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BUSINESS STRATEGY

**Roblox:**  
The Digital Las  
Vegas

TECHNOLOGY

Lab-Grown Meat



Machine Learning Could Destroy Objective  
Truth On The Internet Forever

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# Table of Contents

- 6** Lab-grown Meat: The Future of Food
- 15** Private Equity: A New Player on the Field
- 28** Roblox: The Digital Las Vegas
- 35** Machine Learning May Destroy Objective Truth on the Internet Forever

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# Letter From the Editor

*A Pursuit to Understand a  
Changing and Dynamic World*



Many expected things to be “back to normal” by now, however, that seems to be far from the truth. Like those from the past, every generation faces trying times - our grandparents faced the Second World War and our parents lived through developments of the Cold War resulting in ideologies and mandates we still see today. Now, it seems we are living through trying times of our own, through the form of the pandemic and the specter of conventional war in Europe.

At Waterloo Business Review, we are committed to understanding the world around us - striving for innovative ideas. This starts with questioning our experiences, investigating our surroundings and communicating our thoughts with those around us. Recently, those thoughts have been widespread which is all but easy, yet we are committed to preparing students to gauge the world with a differentiated view and producing content that will engage, educate and empower.

Engaging a dynamic world and trying to make sense of it all is a challenge the Editorial Team has pursued. Our publication explores nuances and provides a differentiated view across Institutional Sports Investing, Objective Truth, the Future of our Food and possibilities in a Digital Environment.

Today, we face unique circumstances for which we do not have much experience - it is in times like these that we must also find unique ways of looking at circumstances to best understand the world around us and dream. That is something we will continue to do, by taking stances and positions that may not fall within the status quo through pushing boundaries and producing unique content.

On behalf of the Editorial Team, I hope our publication provides a fresh take and new ideas as we navigate the world amidst trying times.

Sincerely,

A handwritten signature in black ink that reads "Waleed Khalid".

Waleed Khalid  
Editor-in-Chief

# Our Team

Our dedicated and passionate team is focused on growing and establishing the Waterloo Business Review in the Waterloo and Kitchener business community.

Waterloo Business Review empowers our team through our emphasis on creative freedom, professional development of research and communication skills, and our culture of entrepreneurship and growth as we nurture members to adopt positions of greater responsibility and leadership.

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Technology:

# Lab-Grown Meat: The Future of Food

Sandra Huang, Smriti Sharma, Pranav Shireen

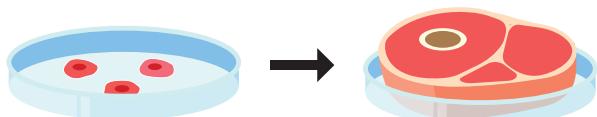


Illustrated by  
Sienna Zhao  
Emily Mo

## Introduction

People have been eating meat for as far back as our history can be traced, but science has lately discovered a way to produce meat in laboratories. Lab-grown meat is the kind of meat that can completely be grown outside of an animal's body in a lab. Will it, however, render factory farms obsolete?

When compared to terms like free-range, lab-grown meat has frightening connotations of being "unreal". However, this should not be the case. For instance, to begin the process of generating lab-grown meat, scientists will use a cow's stem cells, which are the building blocks of muscle and other organs. To help the muscle cells multiply and thrive, the cells are placed in Petri dishes containing amino acids and carbs.



The outcome is a flesh that mimics ground beef once enough muscle fibres have formed, which is much safer and cleaner to consume.

## Thesis

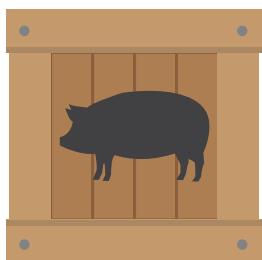
Lab-grown meat is promising but is an early-stage technology that hosts key challenges including cell sourcing, cost reduction, and regulatory approval. As potential consumers, it is crucial to understand the institutional forms the lab-grown meat industry might take and how ambiguities can shape any emergent regulatory system. This article gives an introduction to lab-grown meat technology and explains the technological, consumer, and regulatory elements of lab-grown meat.



