GP Bullhound Global Insights

2020 TECHNOLOGY PREDICTIONS

TRENDS & INNOVATIONS SHAPING THE GLOBAL TECH SECTOR

GP.Bullhound

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FROM GP BULLHOUND

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THE VIEW FROM GP BULLHOUND

We are in the midst of a fourth industrial revolution that shows no sign of slowing down. At GP Bullhound, we are proud to support a tech sector that continues to shape every area of our lives; from the products we buy, to the films we watch and – perhaps most influentially of all – the way we work.

Amid the cacophonous noise that often surrounds emerging trends in tech, it can be hard to achieve a sense of clarity about the future. Our aim is to make it clear what, who and how tech will transform our lives.

Much is said of a supposed 'tech-lash', but we believe that technology has the potential to deliver far more positives than negatives, both in our lives and in businesses. Technology is at the heart of innovation in gaming, television, marketing and it will help businesses to change the world for the better.

As we enter 2020 - a brand new decade – it's natural to reflect on what has gone by. Instead, we want to look at what's to come.

The online streaming race has ramped up over the past year and it will only escalate further in 2020. The big players like Netflix and Amazon Prime will attempt to tighten their grip on the market by splashing piles of cash on original content, while emerging services challenge their dominance. We look at how the disruptors will fair.

We also spotlight another race for technological excellence amongst the big smartphone companies. The introduction of the A13-Bionic chip by Apple, the fastest-ever chip in a smartphone, has pushed this race forward, and we expect to see responses by Apple's main challengers.

A bi-product of these parallel competitions will be a continuing drive forward in efficiency and innovation in smartphones and streaming, and another much-anticipated stride towards efficiency will be taken this year, as 5G is finally introduced at scale, following years of anticipation.

But even at this late-stage, there is still much to fight over in terms of providing the infrastructure and cornering the patents for 5G. In 2020, we will see the unfolding of a battle between companies from across the world to earn the status of premier 5G provider. We look at the impact this tech war could have on the commercial structure of this potentially revolutionary new network.

It is clear that new technology will change the complexion of life and business, but so will the developing public understanding of the applications of tech. New technologies will raise an array of opportunities for businesses in 2020, but executives will need to acquire the necessary knowledge to implement it effectively. We cover the changes that the improved tech education of business leaders will bring to the use of artificial intelligence (AI) in business.

Many of these changes will be seen in the hyper-personalization of advertising and customer experience. Here, we observe the growing role of AI in marketing and how it will transform businesses' ability to communicate with consumers. We assess how AI will enable us to make sense of the huge amounts of data that companies store and its implications for tailoring customer experiences.

Technology is not just changing the tools that we use to do business, it is also changing the way we think about business. We predict that the trend towards treating products as-a-service will continue into 2020, as more organizations realize the flexibility of this approach.

This shift towards subscription-based business models is amongst the innovations we see developing in the gaming sector. Other changes include the expansion of streaming and development platforms across the gaming landscape.

And finally, at a time when advances in technology are often met with suspicion, we focus on the ways that technology can push us to be better. AI has the capacity to power advances in Corporate Social Responsibility by giving companies access to more accurate reporting on their impact than ever before. We ask, how can businesses take advantage of these opportunities to boost their positive influence?

The rapid pace at which technology changes means that new advances will often be met with anxiety and uncertainty. This mind-set can often obscure the array of exciting opportunities that new innovations in tech bring.

The intention of this report is to shine a light on the new trends that will change the technological landscape in 2020 and beyond. We hope it provides some insight into the opportunities and challenges to come.

Recap of GP Bullhound's
2019 PREDICTIONS

DIGITAL BANKING CONTINUES TO RISE ✓

2019 was a repeat of the Boom in Digital Banking fundraising as the excitement around the space continues unabated. Early Neo-bank leaders continued to raise capital and valuations, especially in Europe led by N26's $470m raise at a reported $3.5B valuation in June 2019 and Starling Bank's 100m£ raised in 2019 alone. In the US, competition from incumbents like JP Morgan and Capital One continues to be fierce, limiting the proliferation of US focused Neobanks. However, early leaders continue to scale and add customers as highlighted by Chime and Dave, and others continue to expand their offering, as evidenced by Robinhood's highly publicized foray into checking accounts.

APP DISTRIBUTION MOVING AWAY FROM APPLE AND GOOGLE ✓

Throughout 2019 app distribution shifted away from Apple and Google in terms of number of app management and distribution platforms that gained critical mass. Apple reported 0.2bn fewer downloads in H1 2019 compared to H1 2018 although global app revenues for Apple and Google combined reached $39.7bn in H1 2019 growing 15.4% from the same period in 2018[1]. In 2019, Tinder joined Fortnite in sidestepping the Google Play Store's 15%-30% cost of doing business by using its own payment platform and asking users to enter their credit card information directly in the app[2].

Many smartphone manufacturers are now generating revenue via paid apps and pre-installs. For instance, Baidu, Tencent, Xiaomi, and Huawei have each developed their own app stores. Smaller app distribution and management platforms offer developers alternative go-to-market strategies and a wider variety of app libraries for consumers.

EMPLOYEE ENGAGEMENT GOES HIGH TECH ✓

This trend showed no sign of slowing down in 2019, as companies of all sizes continued to invest in technology to manage their human capital. HCM software companies, such as Workday & ServiceNow continued to grow revenues by 30%+ Y-o-Y in 2019, even as their stock prices pulled back from their peaks.

In 2019, new entrants in the HCM space continued to raise capital to fund growth as interest in the space remains strong. Marquee transactions like BetterUp's $103m round, led by Lightspeed, highlights HCM software use cases expanding from managing employees to improving employee performance. Kwench's acquisition by O.C. Tanner, highlights companies demand for tools that allow them to easily and efficiently engage and reward employees.

RETAIL TECHNOLOGY GETS SMARTER ✓

The rise in popularity of AI- and AR/VR-driven retail solutions has emphasized the importance of incorporating technology into the retail experience. Large companies continue to lead the implementation of these retail solutions by incorporating AR/VR and AI/ML into their business models; seeking to drive customer engagement and to deliver hyper-personalized consumer experiences. Zalando developed a shopping algorithm which creates an outfit each time a customer selects an item of clothing. Speedo and MAC have allow consumers to virtually try on goggles and make-up, respectively.

E-commerce is expected to influence over 50% of in-store purchases as the number of digital buyers in 2019 is predicted to reach 2bn[3]. Smaller start-ups are developing competitive solutions to augment physical retail. Some start-ups focus on delivering a more personalized in-store experience such as ModiFace, Mystore-E, Scandit, and Zappar which help to identify better shoppers and their preferences.

Sources: (1) SensorTower, Global app revenue reached $39 billion in the first half of 2019, up 15% year-over-year, July 22 2019. (2) Fortune, First Fortnite, Now Tinder: How Android's Biggest Apps Are Giving Google's Revenue Scheme the Runaround, July 22 2019. (3) Smallbizgenius, 40 eCommerce statistics every retailer should know in 2019, August 2 2019

THE PREDICTIONS

ARTIFICIAL INTELLIGENCE IS THE END OF REPETITION, NOT THE END OF LIFE ✓

Much has been anticipated of artificial intelligence in this decade and it will continue to own the spotlight in the next decade as well. However, it was apparent in 2019 that artificial intelligence still has a long way to go to replace jobs performed by humans. In 2019, we did not see autonomous cars flood the streets nor robots replace accountants.

Various manifestations of AI, including machine learning, big data analysis and robotic process automation (RPA) will continue to augment everyday tools. Concur, one of the most popular corporate expense tools, continues to automate daily tasks by implementing image recognition, machine learning for expense categorization and data analysis for reporting. FairmarkIT raised $11m to leverage AI to automate procurement spend for the enterprises and reduce wasted human errors. The introduction of everyday tools, supported by AI, will continue to infiltrate every days tasks for the foreseeable future.

CONSUMER SUBSCRIPTION SET TO ECLIPSE ADVERTISING ✓

The Consumer Subscription Software ("CSS") ecosystem saw an explosion of activity in 2019. In addition to the obvious proliferation of Netflix clones in the streaming video wars (Disney, Apple TV), the use cases for the CSS business model continue to expand outside of entertainment.

In 2019, companies focusing on offering consumers CSS products ranging from astrology, photo editing, credit management, to personal therapy all received funding from Tier 1 venture capitalists.

Acquisitions by strategic buyers have continued with Boeing's acquisition of ForeFlight, a tool for amateur pilots, and Vimeo's acquisition of Magisto are just the early examples of the interest in the space.

2020 will see the use cases continue to accelerate as entrepreneurs and consumers continue to discover the benefits of the CSS business model.

A BREAK-UP OF AN ADVERTISING DUOPOLY ✓

The break-up of the advertising duopoly continues as Amazon's platform draws away advertising dollars from Google and Facebook. In 2019, advertisers spent $6.4bn on Amazon advertising accounting for 8.8% of total digital ad spend[1]. This is expected to rise to 10% by 2020[2]. Amazon's key edge over Google and Facebook is its access to customers and the data it collects enabling advertisers to more efficiently target consumers – this is of interest to consumer and D2C brands. It also continues to improve its DSP and offer greater flexibility with automated bidding.

50% of retail executives with $50m+ in annual sales are planning to increase ad spend on Amazon, shifting their budgets away from Facebook and Google. Other players such as Alibaba, Tencent, Snap, Twitter and Baidu are also emerging as competitive threats. Baidu is the most attractive China-based platform with 70%+ market share and ~700m users[3].

LAST MILE DELIVERY GOING THE DISTANCE ✓

As retailers have shifted their focus and efforts towards improving last mile delivery services, the same-day delivery market is estimated to reach ~$1bn for 2019[7] and is expected to show significant growth going forward. Amazon launched Amazon Day and Amazon Counter, and Walmart is taking home delivery one step further with store-to-fridge delivery services. DoorDash raised over $1bn in 2019[8] to accelerate growth and enhance its last-mile logistics platform capabilities. Narvar is addressing a different aspect of last mile delivery, helping retailers maximize the post-purchase experience by engaging customers between purchase date and delivery date to deliver a complete customer journey. This popularization of tech-enabled last mile delivery services has led to a rise in delivery-oriented solutions. Darkstore is currently building plug-ins for Shopify, BitCommere and Magento. Sensors and IoT are also playing a significant role in the real-time tracking of shipments; providing consumers with live SMS alerts and notifications.

END OF THE BOYS CLUB ✓ ✗

This is a trend that is showing incremental gains particularly as it earns coverage in the media spotlight. The VC Diversity Index[4] ranks 102 of the largest US-based VC firms with >$250m in AUMs for gender and ethnicity diversity. For 2019, the top performing VCs for gender diversity included Forerunner, BlueRun, Costanoa, Floodgate, and Uncork. The percentage of women in VCs has risen in 2019; however, of the 720 VC firms in the US only c.30% have at least one female partner[5]. In 2019, 10.4% of venture capitalists across the different fund sizes (micro to mega) were women; an improvement from 8.8% in 2018[6]. Female partners in micro and small firms accounted for 45% of total female partners[6]. New fund formation accounted for the fastest growing segment of women in VC with 29% of US firms having at least one female partner and 7% with at least two female partners[6]. All that said, a more appropriate title for this trend would have been "The Beginning of the End of the Boy's Club," as we're starting to see improvements but still have a long way to go.

CRYPTOCURRENCY WILL GROW UP ✓ ✗

Cryptocurrency continued to capture the world's attention with the rebound in Bitcoin prices in May 2019. The Libra consortium, led by Facebook, generated conflicting reactions from the crypto community with supporters excited about the potential for rapid adoption of any crypto currency, offset by concerns among the community about Facebook's involvement mitigating the many benefits espoused by the crypto community. US Regulators had a decidedly negative view on Libra, effectively causing the consortium to fall apart and resulting in Facebook pausing its US rollout for the foreseeable future. GPB's prediction that institutional money would flow to crypto assets remains unproven with many investors remaining on the sidelines as the various crypto storylines continue to play out. October 2019 reports that Bitcoin prices may be manipulated by holders of Tether continue to cast doubt on the markets transparency and ultimately its use as an investable asset class.

