

**FULCRUM
DIGITAL** **FD**



TRENDS 2020

**Demystifying Bleeding Edge from
Leading Edge Technology**

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Introduction

1.1 The Need for Tech-Adoption

Organizations are required to be at the helm of technology. When businesses don't catch up with the speeds of technological advancements, the odds of staying behind the pack grow. There are cases where newer technologies have caught organizations unawares, and resulted in the shutdown of businesses, or losing of top-notch market positions that they once enjoyed.

1.2 Adopt or Ignore?


'Blockbuster Video' was once an iconic brand that rented out movies and video games (established in 1985). There was a time when the company had over 80,000 people work for it in 9000+ stores.

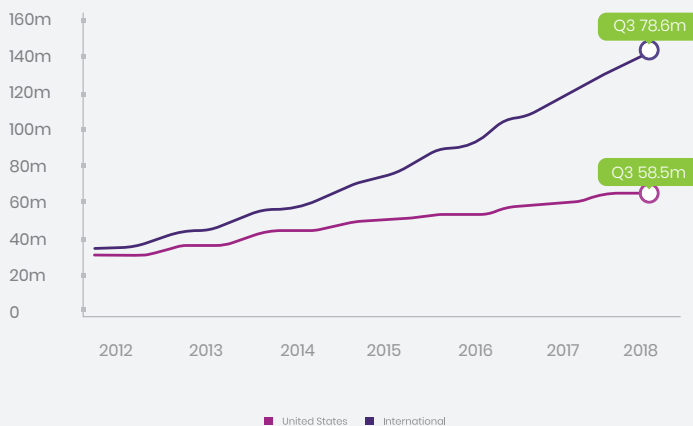
When the digital era started in the 2000s, the company failed to 'digitally transform.' In fact, Netflix wanted to sell the company to Blockbuster – but the latter refused the offer as it couldn't see 'much value.'

Blockbuster company filed for bankruptcy later and today, it struggles to keep a handful of its stores running.

Netflix, as we know, is the streaming company with highest subscribers today (posted revenues of \$15.8 billion in 2018).

*Q4 2018 figures as forecast by Netflix in October 2018

Source: Netflix 



Netflix uses AWS (Amazon Web Services) cloud services to provide seamless services (but what's funny is that Amazon Prime and Netflix are arch-rivals).

Many such examples like the Blockbuster company fall into this 'indifferent towards technology' bucket – but there are other companies who adopted technologies and transitioned themselves successfully to reach dominant market positions.

Let's look at a different case where a company paid attention to the 'need of the hour' and changed the strategy. The New York Times could have been the name of yesteryears when the digital content age arrived and started severely affecting the print media and other non-digital mediums (as we saw in the above example).

But this company embraced the transition with tech investment so well that when other newspaper companies are wiped out of business or struggling to make profits, this one is minting money with subscribers growing by the day (paid ones). The company offered 'smoother digital customer experience' – without which a non-digitally-native company like The New York Times would have stopped to exist today.

The need for changing, adapting and adopting with times is apparent, but what should you base your investment decision on?

1.3. Choosing Prudently

With new technologies getting introduced each year, it becomes increasingly challenging for businesses to make an IT investment decision, especially, when every other technology is branded as the 'next-best tech.'

It gets more confusing with products flooding the market under the pretext of cutting-edge technologies (although these technologies and products are only remotely related, but marketed otherwise).

Here's an interesting case in point: A popular toothbrush company claims that its toothbrushes are AI-powered and 'intelligent' (the brush tells you the areas that need brushing, how you should improve the brushing technique, and so on).

But if you dig past nicely-written PR articles, you will find that the toothbrushes are all about sensors and 'AI' has little part to play. Well, that's that.

The point is how do you differentiate the 'best-fit' technology from the ones that are not more than mere buzzwords. A wrong investment decision might directly impact your bottom line. This whitepaper by Fulcrum Digital is aimed to help you get familiarized with upcoming/existing technologies that will trend in the year 2020.

We will try to breakdown these technologies vis-à-vis their impact, features, definitions, benefits, investments, important stats and more, so that it becomes easier for you to see through and make a wise business decision.

Some of the trends may include an integration of two or more technologies. For e.g., a chatbot application could be based on RPA or ML or even NLP. It could be a mix of any/all of these too. Chatbot will even find mentions under Conversational UI too.

To sum up, the chances of a technology or an application appearing under multiple sections is higher. The upcoming decade will observe the convergence of technologies fuelling some of the greatest applications we've ever seen.