## Benefits of lab-grown meat

Traditional meat is considered detrimental to the environment, human health and the economy. Meat production uses 83% of global farmland and produces 60% of agriculture's greenhouse gas emissions,

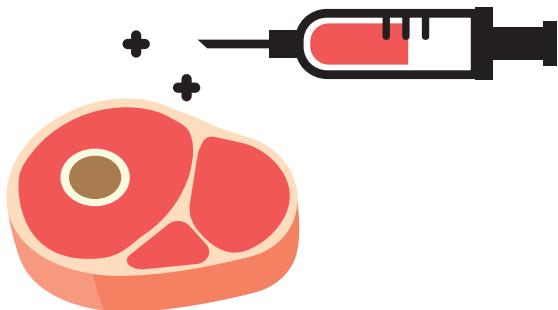
which results in an increase in global warming. Animal agriculture also accounts for about one-third of the world's freshwater consumption, contributing greatly to the depletion of this scarce resource. Moreover, approximately 70 billion land animals are killed globally, due to several reasons such as diseases and confined spaces.



## 70 Billion land animals killed worldwide

Even antibiotics do not usually work since farm animals tend to develop antibiotic resistance, which contributes to the rise of antibiotic-resistant diseases, killing 700,000 meat consumers worldwide.

In contrast, lab-grown meat is produced in a sterile environment and is therefore free from bacteria like *Salmonella* and *E. coli* that live in the guts of animals. Given that traditional meat can cause several diseases, lab meat could eventually have a net health benefit as it can be engineered to have specific nutrient profiles. It can be engineered to provide optimal health outcomes for consumers, such as adding additional supplements.



Once lab-grown meat becomes affordable, it has the potential to feed millions safely and sustainably to help ease the impending food shortage. With global food production needing to double by 2050 to meet the demand of the growing world population, lab-grown meat will become an integral part of the solution.

A common argument against the transition to lab-grown meat is that it would be economically detrimental to farmers. Although this transition has the potential to decrease the need for farmers, it is definitely much cleaner, safer and efficient from a consumer and economic perspective. Rather than compartmentalizing animals in inhumane conditions and utilizing non-sustainable synthetic livestock-raising procedures, farmers will be able to focus more on naturality and quality. This trend will have an impact on the unethical farming practices that exist in some commercial farms, forcing them to adapt. However, the transition to cleaner, safer, and healthier consumption will

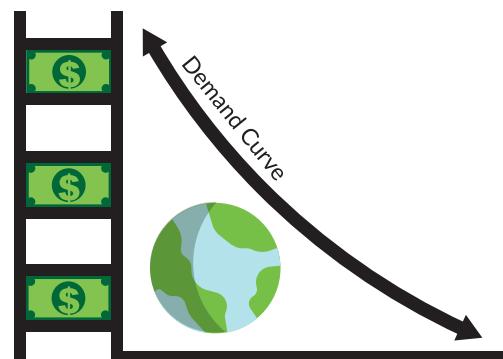
require massive changes in the market structures and lifestyle for billions of people.

Farmers can also potentially benefit from the shift towards lab-grown meat, as they will not face the same restrictive competition. In today's meat industry, the competition is dominated by JBS, Tyson Foods and Cargill. This gives them the majority of the pricing power and forces farmers to sell their livestock to them. With the emergence of lab-grown meat and resultantly more competition, the pricing power of those companies minimizes and allows farmers to earn a better price. In addition to this, it is likely that traditional animal meat will become a luxury in the future and will be consumed less, which reduces the capital expenditures needed for livestock maintenance.

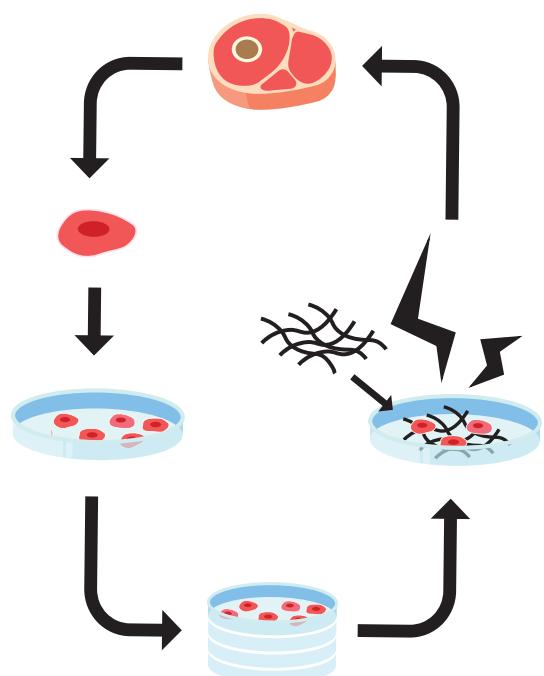
### Why lab-grown meat isn't filling the grocery stores?