Sources: (1) Marketing Land, Almost 70% of digital ad spending going to Google, Facebook, Amazon, says analyst firm, June 17 2019. (2) Amazon Advertising: The 2019 Guide, July 22 2019. (3) Eggplant Digital, Why & how to use Baidu paid advertising in China, February 13 2019. (4) VC Diversity Index 2019. (5) Techcrunch, Scaling a non-profit, start-up style, April 9 2019. (6) All Raise (7) Volttech.io, Last mile delivery market, June 12 2019. (8) Pitchbook, DoorDash profile, November 26, 2019.

Technology Predictions
2020

Over the course of more than a decade, 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. What follows are the ten trends we believe will define tech in 2020.

1. THE WAR IN STREAMING FILM AND VIDEO ESCALATING TO A FRENZY

2020 will see the progression of a fundamental shift in how viewers consume traditional movie and TV content, from legacy television network productions to new digital-first on demand content able to be viewed anywhere on-demand and on virtually any device. Netflix will continue to be the anchor platform, with one other premium platform significantly attracting consumer attention. Content will never have been so available and so easily accessible, across any device, than in the coming year.

2. RELATIONAL DATABASES MAKE WAY FOR DATA LAKES

The increasing prevalence of the data lake cannot be overlooked. In the age of big data and IoT, data lakes serve multiple incredibly important functions that position it to replace the relational database for many enterprises over the next year. 2020 will be the year of the data lake, as more and more organizations realize the uncapped potential of a single unstructured data repository.

3. COMPANIES TURNING TO VERTICALIZED AI SOLUTIONS TO SOLVE REAL BUSINESS CHALLENGES

As the hype of AI has begun to fade and real technology is implemented, enterprises are still in a state of flux when it comes to AI solutions. The ecosystem is complex and ever changing, but in the next year organizations will choose vertical AI SaaS solutions to tackle specific business challenges rather than attempting to deploy horizontal AI across the enterprise IT stack.

4. AI/ML SHOWING QUANTIFIABLE RESULTS IN MARKETING

Advertisers are rapidly adopting Artificial Intelligence (AI) and Machine Learning (ML) in their marketing strategies, allowing them to deliver personalized content and customized experiences at scale. Expect to see rapid adoption of AI within hyper-personalization, branding, and the B2B sales experience. More marketers will set up predictive lead scoring, deploy complex trigger-based campaigns and invest more heavily in dynamic content to develop stronger customer relationships and loyalty.

5. APPLE A13 BIONIC SETS THE PRECEDENT FOR ON-DEVICE AI/MACHINE LEARNING TECHNOLOGY

Apple's new A13-Bionic chip marks an unprecedented incremental leap in on-device mobile compute capability, allowing the tech giant to shape the feature set of the next-gen smartphone with machine learning. We expect this advancement to create a ripple effect in the industry, leaving other phone makers racing to design more efficient and harmonized devices with greater usable performance.

6. GAMING EMBRACES THE ERA OF SUBSCRIPTION AND STREAMING

Consumers are shifting to subscription services over outright game ownership, traditional methods of game delivery are under threat, and developers now have to consider these new platforms and the implications of changing consumption. We will soon see gaming exposed to the masses through streaming, people will increasingly subscribe to libraries of games, and developers will look to newer more comprehensive development platforms and tools for efficiencies and monetization.

7. CORPORATE SOCIAL RESPONSIBILITY TAKES CENTER STAGE

The world has seen an increased focus on Corporate Social Responsibility ("CSR") over the past several years. While the concept is not new, it is gaining recognition as a global initiative that aims to contribute to environmental, economic, and human well-being through business processes and policies. We expect to see rapid adoption of CSR programs by companies and increased investment into the technology companies that enable more efficient systems of record and information transfer.

8. 5G LANDGRAB: THE RACE FOR COMMERCIAL DEPLOYMENT OF 5G

The race for establishing a 5G network has brought about a war amongst the telecom industry's most dominant global heavyweight contenders – competing for the most significant advancement in technological infrastructure and mobile broadband to date. In 2020, companies will look to solidify their position in the spectrum network with the acquisition of certain bands and frequencies and increase infrastructure spend to ensure global coverage.

9. THE EDGE OF TOMORROW

As mobile and IOT devices are increasingly built with more data intensive applications, cloud computing is tasked with processing vast amounts of input data. In 2020, expect the number of start-ups and mid-sized companies that provide compute, network, infrastructure and cybersecurity for the edge to increase as these players will look to provide a viable alternative to a single cloud solution and challenge existing large enterprises like Amazon Web Services, Microsoft Azure and IBM Cloud.

10. EVERYTHING AS A SERVICE

Over the past decade, the as-a-service model has evolved while maintaining its core essence. The concept of leasing a product or providing a service contingent upon the settlement of regularly scheduled payments has been a business model since the introduction of currency-based transactions. In 2020, commercial enterprises will continue to change their product and service offerings to pure-as-a- service models.

PREDICTION 1

The War in Streaming Film and Video

ESCALATING TO A FRENZY

2020 will see the progression of a fundamental shift in how viewers consume traditional movie and TV content, from legacy television network productions to new digital-first on demand content able to be viewed anywhere on-demand and on virtually any device. It is incredibly challenging to predict consumer behavior, but we believe that Netflix will continue to be the anchor platform, with one other premium platform significantly attracting consumer attention.

By the middle of next year, consumers will be able to choose which streaming service they subscribe to from a seemingly endless list of names - Hulu, HBO Max, Amazon Prime, Disney+, Peacock, TubiTV, Apple TV+, the NBA, MLB and of course the 800 pound gorilla, Netflix, to name just a few. All are competing for existing and future content, and ultimately consumers' wallets.

Traditional media companies are clawing back valuable IP to use on their own platforms, none more impactful than global hit "The Office" being withdrawn from Netflix to be used as an exclusive to kick off NBC's forthcoming streaming service. This has necessitated the need for the big technology challengers to furiously produce new content, and pay top dollar for it – it is rumored that Netflix, Amazon and Apple will spend $14 billion, $7 billion and $5 billion respectively on original programming content in 2019[1]. This poses one of the more intriguing questions, why are media companies entering the extraordinarily crowded streaming world?

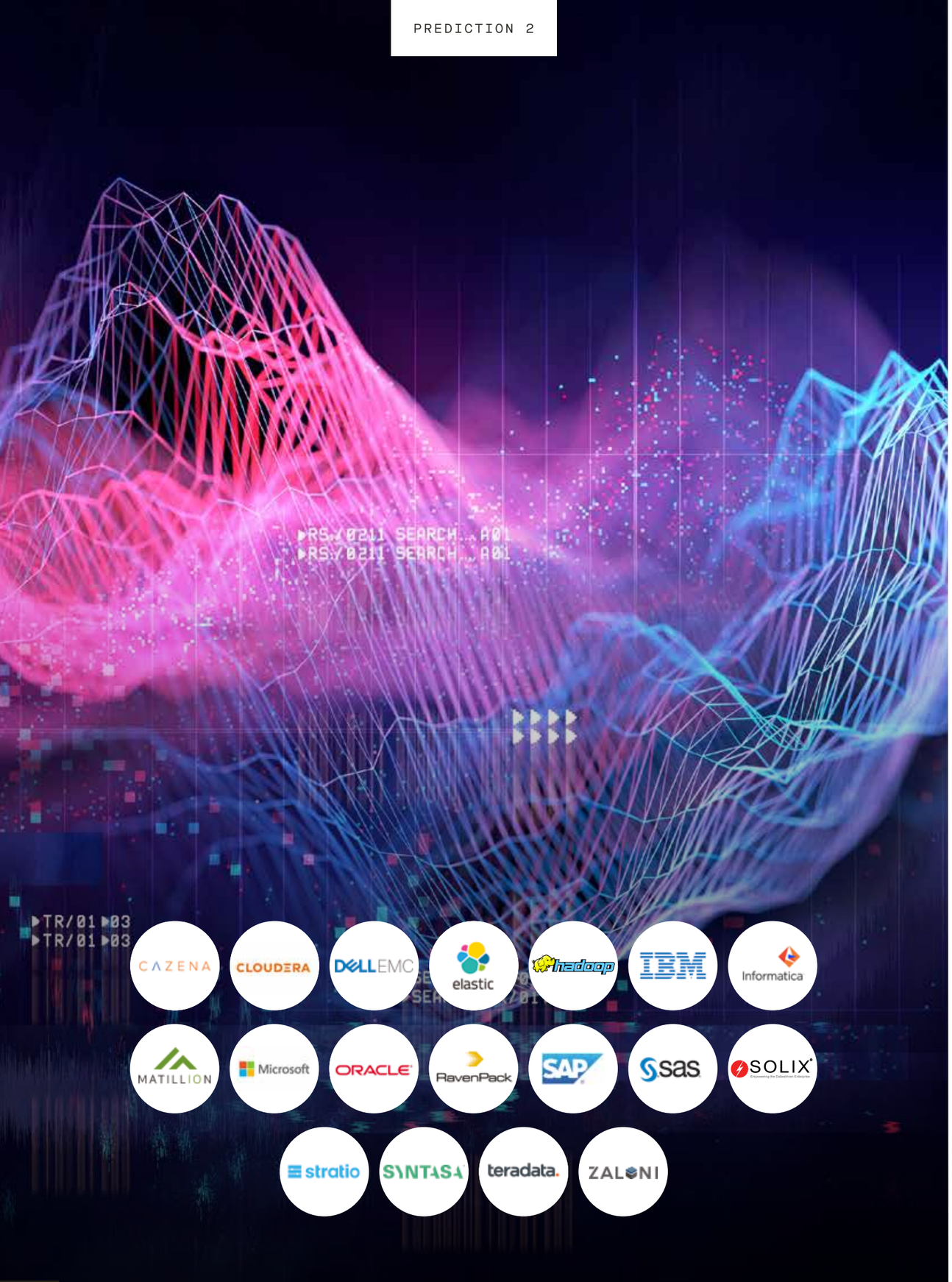
The answer is that companies no longer need to rely on cable providers to deliver to consumers the content they are producing. The wild success of Netflix over the last 15 years has unceremoniously rubbed this point in their faces, licensing some of their most valuable content in the process. At the end of the day, it boils down to owning the consumer relationships from content creation to content delivery, and the monetization opportunities that come as a result of this.

All this begs the question – which content and how much content will consumers be willing to pay for? Will the deep pocketed tech giants be able to produce enough original content to lure people to their platforms? Or will the storied studios and channels be able to attract people with their beloved IP? The answer, of course, is not clear cut, but rather everyone will have a different outlook on what content they want, and how much they are willing to spend on it. However, we believe there will be an anchor platform, likely to be Netflix, HBO Max, or Disney+, with some combination of the other less expensive and less comprehensive platforms (a la Apple TV+).

One of the fortunate and unintended consequences of the competition for eyeballs is that the industry now needs to produce content that resonates with consumers of all kinds. With so much data on users it has never been easier to develop projects and deploy them into the market to test them with a target demographic. This way streaming companies can make lightning quick decisions as to whether a concept or series is going to work. There is also a huge amount of money available for content producers, $12 billion dollars was invested in 2018 by Netflix alone on 700 new original shows[2]. This massive amount of capital combined with a desire by platforms to create niche content that appeals to a broad range of consumers that otherwise might not use the platform, has created an ecosystem that encourages risk taking and creativity.

It will be fascinating to see how an entire industry responds to these monumental changes. While the consequences are hard to predict, one thing is for sure - content will never have been so available and so easily accessible, across any device, than in the coming year.

Sources: (1) Forbes - This Small Company Will Win The Streaming Wars. (2) Fortune – Once Upon a Time at Netflix, October 1, 2019



PREDICTION 2

Relational Databases Make Way for Data Lakes

Though it may not have the sex appeal of Netflix and Disney duking it out for streaming war champion, the increasing prevalence of the data lake cannot be overlooked. In the age of big data and IoT, data lakes serve multiple incredibly important functions that position it to replace the relational database for many enterprises over the next year.

Storing and analyzing data to improve real world outcomes has been talked about at length since the advent of the digital age. But the pace of change in the volume of data being created and the disparate formats and locations in which it is being stored has precipitated a much more meaningful examination of how to best turn data into actionable insights and quantifiable results.

Relational databases store data points that are related to one another in logical data structures, like data tables. They provide the simplest way to query data due to their logical structure - the data points relate to each other, so they can be managed in a secure, consistent, rules-based manner.

This type of data storage has been around for decades and is still widely used by many of the world's private and governmental organizations. However, we have reached an inflection point where companies are generating so much data in such a complex way, that relational databases are no longer suited to be our optimal method of storage.