Computing – Cloud and Beyond

2.1 Where is cloud computing headed?

Cloud-adoption has seen growth ever since its inception and is certainly here to stay – but the critical question to be answered here is whether the growth will sustain in 2020 and beyond. Giants like Microsoft, Google, and Amazon are already pushing aggressively to capture a bigger slice of the market.

Gartner predicts that worldwide public cloud revenues will stand at \$266.4 billion (that's an increase of 17% from the past year). The revenues are set to cross \$300 billion-mark in 2021. Some reports suggest that spending on cloud technology by enterprises will increase by 5X in the coming decade.

2.2 Migration and Security

Although enterprises have made strides towards cloud migration, not everyone has jumped on the bandwagon as yet. The cloud-adoption in some cases is partial, while in some cases, businesses are still evaluating and experimenting with the platform. The banking and finance industry seem to lead the race – with more of them showing intent towards cloud platforms.

So, what exactly will enable more platform-adoption? Perhaps better security. Security remains a primary snag for others who still are contemplating the 'cloud strategy.' Tightening of security measures that arrest data breaches is critical to the success of the cloud platform.

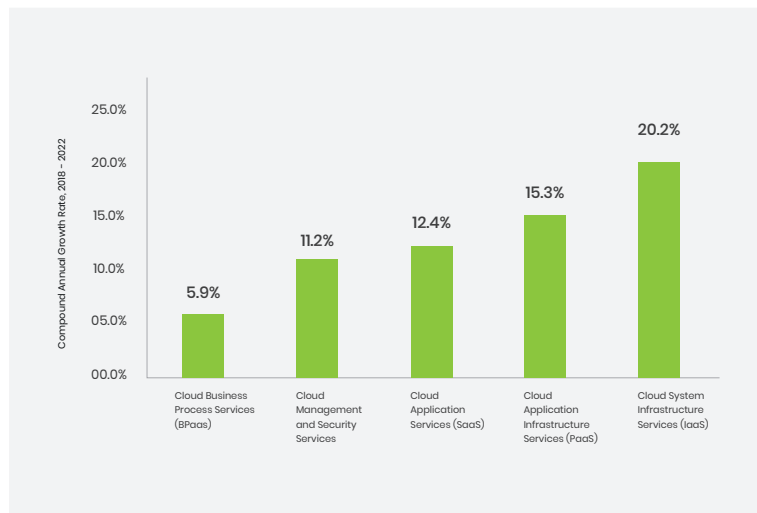
With the onset of technologies like Artificial Intelligence (AI), Predictive Analysis, and Machine Learning, the industry is now seeing a rise in cloud solutions around data control and compliance. This is yet another compelling reason for businesses to go ahead with the cloud platform.

2.3 XaaS

The recent years already witnessed the growth of serverless computing, PaaS (Platform-as-a-Service), SaaS (Software-as-a-Service), IaaS (Infrastructure-as-a-Service), and more. In a nutshell, if you were to choose any of these service models for your business, the outcome would be a decline in operating costs, lower time-to-market, improved scalability, better security, and more (depending upon what you pick).

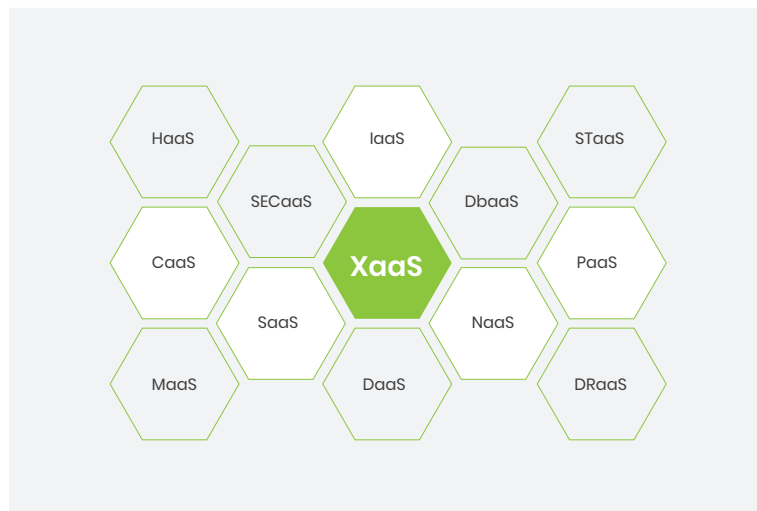
Comparing Compound Annual Growth Rates (CAGRs) of Worldwide Public Cloud Service Revenue Segments, 2018-2022

Source: Gartner, April 2, 2019



Everything-as-a-Service Model

Source: Sam Solutions



Enter 2020, and we are set to have XaaS (Everything-as-a-Service). Apart from the aforementioned service models, XaaS could also mean Storage-as-a-Service, Desktop-as-a-Service, Hardware-as-a-Service, and more. Well, even functions like marketing, healthcare, communications, etc. fall under the ambit of XaaS and will be known as MaaS, HaaS, CaaS respectively. Services and applications offered through cloud platform are rising speedily, hence the name 'everything as a service' (also interchangeably known as 'anything as a service').

