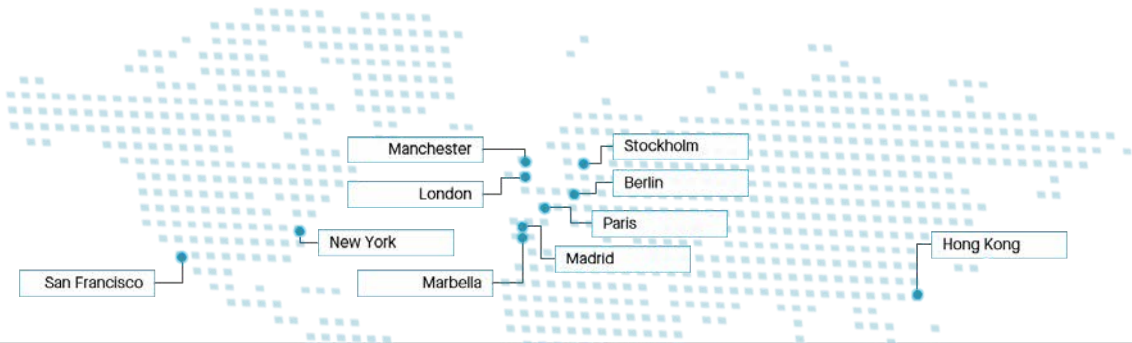
- Formal compliance policies in place against corruption, bribery and to ensure third-party information security
- Support to charitable non-profit organisations for human rights, education, health, diversity and the environment
- Employee volunteering programme

INVESTING & ADVISING RESPONSIBLY

- Multiple criteria when selecting the companies we work with, including: environmental impact and approach to talent, equality, regulatory compliance, financial health and political risk
- Member of the British, Swedish and Hong Kong Private Equity and Venture Capital Associations
- Follows and supports the UN Principles for Responsible Investment

About GP Bullhound

GP Bullhound is a leading technology advisory and investment firm, providing transaction advice and capital to the world's best entrepreneurs and founders. Founded in 1999 in London and Menlo Park, the firm today has 10 offices spanning Europe, the US and Asia. For more information, please visit www.gpbullhound.com



YEAR FOUNDED 1999	PROFESSIONALS 150+	OFFICE LOCATIONS 10
SUCCESSFUL TRANSACTIONS 550+	TRANSACTION VALUE ADVISED ON \$25bn+	AUM ACROSS GP BULLHOUND MANAGED FUNDS \$600m+

Our recent marquee credentials



EGODITOR
ACQUIRED BY
BITLY



BUSUU
ACQUIRED BY
CHEGG
\$436M



LOGICBROKER
INVESTMENT BY
K1 INVESTMENT
MANAGEMENT
\$135M



SPEEDTREE
ACQUIRED BY
UNITY



BLISS POINT
ACQUIRED BY
TINUITI



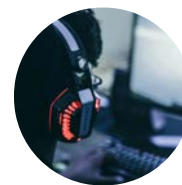
WAYUP
MERGER WITH
YELLO



PINKBIKE
ACQUIRED BY
OUTSIDE



PATREON
INVESTMENT BY
GP BULLHOUND
FUND V



DISCORD
INVESTMENT BY
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LEADERS ON THEIR MISSION TO

Build the Future.

450%

revenue growth
21 vs 20

\$5bn

advisory transaction
value 2021 YTD

\$600m

assets under
management



Transaction value considered as enterprise value



PROUD TO HAVE PARTNERED WITH
26 billion-dollar leaders

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