Enter the data lake. In the age of big data (a term we try to avoid at all costs), every connected device is constantly throwing off huge quantities of data that need to be stored and could potentially elucidate a valuable insight for the owner. The key benefits that data lakes offer, and the reason that we believe they will explode in popularity next year, is accessibility and ease of storage and use - but it is ultimately their untapped power.

More than 80% of the data being produced today is unstructured[1], meaning it is qualitative and cannot be stored or analyzed by conventional methods. Text, video, audio, social media activity, website clickstream data and satellite imagery are just some of the types of unstructured data that we produce every second. The ability to analyze unstructured data is crucial for organizations seeking a competitive edge, because the insights you can glean from this type of data are richer and can surface things like customer behavior, journey, sentiment and intent.

What data lakes add to unstructured data is one single repository for storage. Why is this important? For one, it can sit at low cost even in huge quantities, versus the relatively high cost of "cleaning" and storing data in data warehouses. No less important is the security it provides having all your data flowing into, and sitting in, one location. The list of benefits to data lakes goes on, but maybe the most important from a business standpoint is a unified view of an organization's data when using an effective management/analytics platform. Used in the right way, this data can transform processes ranging from drug trial efficiency to predicting customers' behavioral data.

Relational databases are, and will continue to be, a big part of the way we store data. However, 2020 will be the year of the data lake, as more and more organizations realize the uncapped potential of a single unstructured data repository.

Sources: Illustration from G2 Crowd
(1) G2 Crowd - Structured vs Unstructured Data – What's the Difference?

Expert view: Syntasa

JAY MARWAH
CEO & FOUNDER

The rise of the internet has brought about a massive accumulation of data over the last few decades, posing the question of how we store all this information. In the past, physical data centers presented the solution to this problem, but the advent of the cloud and virtual storage centers has created a literally limitless storage capacity.

In the wake of the General Data Protection Regulation (GDPR) and the California Consumer Privacy Act (CCPA), there is a growing trend among businesses as to how they store an ever-increasing amount of sensitive and proprietary data derived from a variety of sources.

Taking ownership of first-party data in this way allows companies to stay on top of data compliance and governance, and coupled with the desire to bring together disparate sources of data, has led to the rise of Data Lakes; a way of storing all of a company's data in one location, often in its raw form.

This however raises a new challenge in how to process and make sense of the gargantuan amount of data stored in these Data Lakes, particularly for more traditional brick and mortar enterprises.

The main issue for these more traditional businesses is attracting the talent to process, understand and use their data at a time when the world is not producing enough new data engineers and data scientists to keep pace with the amount of data that we are generating.

That is where Syntasa comes in. We ingest this disparate data from Data Lakes, stitch it together into a unified schema for each individual, automatically generate features for data science, and run models to deliver insight into consumer behaviors – pulling exactly what companies need, in the right form.

Syntasa has developed a web application that prioritizes simplicity and usability to streamline the process of analysis. This innovative technology allows digital professionals to do the data engineering and data science work they so critically need. With this technology, you can set up end-to-end data + data science + activation pipelines that run autonomously, without any human intervention.

Once those processes are developed and deployed, the system teaches itself from streaming data that comes in. It continuously uses the latest data and models to generate customer-facing insights and better experiences. While companies may face a lot of challenges around data and how they understand it, the uses of this data have the potential to be hugely rewarding.

One use case for these pipelines is the algorithmic retargeting of website visitors. Traditional retargeting is the process that happens when you look up a washing machine online and then find ads for washing machines on another website.

Algorithmic retargeting fine-tunes this process by using data science to determine where a customer is in their buying journey, the best way to accelerate that journey, and the channel which is most likely to bring them to your product.

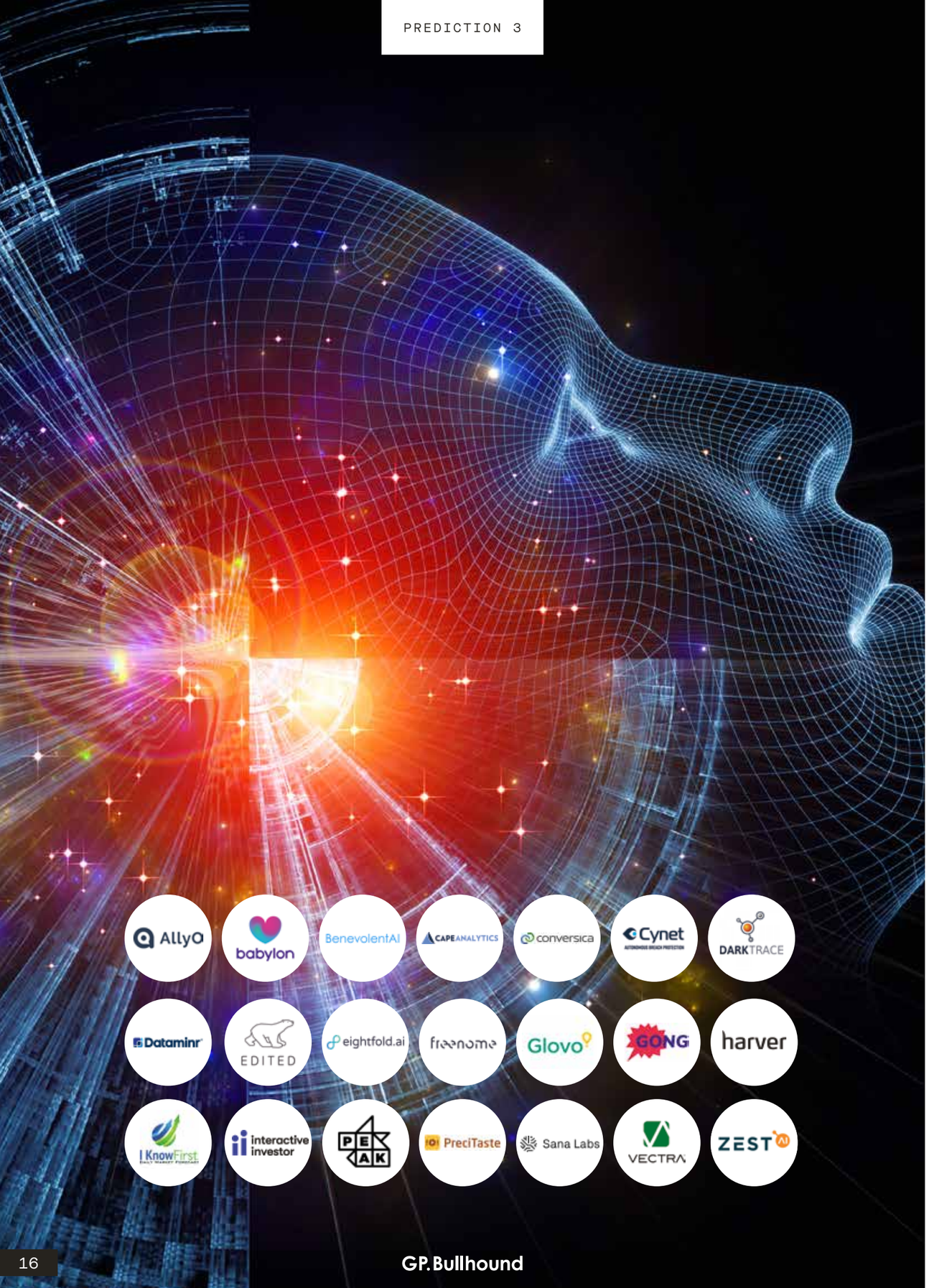
This more precise approach saves money on the retargeting process and increases conversions by focusing advertising when the propensity to buy is highest.

Customer identity resolution is another way to utilize data stores to commercial advantage. Through proper analysis of data, it is possible to determine if the person entering your store is the same person that has interacted with your app or accessed your website. Taking advantage of that knowledge means that you can market better products or offer more personalized experiences to your customer base.

Data can even be used to prevent fraud. Artificial intelligence raises the possibility of analyzing trends in consumer behavior to identify fraudulent behavior before a crime actually occurs.

These different applications of data give companies insight into which channels are attracting consumers, which are ultimately most successful in converting them into customers, and which are leading them through an optimal customer journey.

Traditional businesses are striving to take ownership of their first-party data by storing it in proprietary Data Lakes. Nevertheless, they will have to use all the resources around them to take advantage of the AI and machine learning-type technologies if they want to compete with digital natives.



Companies Turning to Verticalized AI Solutions to Solve Real Business Challenges

VERTICALIZED SOLUTIONS PROLIFERATING

It has become clear to us over the last year or two, as the hype of AI has begun to fade and real technology is implemented, that enterprises are still in a state of flux when it comes to AI solutions. The ecosystem is complex and ever changing, but we believe that in the next year organizations will choose vertical AI SaaS solutions to tackle specific business challenges rather than attempting to deploy horizontal AI across the enterprise IT stack.

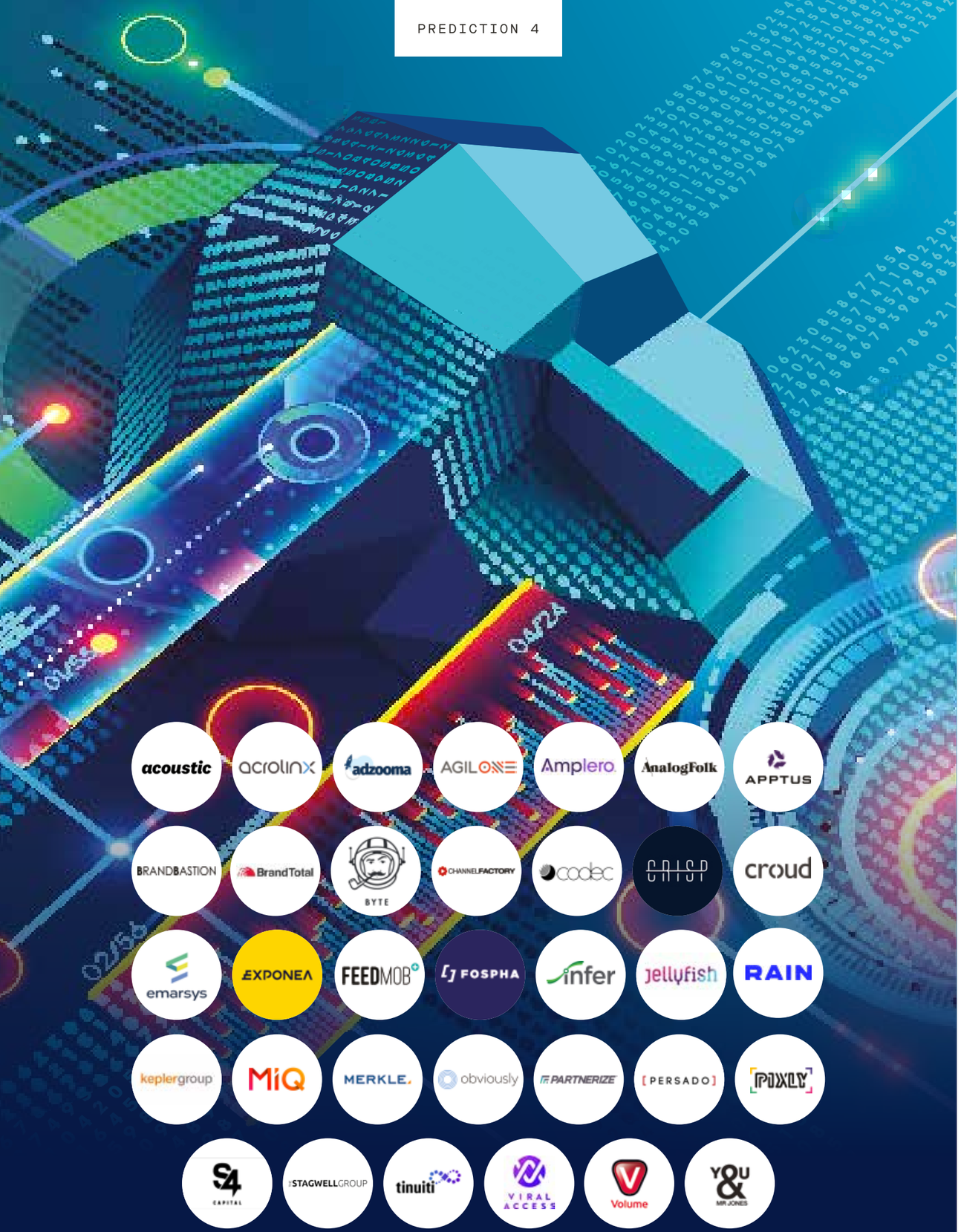
According to IDC, 25% of organizations worldwide that are already using AI solutions report up to 50% failure rate[1]. Lack of necessary expertise and misaligned expectations were cited as the top reasons for failure. That is an incredibly high fail rate that can end up being extraordinarily expensive, time consuming, and can hurt long term competitiveness. We see the market bifurcating into two separate segments, horizontal AI applied to the entire IT stack to incrementally enhance data analytics across the organization's data sets, and the rest of the market that does not have the resources or expertise to implement such a complex solution. Rather, the latter segment will favor highly vertical solutions with robust AI capabilities that help businesses solve specific needs within an industry.