When a business opts for a XaaS model, it continues to focus on the core competency without investing too much time, energy, and cost on infrastructure and scaling concerns. The real advantage is the enhanced quality of service offered which ultimately allows a major transformation in customer experience.

One of the fastest-growing airlines – Emirates is using cloud platform today to offer a uniform customer experience across countries (in different languages) that it is operating in. Market leaders in the cloud space like Amazon, Google, and Microsoft will widen their offerings w.r.t XaaS.

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2.4. Edge and Fog Computing

The whole idea of migrating to cloud technology has been 'using optimum resources as required.' Edge computing is ten steps ahead, where the processing is set to occur at a phenomenal rate. Not all the data collected by the company is useful, and doesn't need to be sent to the cloud – therefore, edge computing enables processing of the required data just near the source of data-generation (at the edge of the network).

The result? The costs decline along with the latency, leading to remarkable response time.

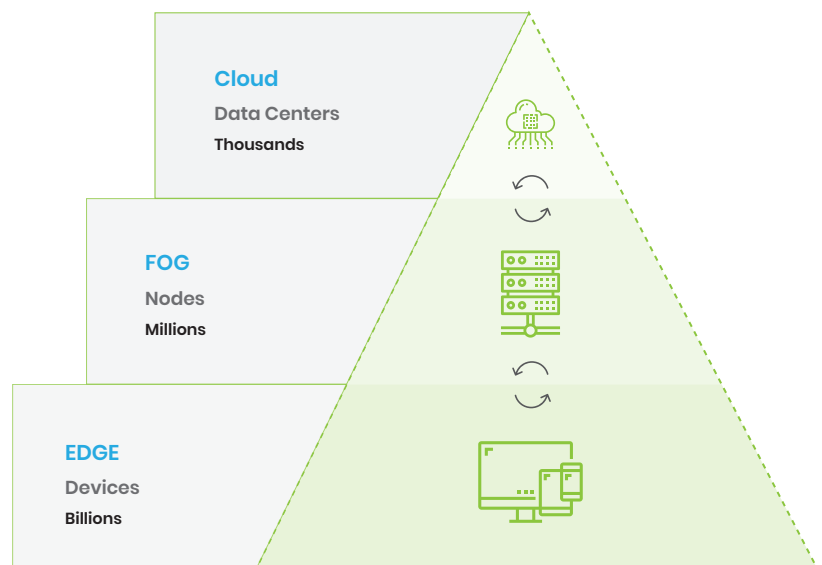
Fog computing is very similar to edge computing. The critical difference lies with the location where computing happens. Edge computing happens right at the IoT devices/sensors, whereas fog computing happens at LAN hardware (which are slightly away from devices). Since processing for edge computing happens closer to the devices – it is faster.

Besides XaaS, Edge, and Fog, what will continue to grow and take shape are the following:

Containerization. Containers help in migrating between one service provider to another, and make software-production faster.

Kubernetes. a growing open-source platform for deployment and scaling of containerized applications.

Serverless Computing. This approach allows businesses to deploy easily and scale without worrying about the infrastructure.