Clearly, if an AI company cannot explain what they do for potential customers, particularly mid and lower market customers, it will be difficult for them to compete with the clear value propositions that vertical solutions offer. Conveying to executives exactly how a solution will add value is key to the adoption of these solutions in the future, this is most easily communicated when being used to overhaul highly manual processes.

There are numerous examples of these in the market now, and their growth over the next year will be illustrative of how machine learning is growing into an entire sector of venture backed companies. London based Tractable has an AI accident image and data intelligence solution for insurance companies that far exceeds human accuracy, automating what was once a manual task. Palo Alto based AllyO utilizes conversational AI to help companies find more qualified candidates, automate recruiting processes, and receive actionable insights. The list goes on.

No longer will executives and investors fall for generic AI positioning in a company's sales or pitch deck. As education levels increase, and leaders understand what AI is and where AI can improve their businesses, companies will seek out solutions that tackle those challenges leading to dramatically improved AI implementation success rates. We look forward to a time soon where these more effective vertically focused solutions are widely adopted and allow humans to be more productive and spend more time doing the work that requires human intelligence.

Sources: Zoominfo. (1) Forbes - This Week In AI Stats: Up To 50% Failure Rate In 25% Of Enterprises Deploying AI

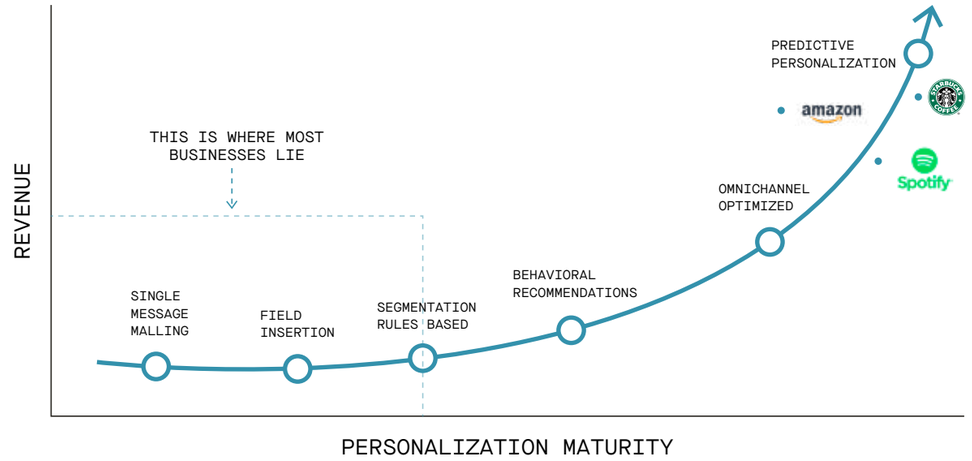


Artificial Intelligence and Machine Learning Showing Quantifiable Results in Marketing

Today's marketers must constantly compete to stay relevant and engaged with customers in the increasingly crowded attention economy. Technology has enabled brands to reach customers with ease across a variety of touchpoints including email, ads, push notifications, social media and much more. Thus, it is more important than ever to cut through the noise and win engagement on a one-to-one level. To achieve this, advertisers are rapidly adopting artificial intelligence in their marketing strategies, allowing them to deliver personalized content and customized experiences at scale. We expect to see rapid adoption of Artificial Intelligence (AI) and Machine Learning (ML) within key topics including hyper-personalization, branding, and the B2B sales experience.

Hyper-personalization utilizes AI and real time behavioral data to deliver highly relevant engagement through the right channels at the right time[1,2]. Personalization, on the other hand, is simply the incorporation of personal and transactional information like name, title, organization, etc. into communication strategies, according Martech Advisor. It is the ability of AI to predict behaviors by studying patterns between large quantities of variables that enables marketers to reach individual consumers with uniquely tailored content in highly dynamic digital environments. For example, AI enables personalized email marketing to be created through rigorous A/B testing and distributed broadly, while constantly adapting to click-through, conversion and shopping cart data. AI and inferential Natural Language Processing ("NLP") are also improving search marketing with analysis of vast amounts of click-through data and related keywords to predict consumer search trends.

HOW BRANDS ARE USING HYPER-PERSONALIZATION[1]



Sources: (1) WebEngage, Why Hyper-Personalization is The Future of Marketing (And how to do it), October 30, 2019. (2) Martech Advisor, Hyper-Personalization: The Role of Data and Technology, July 18, 2019.

AI also has applications for broader branding and customer segmentation. Marketers can use AI to create highly refined “microsegments” of customers, separating them into different personas to understand what motivates them. Brands can then recognize patterns of how consumers change personas over the customer journey and maintain personalized and evolved relationships. Influencer marketing is becoming increasingly important in brand strategy, and AI can be massively beneficial to identifying key influencers around topics most relevant to a brand. Using advanced computer vision and NLP technology, marketers can analyze unstructured data including contextual relevance, photo/video affinity and demographics from social media to define and measure influence, allowing brands to understand which content would resonate the most with that influencer’s followers.

Finally, the B2B sales process presents significant potential for disruption from AI. B2B sales often involve numerous points of contact, interactions, and approvals over an extended decision-making period. AI can help pool and analyze troves of CRM and third-party data to understand “how prospect actions and attributes correlate with actual purchasing patterns,” according to AI sales firm Infer. This allows marketers to predict which leads are ripe for sales calls and which ones need additional nurturing, giving sales teams the visibility they need to allocate resources efficiently[1]. In addition to lead scoring, AI can play a role in content customization for B2B sales by organizing unstructured case studies, social media, and white papers into individual campaigns that are relevant to a particular business’s operational use case.

AI has shown massive potential and adoption within digital marketing. It is capable of ingesting large amounts of data, producing accurate and insightful statistical models, and automating personalized content delivery at scale. In 2020, expect to see more marketer’s set-up predictive lead scoring, deploy complex trigger-based campaigns and invest more heavily in dynamic content to develop stronger customer relationships and loyalty.

Sources: (1) Infer, Make Your Job Easier with AI For Sales, October 22, 2019

PREDICTION 4

Expert view: Obvious.ly

MAE KARWOWSKI
CEO & FOUNDER

Although a relatively new sector of the industry, influencer marketing has rapidly changed in the past decade alongside rapid social media growth. Emerging technologies are creating new opportunities and improving marketing firms' approaches to analytics and optimization.

In its earliest days, influencer marketing involved asking an influencer to post about a product and waiting to see what impact it had.

At Obviously, our role is to bridge the gap between large enterprise brands and the hundreds of thousands of influencers across the world that they want to work with.

Crucially, influencers are people, not companies or ad units, and interactions with them cannot and should not be 100% transactional. This isn't just about buying inventory in an influencer's feed; it is about forging a connection with a real person and making sure that they know, understand and convey love of a brand or product.

Artificial Intelligence (AI) and Machine Learning (ML) can help us to build more meaningful relationships, particularly for bigger campaigns. It is easy to get five influencers to feel invested in a brand, but much harder to get 5,000 on-board. So, the AI and ML technology helps to provide more precise results utilizing a data-first approach – such as identifying target audiences with incredible granularity.

In a crowded marketplace, AI is key to finding the right influencers for the brands we work with, not just those with a large following. We use AI to find out who this person is influencing - who their followers are - and what they care about and engage with online. We can pinpoint statistics such as: 75% of their followers are women within the age of 25 to 35; they follow these accounts, they use these hashtags and they are in this area.

This allows us to look past the term 'influencer' and focus on how we find content creators who are engaging the right audience. AI and ML act as a guide to make sure that we are being as efficient as possible, while our full-service staff is also working hard to foster those important human relationships between brand and influencer.

AI and ML also helps us to learn from the impact of our campaigns. They enable us to look at which types of consumers respond positively to brand collaborations and what type of content works with which influencers and audiences. Once we have this information, we can use it to optimize our operations in the future.

But just as new opportunities have arisen with influencer marketing, so have new challenges. AI is the key to combatting the big issues in the industry, including fraud and fake followers.

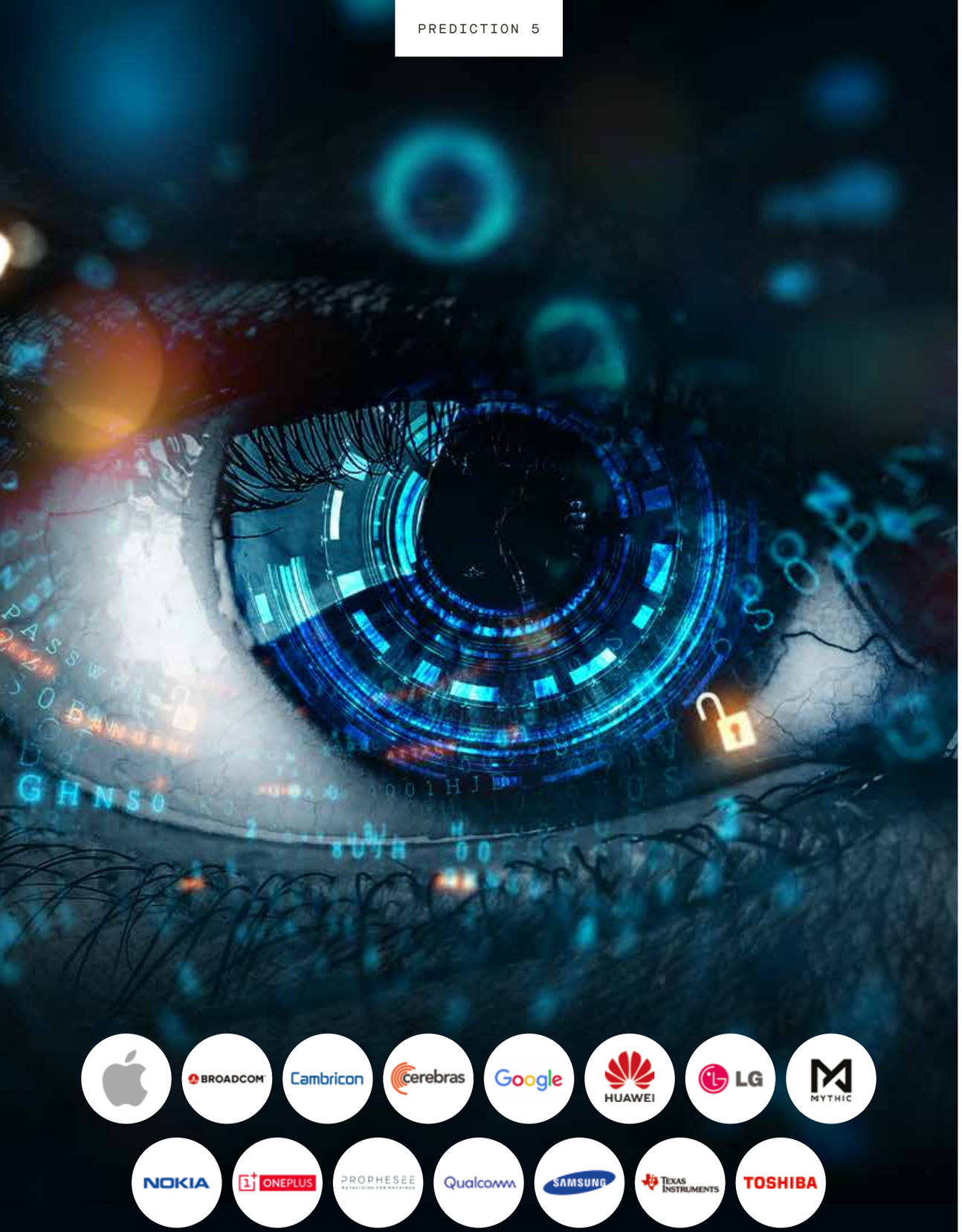
Technology allows us to identify bot accounts and unusual spikes in a person's following. If someone gained an extra 200,000 followers six months ago, without any trace of viral content from that time, we can identify that as fraudulent behavior. That is also part of our optimization process.

Looking forward, there is great potential for computer vision to play a role in influencer marketing. Young creators are moving away from the dominance of static images and becoming more comfortable with creating video content.

Computer vision has already given us the ability to analyze how the composition of photos affects their impact. It can tell us what it is about a photo that tends to resonate with an audience, whether it is a natural setting, a person in the foreground, or a picture of the product.

The shift towards video is likewise a very exciting development and it creates prime space for these techniques to be used for analyzing the impact of video content.

The crucial point is to use AI to find out not only what content works, but why it works and how those lessons can be applied to campaigns in the future.



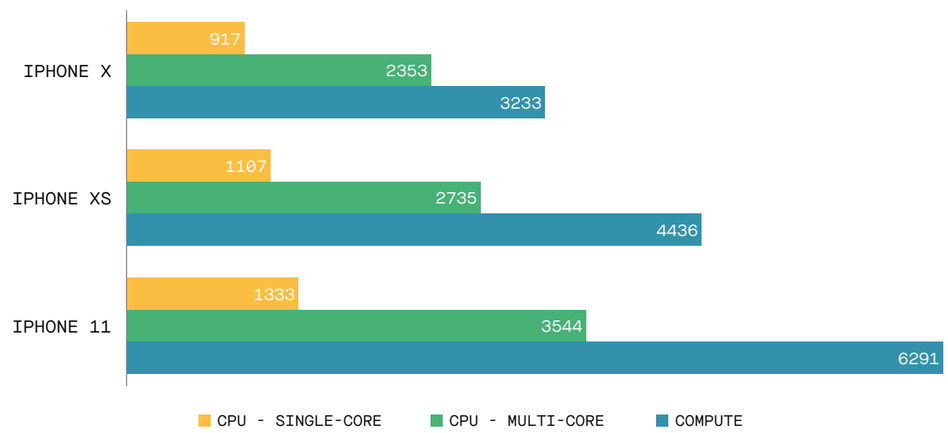
PREDICTION 5

Apple A13 Bionic Sets the Precedent for On-Device AI/ Machine Learning Technology

On September 10th, 2019, Apple held it's iPhone 11 launch event at Steve Jobs Theater in Cupertino, and while there were the usual slate of performance improvements and new features, the announcement of the new A13-Bionic chip marked an unprecedented incremental leap in on-device mobile compute capability. Developers are increasingly looking to weave machine learning into applications in an effort to improve the way we interact with our smart phones, but implementation is constrained by on-device compute resources. In the distant future, massive processing loads may be run off-device when 5G networks are fully developed. Until then, however, the A13-Bionic chip, which is owned by Apple and designed in-house, has set the bar for on-device processing performance. This will bridge the gap to make devices themselves smarter.

The new chip boasts 8.5 billion transistors, six CPU cores, a quad-core graphics processor, and an eight-core neural engine that can perform machine learning functions 20% faster. The CPU now has a set of machine learning accelerators that can process matrix multiplications, a task critical to machine learning, six times faster than the CPU alone[1]. All of that together distinguishes the A13 Bionic as the fastest chip ever in a smartphone[2].

GEEKBENCH 5 SCORE[1]



How has Apple achieved this? Apple's development team constantly measures usage patterns so it can optimize for the way consumers most frequently interact with their iPhones. In reality, we don't regularly use the maximum capacity available in most of today's smartphones. By virtue of owning the full stack, from the chip design to the operating system, Apple can design purpose built integrated circuits to maximize efficiency across the entire device. Anand Shimpi of Apple's Platform Architecture team says they really view performance as performance per watt, "We look at it as energy efficiency, and if you build an efficient design, you also happen to build a performant design[3]." Other chips, like Samsung's Mongoose, boast bigger cores, additional transistors, or more raw processing power, but the specs on paper don't capture the true advantages of Apple's design.

Sources: (1) Macworld, Inside Apple's A13 Bionic system-on-chip, October 2, 2019 (2) Medium, AI Chip Duel: Apple A13 Bionic VS Huawei Kirin 990 5G, September 10, 2019 (3) Wired, An Exclusive Look Inside Apple's A13 Bionic Chip, September 19, 2019 (4) Lionbridge, Three Ways Your Smartphone is Programmed to Use AI and Machine Learning, June 06, 2019. Note: Geekbench 5 scores are calibrated against a baseline score of 1000 (which is the score of an Intel Core i3-8100). Higher scores are better, with double the score indicating double the performance.

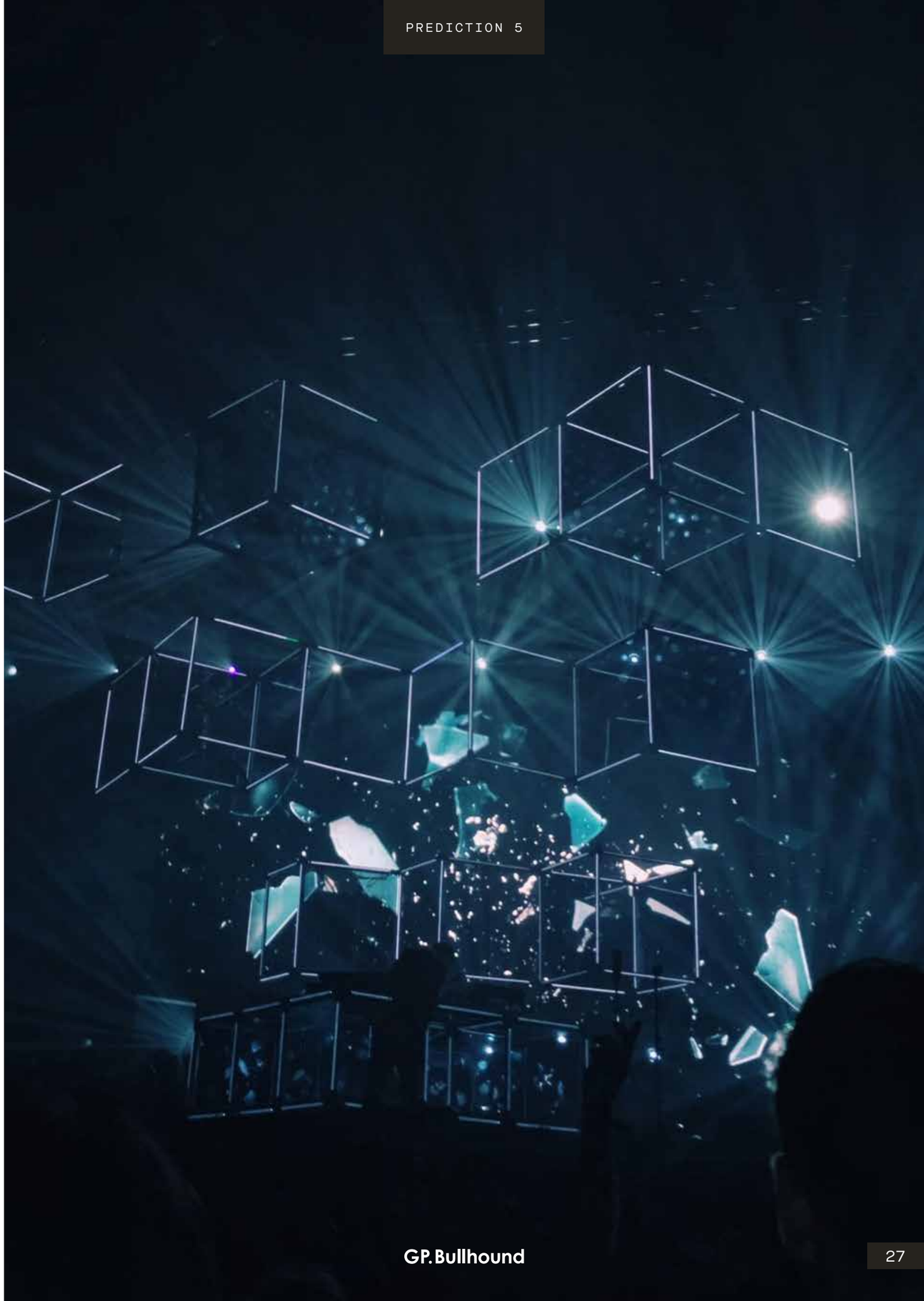
Of the six CPU cores, two are high performance cores that can be drawn on for demanding tasks like rendering games and web pages, and the remaining four are efficiency designed for tasks like opening email and texting. On top of that, Apple was able to squeeze a 20% performance increase out of the CPUs at the same power draw as the A12 chip by using the second generation 7nm manufacturing process to pack more transistors into a smaller space, reducing power leakage. This has enabled Apple to bring machine learning on-device without thermal issues or negative impacts to battery life.

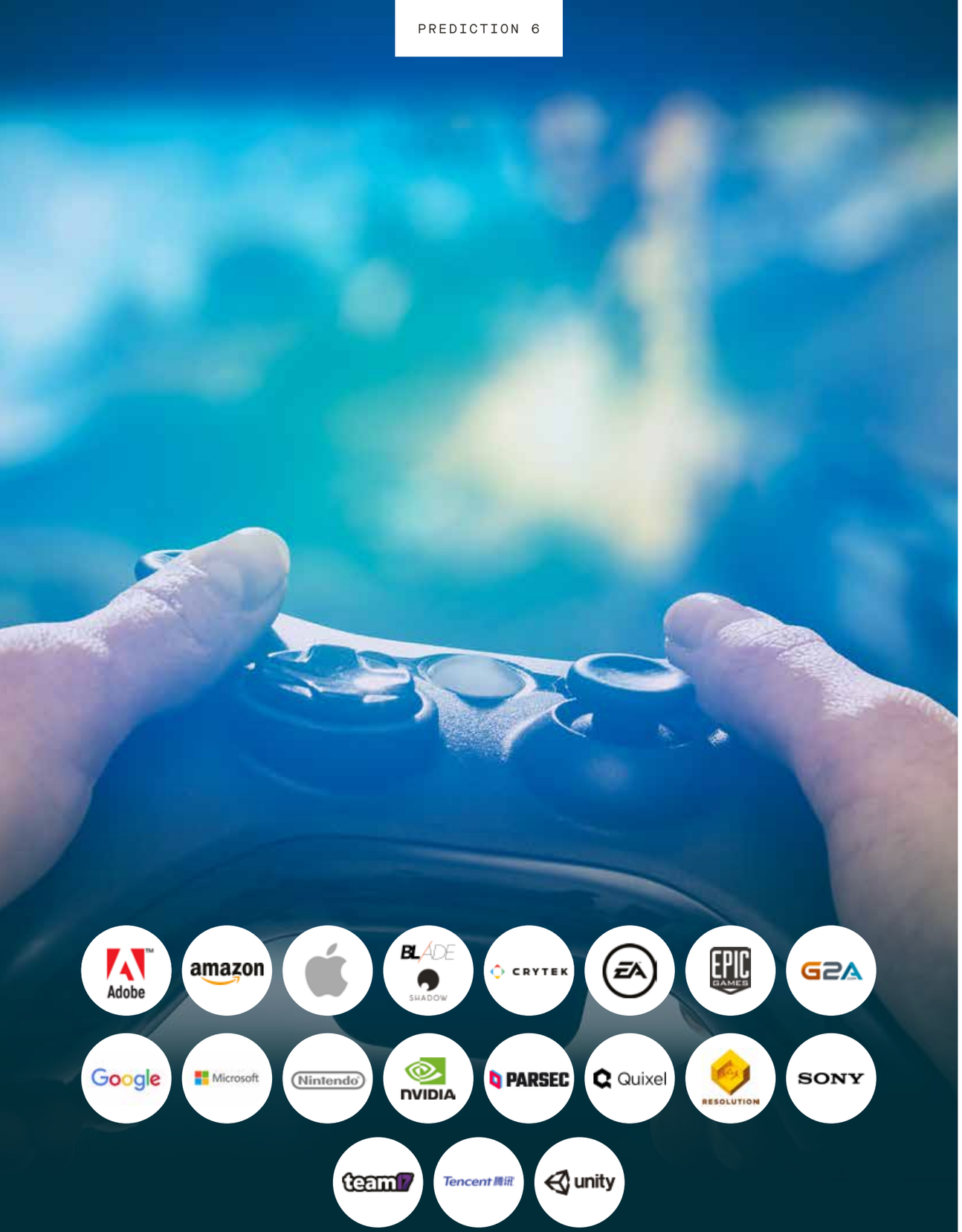
The result is a seamless smartphone experience enhanced by machine learning. For instance, the new Deep Fusion camera technology uses the A13 Bionic's neural engine to examine each individual pixel taken from a series of photos captured with short and long exposures both before, during, and after the shot. It then optimizes for the best pixel across each picture, accounting for light, texture, and frame stabilization. Other noticeable areas include natural language processing capabilities in Siri as well as augmented reality tools, games, and learning instruments[4]. Critically, machine learning is constantly running in the background to assign resource draw throughout the chip, increasing efficiency and battery life.