2.5 Market Leaders

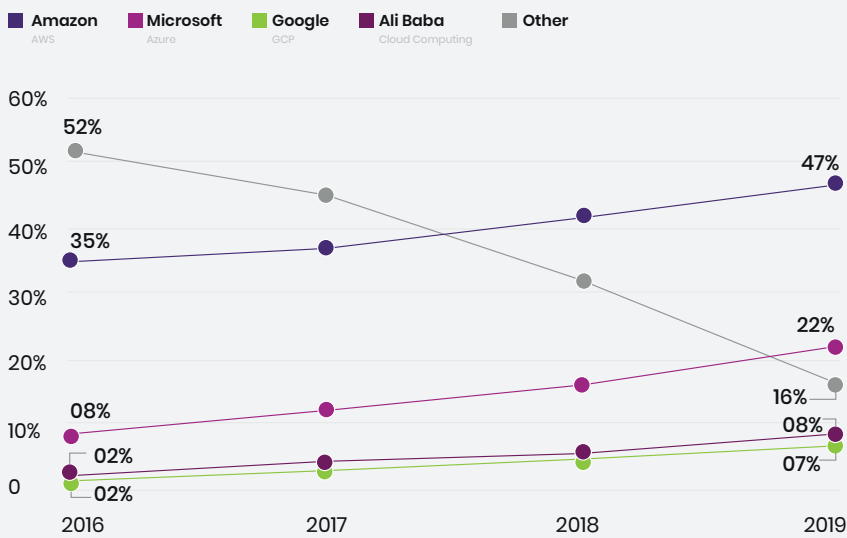
With respect to revenues and market share, Amazon remains a clear leader with its AWS (Amazon Web Services) offerings. In mid-2019, the company reported a growth of 41%. Microsoft is following up with Amazon by gaining speed with its offering – Azure (the company reported a surge in revenue of 73%).

The third position in the cloud space is held by Google Cloud Platform (Google is tight-lipped about the revenues from the platform offerings, but it is speculated to be growing faster).

AWS enjoys the numero uno position because of its early entry into the segment. Another reason that allows Amazon to be ahead is its dynamic pricing structure and innovation-focused approach.

PUBLIC CLOUD MARKET SHARE

Source: Gartner, Goldman Sachs



Analytics

The era of decision-making built on gut and intuition is long gone now. Be it launching an offering or even creating personalized customer experiences, businesses are calling shots based on analytics (more specifically 'data analytics').

There was a time when banking experts would table reports citing banks should focus on pitching wealth management products to an older age group. With the arrival of analytics, a different picture unfurled which surprised the industry. Upon analysing the data with intelligent tools, it was noted that a much younger group (the group of 20-35) is turning towards wealth management products, and therefore, that compelled the C-suite executives to change the outlook and the strategy of their product lines.

Analytics has evolved and is certainly not a 'thing' of recent years, and data has become the heart of most, if not all organizations today. The whitepaper under this section focuses on forms of analytics which will gain more ground in 2020 and beyond.

3.1 Augmented Analytics and Data Management

The whole gist of augmented analytics is to aid the decision-making process for businesses. Data analytics fundamentally is digging out useful data from the heaps of it. Augmented analytics is cutting-edge and deployed to extract the 'most crucial data' which powers the decision-making directly.

With augmented data management, AI (artificial intelligence) and ML (machine learning) techniques are utilized to refine the data even better. Data scientists usually spend 4/5th of their time in operating on the data manually, but with the advent of this tech, they save time by automating the 'data refinement' process. Ultimately, this translates into more business value.

3.2 Natural Language Processing and Conversational Analytics

AI is already turning passive reporting into more proactive reporting by finding imperative patterns and in some industries, it is proving extremely useful in detecting anomalies. (Although we will cover AI as a separate piece in this whitepaper, the mention of AI here is vis-à-vis analytics.)

A lot of data that businesses collect is unstructured, in the sense, that computers cannot really interpret the data and analyse it. But with NLP analytics in place, systems analyse language-based data (unstructured) without any human intervention.

The amounts of data to be analysed is very large, NLP analytics enable the process to happen faster. Conversational analytics, on the other hand, is interpreting voice-based data (any verbal inputs – perhaps data of call records), and analysing it to offer intelligent insights.

As of now, there are companies who are already realizing the benefits through the adoption of NLP, conversational, and text analytics. One good example is The Royal Bank of Scotland, which uses analytics extensively to enhance its customer experience.

It delivers faster resolutions by identifying the issues that need attention through analytics. For e.g., the analytics deployed can identify customers who are unhappy with the process. The analytics help the company to understand the unstructured data (complaints). As a result, the response to customer complaints from the bank is extraordinary as the bank's net promoter score (NPS) has shot up post the tech-adoption.

3.3 Graph Analytics

Graph analytics application is expected to grow by 100% each year (by Gartner) – and there's a strong reason that underpins this bold forecast by Gartner. Graph analytics' ability to study a large amount of data to determine crucial relationships between people, places and other objects is incredible.

Another important factor that makes graph analytics beneficial is the fact that it can integrate two different datasets without any kind of data modelling (which is a major headache for organizations). Businesses save on time and cost with such a pathbreaking approach. One use case that we can easily think of is fraud detection, where patterns (or flags can be raised) can be easily highlighted with the help of graph analytics tool to detect unusual activity. This is achieved by using connected data analysis and Graph Neural Networks. By 2024, the graph analytics market is set to reach \$2.5 billion.