Apple is defining the feature set that consumers will come to demand in the next generation smartphone and it has upped the ante for other handsets in the market. This is enabled by unprecedented machine learning processing capability on the device itself. We expect this advancement to create a ripple effect in the industry, leaving other phone makers racing to invest in designing more efficient and harmonized ecosystems with greater usable performance.

4) Lionbridge, Three Ways Your Smartphone is Programmed to Use AI and Machine Learning, June 06, 2019. Note: Geekbench 5 scores are calibrated against a baseline score of 1000 (which is the score of an Intel Core i3-8100). Higher scores are better, with double the score indicating double the performance.

PREDICTION 5





PREDICTION 6

Gaming Embraces the Era of Subscription and Streaming

Almost every aspect of the massive, growing gaming industry is undergoing monumental changes. Consumers are shifting to subscription services over outright game ownership, traditional methods of game delivery are under threat, and developers now have to consider these new platforms and the implications of changing consumption. Over the next year, we will see gaming exposed to the masses through streaming, people will increasingly subscribe to libraries of games, and developers will look to newer more comprehensive development platforms and tools for efficiencies and monetization.

The subscription model of gaming consumption is going to gain significant momentum in 2020. This means that consumers can pay on a monthly or annual basis for a bundle of games from major developers. For example Electronic Arts offers a subscription to games including FIFA, Madden, The Sims, Star Wars Battlefront and more[1]. Adoption has taken time, but the data shows subscriptions are set to be a major driver for the industry in many key categories.

According to Electronic Arts ("EA") subscribers play 2.5x the number of games that non-subscribers do, spend over 3.5x the amount of time, and most crucially spend over 3x more money[2]. If you have access to more games for the same cost, it makes sense that gamers would spend more time in a wider range of games, adjusting playing patterns based on mood rather than ownership. This new model of ownership, adopted by many in the space including Xbox, Apple and more, may also increase the number of new players previously put off by the high price tag of owning one or multiple games. Now they can access many games they want for a flat fee. This means the studios now have access to more gamers who will be inclined to spend more in-game because there is a low upfront cost associated with playing that game.

SUBSCRIBERS SHOW SIGNIFICANTLY MORE VALUE IN THE GAMING ECOSYSTEM[2]

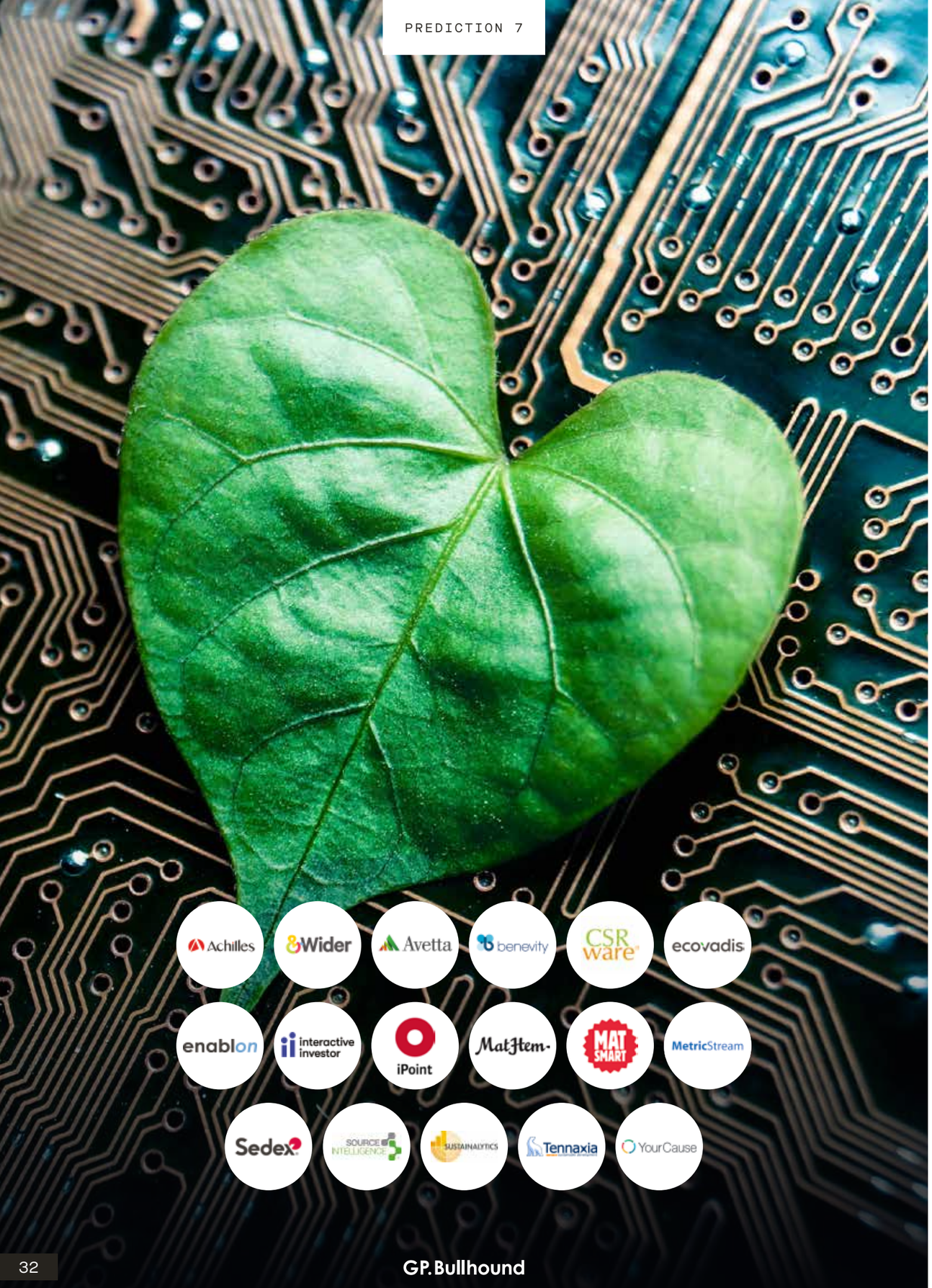
Sources: Electronic Arts, Electronic Arts estimates
(1) Reuters - More U.S. millennials subscribe to video games than traditional pay TV: survey (2) Electronic Arts - Long Term Value Creation

Arguably the most disruptive change we will see in the industry is coming from streaming platforms a la Google's Stadia and Microsoft's xCloud. No longer do we need to own consoles that sit underneath televisions, now we can play games directly on our devices anywhere in the world, as long as the network connection is strong enough. Game streaming happens on a remote server rather than a local machine, the video is then streamed back to a device as the gamer's inputs are simultaneously sent to the server. Right now, that requires a strong Wi-Fi connection – over half of the US currently does not have the required bandwidth – however, with advancements in cellular network technology, specifically 5G, speeds will rapidly make streaming viable for many more people.

Development platforms are also democratizing the game building process as studios now have access to robust game creation tools that can create high quality games. With the advent of streaming and an ability to play high quality games on any device, and not just console, more and more teams, both large and small, will utilize the big game engines. Epic's Unreal engine, and Unity's Unity 3D are leading the way now, but Amazon with its multiple complementary products (AWS, Twitch) has also entered the market with Lumberyard, competing for a greater share of the gaming pie. These platforms have also made sophisticated monetization tools available, giving small studios capabilities they did not have just a few years ago.

It is a big year for the video game industry, with many unknowns. While upheaval is sometimes challenging, the adoption of subscription and streaming services will ultimately broaden the accessibility of gaming. This, we hope, will allow for a flourishing developer community that reaps the benefits of mass consumption.

PREDICTION 6

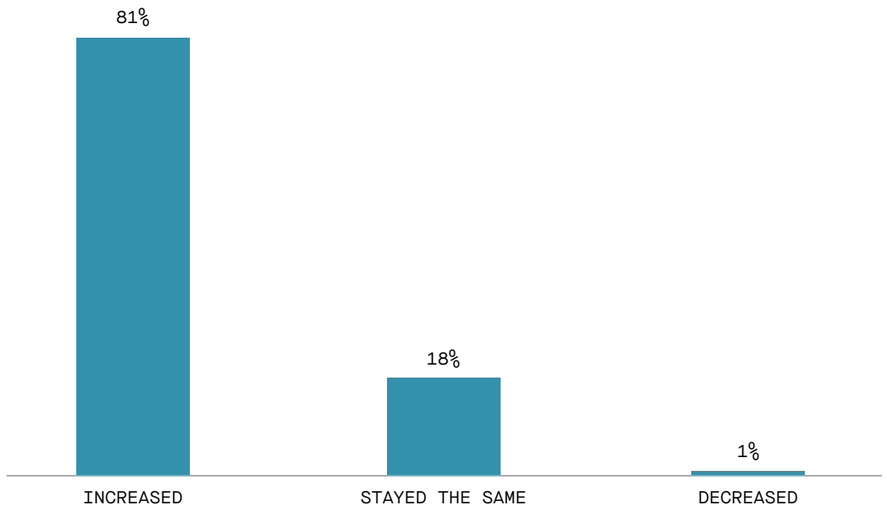


Corporate Social Responsibility Takes Center Stage

The world has seen an increased focus on Corporate Social Responsibility ("CSR") over the past several years. While the concept is not new, it is gaining recognition as a global initiative that aims to contribute to environmental, economic, and human well-being through business processes and policies. CSR is a broad term that encompasses a wide range of activities, including procurement, fair labor practices, and philanthropy, among others. We expect to see rapid adoption of CSR programs by companies in the near future and increased investment into the technology companies that enable more efficient systems of record and information transfer.

A decade ago, it was thought that regulation from the public sector would be the main driver of CSR adoption, but that is not the case today. Business operators, employees, and consumers - driven by millennials and Gen Z - are demanding tangible action from corporations. Consumers are leveraging their power through purchasing decisions and increasingly demonstrating their willingness to pay more for goods that are sustainable. In turn, brands are looking to provide transparency in their production and supply chain processes that provide consumers with a reliable benchmark to measure their corporate social impact.

ORGANIZATIONS' COMMITMENT TO SUSTAINABLE PROCUREMENT[1]



Sources: (1) NYU Stern Center for Sustainable Business, Sustainable Procurement Barometer 2019, July 24, 2019

To meet the demands of stakeholders, businesses must quantify, measure, report, and communicate the impact of their CSR practices. Traditional methods of accomplishing this are manual and archaic, requiring significant time, effort, and resources[1]. As a result, data is often outdated, inaccurate, and of poor quality, undermining the impact of corporate efforts. Because technology's biggest benefit is speeding the transfer of information at scale[2], it can be leveraged to improve transparency of a company's CSR impact and improvement areas. For instance, a large procurement operation must collect, assess, and aggregate CSR data from thousands of suppliers and sources. Software can streamline and automate that process, allowing all parties involved to manage their projects from a centralized dashboard in real time, delivering tangible value to the organization as a whole. Accurate visibility into CSR performance then enables management teams to quickly react with improvement plans while reliably reporting performance to the external community.

The benefits of CSR programs to society and the environment are considerable, but so are the business benefits. Perhaps most apparent is brand differentiation and uplift in the top line. Customers want to do business with ethically and environmentally responsible brands, and a strong reputation in CSR can lead to customer loyalty and provide a significant competitive advantage[3]. In addition to attracting customers, CSR leaders can attract more talent and better retain employees. CSR scores are becoming more important in gaining access to financing, as investors are more likely to deploy capital in reputable businesses. For instance, Benevity recently raised $40m in Series C funding from JMI and General Atlantic[4]. Benevity provides employee engagement software, including online giving, matching, volunteering and community investment. In announcing the transaction, Bob Nye, General Partner of JMI Equity said, "Companies with purpose-driven cultures are better positioned to succeed in the new economy, especially as the latest generation of employees seek jobs that provide a sense of meaning and opportunities to make a larger social impact."