3.4 Descriptive, Predictive, and Prescriptive

These three areas are often confused with each other and used rather loosely but are distinct forms of analytics. A number of use cases in descriptive and predictive analytics have already been identified, but for the sake of clarity – let's just throw a cursory look at all of these again, and more importantly – we think they will continue to grow in the coming years.

Descriptive Analytics. Descriptive analytics offers insights on the activities that have already happened in your company. The reason it still finds a mention in this whitepaper is that the analytics-adoption is witnessing growth.

Four companies out of five will become data literate in the coming year (says Gartner). Although descriptive analytics is the most fundamental form of the three types mentioned here, it is still very critical for businesses, who are just moving towards data-driven decision-making (as a part of their digitalization strategy), and this type becomes the starting point.

Predictive Analytics. As the name suggests, Predictive analytics lets you have insights on how future trends will shape up. When AI and ML algorithms run across current data sets, vital information gets pulled out – which businesses leverage for gains.

Trends as such aren't just confined to IT businesses – did you know that some of the reputed chemical companies today bank on predictive pricing techniques to make sure that they make good profits? Analytical tools are being deployed by energy companies for predictive maintenance of machinery, equipment, and devices – which helps them save on time, effort, and cost.

Prescriptive Analytics. Prescriptive analytics is the next logical step of predictive analytics – it doesn't just provide you insights for decision-making, but also offers you valuable recommendations which will translate into a maximum gain for your business (or it could be loss/risk-aversion too). A lot of bets have been placed on prescriptive analytics already for results like more revenues, enhanced productivity, decrease in costs, and more.

One example where prescriptive analytics can help businesses reap maximum benefit is campaigning (marketing). 'What sort of collaterals at what time of day for which target audience will make the most impact' is a kind of brain teaser that prescriptive analytics will answer with ease and make the department's job easier.

In 2020 and beyond, companies will boost investments in analytics technology – what form of analytics gets adopted is a different question, but what remains firm is the fact that the world is moving towards data-driven decision-making. MarTech (market stands at \$76 bn) and market research (market stands at \$52 bn) industries growing at a break-neck speed, is a clear indication of the fact that businesses are going the 'data' way.

Other analytics trends to watch out for:

- **Data Discovery**
(not new, but unlikely to evaporate soon)
- **Data Fabric**
- **Data Quality Management**
- **Explainable AI**



Artificial Intelligence (AI)

If we were to choose one winning technology of the previous decade, then that has to be Artificial Intelligence, without blinking an eye. Much has already been written about AI and there's no need for further preamble. So, cut to the chase, let's look at AI areas that you should be watching out for in 2020 and beyond.

4.1. NLP, NLG, and NLU

Let us quickly touch upon how these terms are different from each other and not really mere 'jargon'- and then let us discover why they are important pieces of technology.

Natural Language Understanding (NLU). The machine's capability to understand the human language (through text or speech) is NLU. Human language is tricky as the syntax, sentiment, and figure of speech are all important. These elements change the context of what is being said. With NLU algorithms, the machine has the capability to think like humans do and understand the context.

Natural Language Generation (NLG). With human input in the form text or speech, the machine has now the critical task of responding back. This is exactly where NLG comes into the picture. NLG imparts the ability to construct human-like responses to machines, which sends them as output.

If this helps you imagine better: You ask your voice assistant "should I be leaving for office now?" and it responds saying, "It's a bad idea – the traffic is bad, try starting 45 minutes later."

This is a perfect example of NLG and NLU working in tandem. Without NLU and NLG, the machine could have replied, "what do you mean by that?" or "I don't know."