Looking forward, we expect to see growing investment and capital market focus on CSR performance and accountability. We expect CSR-focused companies to continue to attract significant investment, enabling VCs to add "impact" to their portfolio to stand out against the usual backdrop of capital representing the LP community. This trend will further be supported by investment into technology companies that provide scalable information transfer and real time visibility into the practices of global corporate citizens.

Sources: (1) Eco-Business, Five technology trends defining the future of corporate sustainability, August 28, 2017. (2) Stanford Social Innovation Review, What Does Corporate Social Responsibility Mean for the Technology Sector?, October 3, 2014. (3) niBusiness Info, Business benefits of corporate social responsibility, May 8, 2017. (4) PE HUB, General Atlantic, JMI invest $40 mln in Benevity, October 22, 2019

PREDICTION 7

Expert view: EcoVadis

FREDERIC TRINEL
CO-CEO & CO-FOUNDER

The era of Mark Zuckerberg's "move fast and break things" is over. It's time to act fast and clean up.

Technology should be a disruptor, but one that meaningfully helps the world not hinders it. It can help businesses to introduce Corporate Social Responsibility (CSR) and Environment, Social and Governance (ESG) criteria at a rapid pace and on a universal company scale.

At EcoVadis, we assess companies on their ESG performance as if we have given them a blood test, prescribe the necessary medication and monitor their progress. This will depend on many factors – from size and complexity to geography and industry – and it is done at a very large scale (i.e. tens of thousands of companies are assessed every year). So, the only way to ensure each is given the bespoke CSR rating and treatment it needs is through the efficiencies of technology – a secure software-as-a-service platform that allows us to operate in over 155 countries delivering quality ratings for any company no matter the size or territory.

There are industries that are more advanced than others: chemicals, pharmaceutical, retail and manufacturing – their exposure to sustainability risks in their supply chain has always been greater than in other industries which gave them an obvious business case: the cost of not properly monitoring sustainability in their supply chain has always been potentially massive! In general, any business still asking 'why' rather than 'how' will be left behind.

You can compare the adoption of CSR or ESG by businesses to the adoption of the seatbelt. The old guys complained about this new regulation, it was hard for them to adapt and they viewed it as a bad thing. Looking back, we all know it was the right thing to do and it is something we now do not even think about.

Purpose in business is the same – for many the change will be hard and perhaps painful, but one day we will look back on those who were slowest to change and judge them poorly. Those who adapt quickly will be on the right side of history.

Ten years ago I would have thought that environmental regulations would be the primary market motivator, but in countries like the US, which are more consumer-driven rather than regulatory-driven, we simply cannot rely on this alone.

We likewise don't have time to wait for the younger generation to mature into tomorrow's politicians and institute the policies that we need, change must happen now.

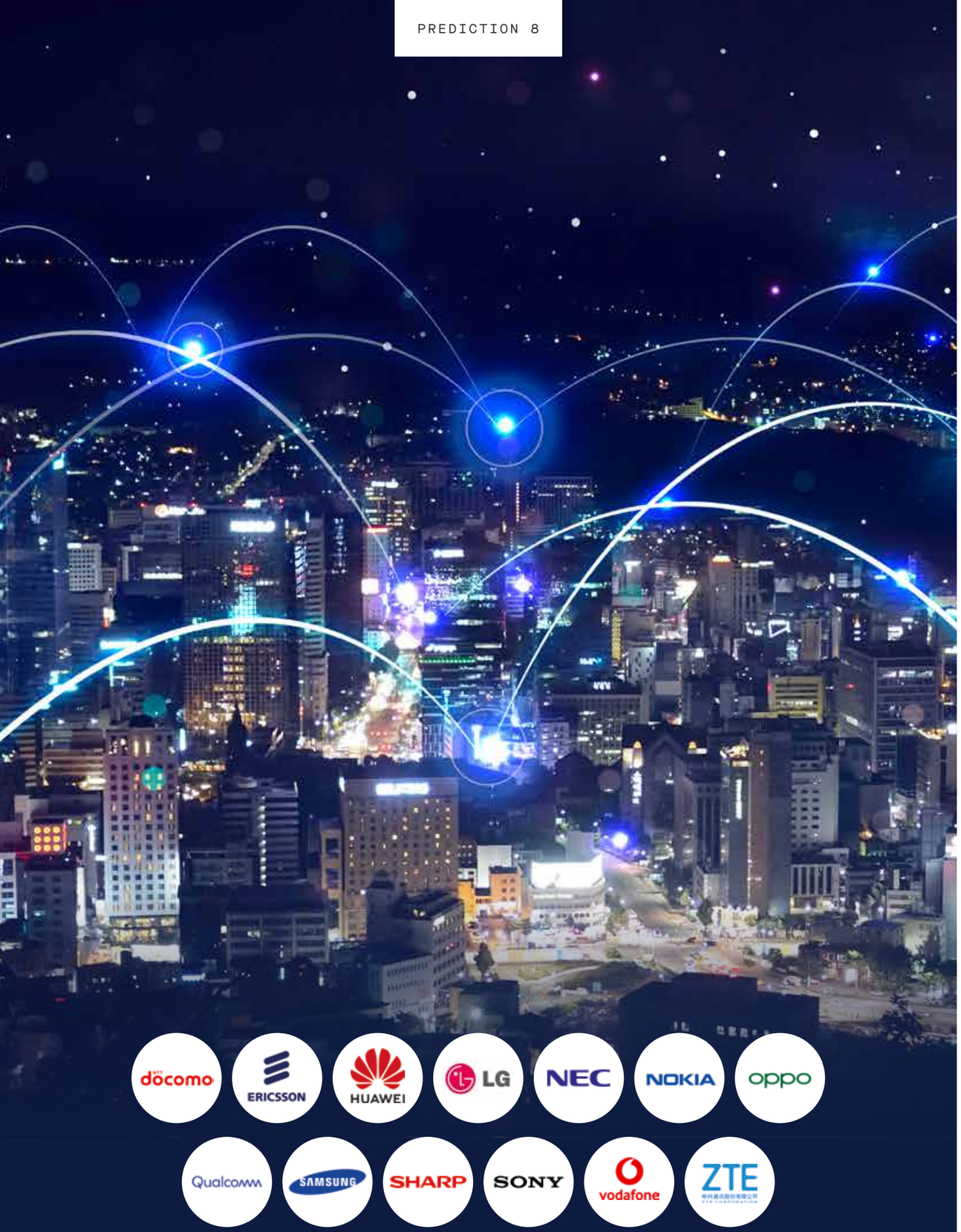
Consumers are the real drivers of change and this generation is the most purpose-driven consumer market of all time; they will reward companies that adapt to the times, and punish those who do not. The younger generation particularly are aware of the short-term cost of sustainability and are willing to pay it for long-term gain. Businesses should operate in the same way.

The argument many in these industries make is that the cost of making products or services more environmentally and societally conscious will be passed onto the consumer. Perhaps they do cost a little more now, but it is short-sighted to think this will always be the case, or that this will change without wide-scale adoption of eco-friendly practices.

One of the reasons it is more expensive today is that older materials continue to be sold at an incredibly subsidized rate despite their negative impact. There has to be a market adjustment – this will come through consumers demanding better business behavior, and from organizations responding correctly.

Young people are the driver, the accelerator and the catalyst for change. As the world becomes more integrated with tech and a new generation of business leaders and consumers comes through, it is paramount that the tech industry takes the lead. It is not an industry bound by traditions, it is one that is transformative in itself.

Change is embedded into tech culture, it now must ensure that change is for the better, and help other industries more cut adrift to do the same, just as EcoVadis does.



5G Landgrab

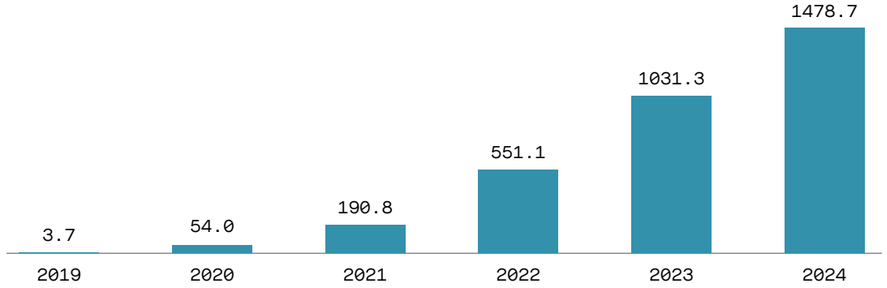
THE RACE FOR COMMERCIAL DEPLOYMENT OF 5G

The race for establishing a 5G network has brought about a war amongst the telecom industry's most dominant heavyweight contenders from all corners of the world. They're all competing for first mover advantage in the commercial deployment of what is expected to be the most significant advancement in technological infrastructure and mobile broadband to date.

5G should not be thought of as another commercial ploy to promote yet another incremental upgrade to your cellular network service. It presents an industry disruptive technological edge that will increase data rates and bandwidth, lower latency and greatly enhance mobile computing capabilities.

However, as promising as this trend sounds for the future development of IOT / IIOT devices and mobile broadband capabilities there are still geopolitical and structural barriers that are impeding the full deployment of 5G. Given that much of the industry standardization process behind 5G has yet to be defined in terms of which companies will be granted intellectual property rights and essential patents, as well as what portion of the spectrum and frequencies will be allocated for global commercial usage, there is no definitive answer as to who will emerge as the initial major stakeholder in this unchartered network.

5G SMARTPHONE CONNECTIONS WORLD WIDE, 2019-2014 (IN MILLIONS)[1]



Historically, large players in the space such as Qualcomm, Samsung and Huawei have held a majority of essential patents during the eras of 2G, 3G, 4G and 4G LTE, providing the ability to generate revenue from advancements in mobile device hardware. As the build out of 5G progresses, a similar trend is expected to follow. The most profitable players are going to hold a significant amount of critical IP which will have an enormous impact on a company's time-to-market and its ability to generate revenue. The essence of 5G is focused around the network and availability of the spectrum's high bandwidth and low latency frequencies – meaning that as the amount of mobile and IOT devices that are subject to connectivity increases, so will the value of IP leading to higher revenue generation.

Holding the rights to certain spectrum bands does not imply market dominance. Rankings are subject to change as companies face a combination of various challenges such as security, corporate governance and compliance of the spectrum network, the division of patent rights to commercial approved bands and frequencies and infrastructure deployment; all of which currently pose a challenge to 5G. Currently, U.S.-based companies hold the lead in number of commercial investments and infrastructure deployments[2], while Asia-based companies such as China and South Korea are leading in the category of number of patents declared[3].

All over the world, companies are chipping away at these barriers to be at the forefront of 5G deployment – wanting to solidify their claim as the originator of the first successful, fully operational 5G commercial network. Going into 2020, companies will look to solidify their position in the spectrum network with the acquisition of certain bands and frequencies and increase infrastructure spend to ensure global coverage.

Sources: (1) eMarketer, Getting ready for 5G, February 26, 2019 (2) Citia, The Global Race to 5G Spring 2019 Update, April 2, 2019
(3) iPlytics, Who is leading the 5G patent race?, November 1, 2019

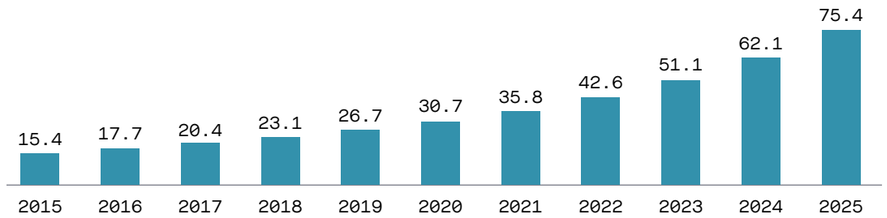
The Edge of Tomorrow

The first two decades of the 21st century have been driven by a movement to cloud computing, as businesses began moving all data storage and processing off premise to third-party data centers. Cloud-based data centers have provided a platform for companies to scale more efficiently via a reduction in infrastructure spend and improved the speed of mobile devices by off-loading tasks that require large sets of data. The economic benefit of centralized data centers has led many companies to believe that cloud computing is the best way to improve connectivity.

However, as mobile and IOT devices are increasingly built with more data intensive applications, cloud computing is tasked with processing vast amounts of input data. This can lead to an inefficient backhaul of network traffic, introducing latency and slowing performance. In order to reduce the amount of data moving through networks to centralized data centers, many companies are shifting their computer processing to the network edge, resulting in more responsive devices, improvements in usability, and a more seamless performance dynamic.

Placing edge servers closer to the source of IOT sensor data allows sensor technology to collect raw data more quickly with real-time analytics to determine which data points should be sent to the cloud for storage or processed on an edge server or a micro data center. In turn, this frees up bandwidth by a multiple of 3x to 6x[1], leading to lower latency and greater operational efficiency.

NUMBER OF IOT CONNECTED DEVICES FROM 2015-2025 (IN BILLIONS)[2]



Dispersing the locations at which data is processed also presents added security benefits that are not possible with a cloud only solution. Having data processed at the edge of the network prevents mission critical data from being pushed through a backhaul of a cloud network and allows for proactive safety measures to be built into networks; which can protect against a variety of issues including industrial and public utility system failures. Edge servers and micro data centers can be equipped with similar security features found in regional data centers; with such capability, this provides a greater level of protection for data that's scattered across different geographies. Insuring not only against unforeseen cloud failures but also mitigating attacks and reducing the probability of compromising critical data.

A common misconception about edge computing is that this trend will render cloud computing obsolete. Edge computing alone has limited storage capability and still requires its centralized counterpart to maximize its full computing capabilities. Going forward, edge computing will present a third option to the traditional private versus public cloud structures, utilizing a combination of both centralized and decentralized data processing. Businesses can utilize the benefits of each architecture and implement a hybrid cloud and edge computing solution to optimize their networks for efficiency and greater scalability.

The capabilities of edge computing will pave a path for advancements in technology and telecom that will streamline the integration of sensor technology into our homes, cities and digital networks. Combining this collaborative infrastructure with improvements in sensor technology will enable endless new applications for low latency computing, inclusive of, but not limited to, the large-scale deployment of 5G for IOT, and autonomous vehicles and smart cities. In 2020, expect the number of start-ups and mid-sized companies that provide compute, network, infrastructure and cybersecurity for the edge to increase as these players will look to provide a viable alternative to a single cloud solution and challenge existing large enterprises like Amazon Web Services, Microsoft Azure and IBM Cloud.

Sources: (1) Carnegie Mellon University, The Emergence of Edge Computing, January 1, 2017 (2) iPropertyManagement, IoT Statistics, November 1, 2019

Expert view: WellAware

MATT HARRISON
CEO & FOUNDER

The vast quantity of data being produced by the Internet of Things (IoT) today simply isn't optimized. As a result, companies spend much time normalizing and cultivating data, but rarely receive great data sets to push to business intelligence platforms for financial and operational outcomes.

At WellAware, we've approached this issue by developing an edge data architecture that is secure, intelligent, field upgradeable, and has all of the IT capabilities from a processing, storage, and connectivity perspective to allow you to prepare data and make decisions at the edge. This ultimately brings computation and data storage closer to the locations, people, and events where it is needed to improve response times and operational outcomes.

The real-world benefits of efficient, on-site data collection and analysis within edge technologies span a variety of sectors, from manufacturing to the public space, and, ultimately, anyone who's got critical infrastructure that needs to be maintained.

For WellAware, the most significant benefits of IoT data optimization revolve around labor optimization and developing a proactive approach to service. Many industries still rely heavily on humans to collect data – which is inherently expensive, sporadic, and results in very latent data that can't be used in real-time.

By deploying data collectors proactively, they can instead arrive in the field with the data they need already to hand. As a result, our customers and our field technicians can handle two to three times the number of assets they could have managed without WellAware. Furthermore, they are also increasing production uptime, avoiding expensive infrastructure workovers, reducing overall maintenance costs, and most importantly, improving safety.

More broadly, however, the technology and infrastructure currently deployed in the industrial markets today needs to be enhanced to more fully support this initiative around using better data to achieve better operational and financial results. Critical operational data is not being captured at the rate or resolution that's required to get the necessary insights from a predictive analytics platform.

Nevertheless, companies that can leverage and augment existing automation and infrastructure with existing technologies are going to have an advantage. It's also been the case that the adoption of IoT solutions in traditional industries has tended to be slow, with a 'tools and widgets' approach leaving it to the customer to derive the business outcomes of these technologies.

Looking to the future, the opportunity is there for IoT solution providers to collaborate to deliver business-level outcomes that are validated by the customer – to offer secure, cost-effective, easy to deploy, edge technology to capture better data sets around operational insights.

Democratizing this data for all who want to use it will in turn overcome the issues of data becoming stranded inside a company, instead facilitating its conversion into value through predictive analytics platforms.

Having the edge and the cloud working together in a coordinated way is going to be incredibly valuable as a business-level solution. The cloud is a perfect place to run multiple operational scenarios, using data aggregated from the edge, to optimize what's in the field.

However, cloud platforms alone cannot deliver when it comes to safety applications, and when there's latency involved. Cloud platforms typically should not be making critical shutdown decisions, and centralized cloud computing should not be controlling any latency-sensitive optimization processes involving control on the edge.

A range of key enabling technologies have helped us reach this point. Local connectivity and innovative power technologies have moved us beyond the trench-digging and conduit installation that made it so time and cost prohibitive for many companies. What's more, cellular coverage has improved in rural areas and ease of deployment has increased. All of these advancements have been tremendous for putting very disruptive edge intelligence out in the marketplace.

Moore's Law – the continued drive down of cost and power – has opened up this technology that can go through very difficult certification processes and sit out in the field, and it will continue to drive this kind of innovation.

2020 is going to bring much easier and more rapid deployment of intelligent automation, and with it the normalization across sectors. We have seen it in oil and gas and in manufacturing: it's going to get a lot easier for people to install and collect valuable information from the edge, which in turn will results in much better data outcomes for companies.

PREDICTION 10

Everything as a Service

XAAS PICKS UP MOMENTUM GOING INTO 2020

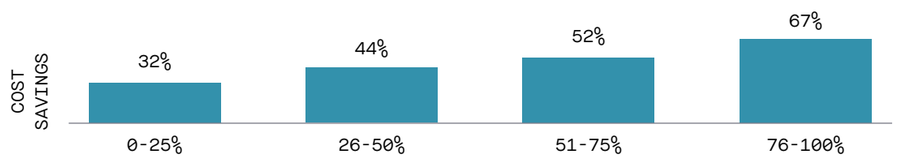
Over the past decade, the as-a-service model has evolved while maintaining its core essence. The concept of leasing a product or providing a service contingent upon the settlement of regularly scheduled payments has been a business model since the introduction of currency-based transactions.

Over the last several years, this model has taken a different form, best exemplified by cloud computing services. This, in turn, has led to the adoption of software as a-service (SaaS), infrastructure as a service (IaaS) and platform as a service (PaaS) as an alternative to IT infrastructure and on-premise processing. The byproduct of these services was the notion that everything can be offered as a service, or XaaS.

XaaS utilizes an outcome-based pricing model in order to deliver an all-encompassing set of services over the internet, created with the intention of helping companies progress in an era of rapid digital transformation. Today, XaaS is significantly impacting the way executives are structuring the layout of their business, allowing them to optimize for long term growth at the point of inception. By implementing this new operating model, companies are removing a significant portion of financial and operating exposure associated with expensive IT hardware. Moving internal operations like data storage and processing off-premise allows companies to cut wasteful spend on capital-intensive infrastructure, prevent additional spending on obsolete technology and trim down operational expenses. The XaaS model allows companies to deploy systems that rely on IT quicker and faster, removing the need for routine maintenance – leading to increased levels of productivity and faster deployment.

With the power of XaaS, businesses possess greater flexibility and agility to scale in their formative years, provide users with broader access to resources and eliminate the risk and cost exposure associated with outdated equipment – all of which lead to improved operational efficiency[1].

COMPANIES WITH A GREATER PROPORTION OF XAAS ARE MORE LIKELY TO ACHIEVE COST REDUCTIONS[2]



SHARE OF COMPANY'S ENTERPRISE IT THAT IS XAAS (VS. TRADITIONAL IT)

Consumer facing companies are also benefitting from the transition to XaaS and are expanding their service offerings across a variety of consumer products. Streaming music and video are common examples of this, but we are also seeing these models applied to newer areas such as appliances and furniture. Even prominent mobile device makers like Apple have recognized the potential benefits of providing a subscription service for their bestselling product, the iPhone.[3]

In 2020, commercial enterprises will continue to change their product and service offerings to pure-as-a-service models. HP recently announced its plan to transition to an as-a-service model over time and offer its entire portfolio of enterprise solutions through subscription based, pay-per-use and as-a-service payment models; in order to provide its customers with better choice, flexibility and control[4]. Microsoft is walking a similar path with the introduction of its AI tool, serving as a step towards its vision of an all-encompassing suite of services. Similarly, companies like Rolls Royce and GE are applying the XaaS model to their manufactured products, where end users can pay for their products on an hourly basis[5]. In 2020, expect commercial enterprises to expand their service offerings beyond existing offerings such as database as a service (DBaas), desktop as a service (DaaS), communication as a service (CaaS) and monitoring as a service (MaaS).

Sources: (1) CIO, XaaS: Making the shift to services-oriented IT, March 25, 2019 (2) Polcode, XaaS: Anything-as-a-Service? Yes, Please!, July 12, 2019 (3) The Motley Fool, Apple's CEO Hints at a Major Business Model Change, November 3, 2019 (4) Global Newswire, Digital Transformation, Customer Experience and Services-led Selling Take Center Stage at HP Reinvent, March 18, 2019 (5) QAD, The Rise of XaaS, January 15, 2019

OUR MISSION

To support the world's technology entrepreneurs

Methodology

This report was compiled through the expert insights of GP Bullhound's worldwide team alongside detailed analysis of investment trends from across the global technology landscape in recent years. It is intended to provide our predictions for growth, investment, and impact in the digital economy in 2020. Each year, we provide a transparent assessment of our predictions from the previous report to maintain a high level of scrutiny on our own research.

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GP Bullhound is a leading technology advisory and investment firm, providing transaction advice and capital to some of the best entrepreneurs and founders. Founded in 1999, the firm today has offices in London, San Francisco, Stockholm, Berlin, Manchester, Paris, Hong Kong, Madrid and New York.

MERGERS & ACQUISITIONS

We are the no.1 global advisor[1] to leading technology companies in competitive international sale and acquisition processes. The firm has completed 420 successful M&A transactions to date, worldwide, with a total value of over $18bn.

CAPITAL TRANSACTIONS

We are the no.1 global advisor[1] to companies and their owners on capital related transactions including venture capital, growth capital, acquisition funding, secondary block trades and initial public offerings. The firm has completed 120 rounds of financing for technology companies to date, with a total value of $2bn.

INVESTMENTS

Through our investment team, we provide investors with access to category leading technology companies. We currently manage four closed-end funds for a total value of more than €170m and our limited partners include institutions, family offices and entrepreneurs.

INSIGHTS & EVENTS

Our events and speaking activities bring together thousands of leading digital entrepreneurs and technology investors throughout the year. Our thought-leading research is read by thousands of decision-makers globally and is regularly cited in leading newspapers and publications.

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PRIVATE PLACEMENT
BARING VOSTOK, KINNEVIK
$101 MILLION

DELIVERY HERO
PRIVATE PLACEMENT
US HEDGE FUND
$85 MILLION

INNOGAMES
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MODERN TIMES GROUP
€260M VALUATION

PRODIGY FINANCE
INVESTMENT FROM
INDEX VENTURES & GLOBAL INVESTMENT BANK
$240 MILLION

BALTIC CLASSIFIEDS GROUP
SOLD TO
APAX PARTNERS
UNDISCLOSED

JELLYFISH
INVESTMENT BY
FIMALAC
£500 MILLION

SPOTIFY
INVESTMENT FROM
GP BULLHOUND

KLARNA
INVESTMENT FROM
GP BULLHOUND

SLACK
INVESTMENT FROM
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Sources: (1) League table data represents selected transaction advisors. Time period is 2015-Q4 2018. Global M&A transactions between $10m and $200m and Private Placements between $10 and $200m

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