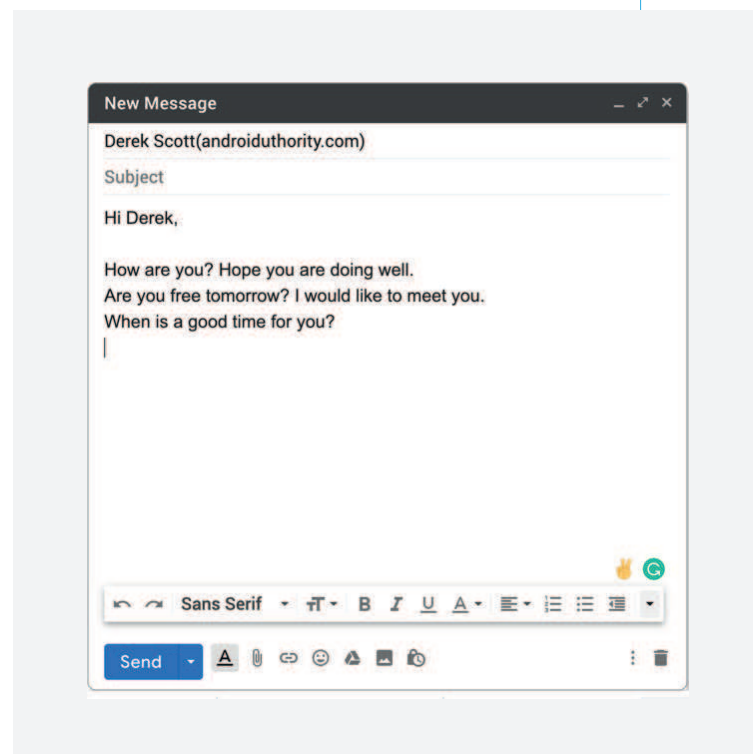
Natural Language Processing (NLP). NLP is an umbrella term which consists of NLG and NLU under it. When you call a device to be NLP-enabled, it means the device is bundled with NLG and NLU already.

There are high chances that you've already interacted with applications packaged with NLP. Most of the assistants like Alexa, Siri, Google Assistant, and more use NLP technology to listen and understand human queries and throw intelligent responses back.

Modern-day email applications too, are relying on NLP to autocorrect or even suggest replies to emails that you receive (you'd know that already if you're using Gmail).

Chatbot industry (detailed-coverage below) is another brilliant example of how NLP is being intelligently utilized. 85% of the customer interactions in the year 2020 will require no human intervention. The applications and use cases are too many, and businesses aren't shying away from adopting it since benefits are apparent.

GOOGLE SMART COMPOSE



Did you know that Google Translate (NLP-based product) is being used by 500 million people every day?

4.2. Chatbot

Although chatbot isn't a technology in itself, but the application has been trending and will garner more importance with benefits being realized across a range of industries. We will specifically cover AI-based (Natural Language Processing and Machine Learning-inclusive) chatbots in this section, which are clearly distinct from outdated IVR-based chatbot.

The market today is flooded with chatbot solutions, but the key ingredient to look for is 'intelligence.' Lack of intelligence in chatbots gives rise to an array of problems like interpretation, accent, dialogue, and so on – and ultimately rise in either customer complaints or loss of business revenues.

Chatbots will get smarter in their responses with NLP, as discussed earlier – not just smarter, but as a business, you will have the capability to power the chatbots in a manner that they offer personalized solutions/responses to different individuals. The chatbot's ability to drive customer support, sales, lead-gen, brand awareness, and even marketing for a business is notable – which directly result in cost-savings and revenue-enhancement.

With voice tech-adoption rising, voice bots will become commonplace. The consumers of the digital era demand platforms that are both text and voice-enabled, and businesses are leaving no stone unturned to tap high levels of customer engagement through innovative platforms. Customer experience transformation is already happening out there with brands like Burger King, Dominos, and many are using AI-based chatbots.

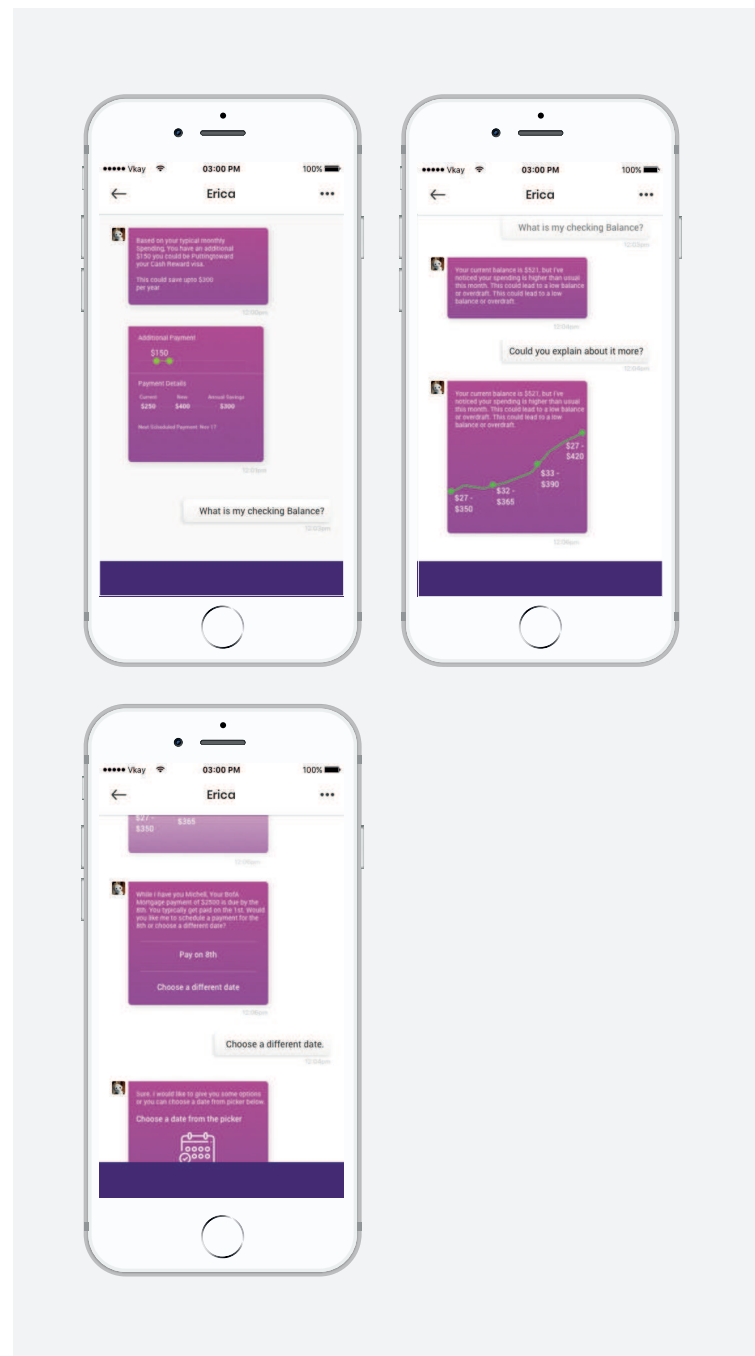
The smart use of these platforms to interact, engage, and sell to a customer gave rise to the term 'conversational commerce' – which is essentially the gist of what we've discussed. This term is certainly to trend as the chatbot industry grows (forecasted to grow by around 24% each year).

Brands are casting a wider net to reach out potential leads and customers through chatbots on social platforms (but the role of AI is also to do with analytics in this case). In 2017, Facebook had over 100,000 messenger bots deployed by businesses. In the very next year, the number surged and became 300,000. That's how the growth for chatbot is headed. From gathering customer opinions to targeted marketing, from customer support to active sales, chatbot strategy is helping brands significantly.

Financial services giant MasterCard is using chatbots to automate payments – the bot even answers queries regarding customer account balance, and enables the customer to pay too.

Bank of America uses its popular chatbot – Erica to service its growing mobile banking customers. Erica helps customers stay atop their investments and finances with proactive guidance and personalized feeds. Last year, Erica surpassed 6 million users and over 35 million client queries/requests.

Enterprises deploying chatbots for internal functions such as HR, Admin help desk, IT, Finance, etc. save lots of time and cut down human dependencies. All in all, chatbot-adoption will rise only for the good of businesses, and become a billion-dollar market soon.



4.3 Robotic Process Automation

RPA technically does not fall under the umbrella of AI, but this whitepaper mentions it otherwise because the upcoming year is all about convergence of AI and RPA, which will boil down to intelligent and cognitive automation.

Self-learning RPA and low-code/no-code RPA platforms will definitely rise. Basic RPA software deal only with structured data, but with AI in the powerplay, the software will also be capable of handling unstructured data – which is a major breakthrough as it would eliminate significant limitations.

Investments of \$1 billion on RPA software is forecasted by Gartner for 2020 already (an unbelievable annual increase of 41% also projected). Technology-wise, CIOs who invested in RPA have seen the banner year already. Of all IT investments, automation software has paid businesses off with more profits.

The ROI realization happened faster than expected as RPA helped businesses grab those 'low hanging fruits' like lower costs, more revenues, quick implementations, decline in errors, and more.

Deloitte reported that organizations who implemented RPA software even at a smaller scale could automate 20% of their total operations easily, whereas more digitally-inclined ambitious companies automated more than 50% of their processes, and achieved RPA at scale.

As of today, companies in the finance domain have been champions in RPA-adoption (from automating accounting to handling customer transactions, business cases are growing by the day).

American Fidelity Assurance, a US-based life and health insurance company, scans over 9000 emails in seconds, which previously consumed about 45 person-hours. The company manages over 2.5 million insurance policies – and RPA is making the job easier, a lot faster, error-free, and of course, profitable. State Auto, one of the auto insurance companies based in the US, claims to have saved over 60,000 manhours with RPA software after the software-deployment.

But this year, other domains too will start automating their processes by integrating legacy systems, cloud platform, and other software too. RPA has already gained entry into the Public sector. For e.g., one of the legal firms is using RPA software to collect data from different govt portals and key the data into a case management portal.

4.4 Computer Vision

Computer Vision technology seems more promising than ever, and the market is forecasted to reach \$11.9 billion by 2023. There's been rapid progress with the Convolutional Neural Network (CNN) – which has allowed Computer Vision to take quantum leaps and progress in areas such as – facial recognition (biometrics), image search, augmented reality (AR), and more.

Social platforms like Facebook, Instagram, and Snapchat already use computer vision to identify image elements. (Biometrics is another tech that coincides with computer vision, but we will cover it as a separate trend altogether).

From Fords to Teslas, all of the cars that offer 'autonomous driving' feature are underpinned by computer vision (using LiDAR and ultrasonic sensors). The technology is currently helping the medical industry identify and detect cancer early. In manufacturing industry, computer vision paired with IoT is being used to identify defects in products and machinery – and thereby, eliminating human inspection and saving time, efforts, and costs.

Computer vision will play a key role in surveillance too with cameras able to raise flags and alerts on basis of unusual activity, incidents, and more.

For example, Austin-based security startup – Athena Security is developing gun-detecting cameras that are aimed at arresting gun-related violence or at least making the response-time of authorities faster.

Google Translate too uses the combination of AR and computer vision technology to read images and translate the text in the desired language. The gaming world definitely enjoys the benefits of this technology but there are other areas too. For e.g., MasterCard interestingly is leveraging the technology to help gamers pay, while still being in the virtual gaming world. AR, VR, and biometrics happen to be major areas of intersection (covered in the second edition of this whitepaper).

The top 3 vendors in this space are UiPath (valuation of \$7 billion), Automation Anywhere (valuation of \$6.8 billion), and Blue Prism (valuation of \$2.6 billion).

There are reports (by IDC) which suggests that only 10% of all data is used for analytics – the rest of the 90% still remains unutilized, also referred to as ‘dark data.’

Will 2020 be the year where dark data get to see the light of day?





Epilogue

Gartner's prediction of 3.7% growth in IT investments for 2020 looks achievable with newer and promising trends emerging. The need for transformation is at an all-time high. There are companies that are moving out of their traditional core business and completely transforming to stay competitive.

Giants like Tencent Holdings have completely changed their strategy to accommodate the changing technology landscape – the company has invested in many emerging areas, right from Fintech to autonomous vehicles. The move has helped the company become the first Asian firm to cross a valuation of \$500 billion.

As a matter of fact, another case in point is AWS. Amazon launched AWS to control the infrastructure overheads with the help of cloud technology (which was in early stages then). The company now is a leader in the segment because the investment in the right technology at the right time paid off.

As mentioned in the introduction of this whitepaper, Fulcrum Digital's focus is on introducing the technology landscape and trends shaping up in 2020. The facts and examples in this whitepaper are covered with an intent to evaluate and estimate the impact of technology on the business, and not to promote technology or a brand.

We eliminated buzzword technologies that offer no 'business value' to the companies. For the sake of brevity, only some use-cases are mentioned in this whitepaper. These will definitely offer inputs in gauging the importance of these technologies, and further providing a ground for decision-making or even serve as a starting point in investment decisions.

The next edition of this whitepaper would touch upon a few more pertinent technologies and sub-technologies such as Voice Assistants, Biometrics, Augmented and Virtual Realities, and IoT.

Do let us know if there is any other area you would be interested in knowing about, or if you wondered why a certain technology is missing in our outlook in Trends 2020.

About Fulcrum Digital

Fulcrum Digital specializes in digital transformation, delivering industry platforms, enterprise-grade products software products, and digital accelerators and transformation services. At Fulcrum Digital, our baked-in agility allows us to continuously evolve and provide increasing value to our global clients. Our experience, our people, our expertise, and our untiring pursuit of innovation and client value, propel our firm into emerging technologies and markets. As a living and learning organization, we continuously adapt and mature our practice, becoming a leading authority on digital transformation in the global marketplace. We have worked with a number of industry leaders on their digital transformation, and have always adapted to their specific business problems and needs, and customized our approach to rendering maximum value to them.

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