Despite the benefits of lab meat, it obviously is not as prevalent as traditional meat. One reason lab-grown meat is not yet readily available for consumption is due to the scale of production. The economic and engineering challenges of building full-scale facilities are prohibitive, requiring next-generation bioreactor platforms with

the capacity to grow huge numbers of cells at high densities. With fewer opportunities to produce effectively and efficiently, this poses a significant challenge in growing meat in the labs.



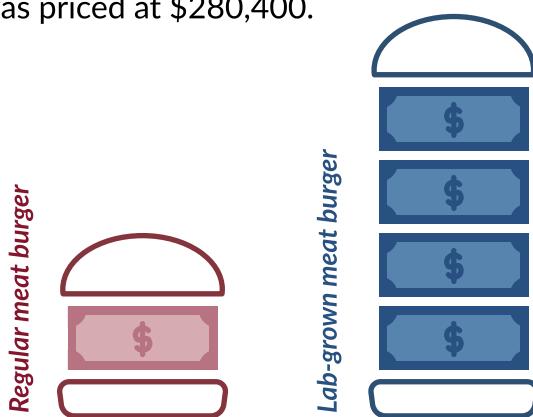
Furthermore, the process of creating lab-grown meat is sophisticated and tedious. Replicating the structure and texture of meat requires complex scientific techniques such as tissue engineering, which is shaping cultured cells into complex tissues.



## TECHNOLOGY

To date, tissue engineering has largely been focused on medical applications such as regenerative medicine and non-animal technologies for in-vitro models used for drug discovery and toxicology. The technical principles are the same for producing lab-grown meat, but for meat, the scale is much larger and the product must be affordable as a commodity. Without sophisticated practices of tissue engineering, lab meat will fail to look realistic and be affordable.

Moreover, the staggeringly expensive production cost can be attributed to the lack of current research that is available. The first lab-grown beef burger in 2013 was priced at \$280,400.



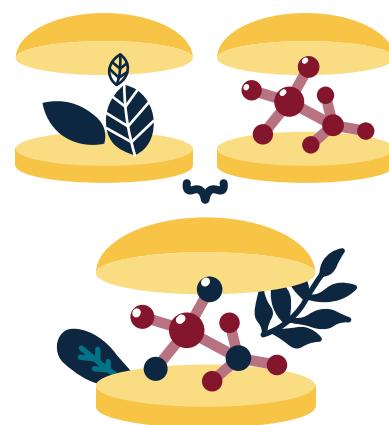
However, with significant analysis of the barriers to entry in the market, cost of innovation, how laws and regulations impact production, this price can be lowered to be competitive with traditional meat. With more research on the scale and techniques of growing lab meat to lower

costs and increase production, lab-grown meat could certainly be as competitive as traditional meat in the market.

## Solutions

Future Meat Technology (FMT) is the world's first industrial line for lab-grown meat. FMT has conducted research into producing scalable meat and has found success in ways to reduce the cost of production. One idea they have is to use Fibroblasts, a more efficient nutrient media, which is a cell used for healing paper cuts. This is more efficient from a cell density perspective as it is cheaper and rapidly produces biomass since the cells double within 24 hours. It essentially reduces the cost of the meat and volume needed, while increasing cell density.

Another idea they have is combining lab-grown meat with plant-based protein, which would be easier to scale to market.

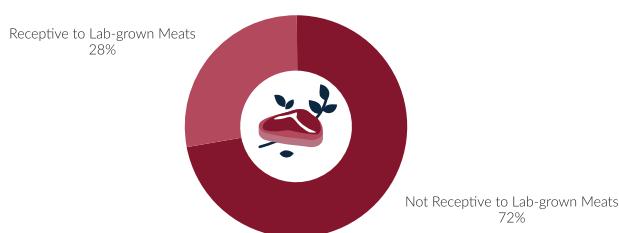


FMT is partnering with Nestlé to blend the two proteins and create a new product that delivers the full flavour of meat at a lower cost.

## Consumer perception

After overcoming the technological challenges and achieving price parity, lab-grown meat should be readily available to enter consumer markets. However, this step presents a new set of challenges with regard to consumer perception and acceptance. A survey of Gen Z found that 72% of respondents wouldn't be receptive to lab-grown meat, with many seeing the process of production as unnatural and heavily processed.

**Receptiveness to Lab-Grown Meats**



Overcoming this stigma will require strategic marketing to educate and promote the benefits of lab-grown meat. Partnerships with celebrities could be the bridge to connecting with this generation. High-profile celebrities like Leonardo DiCaprio, Jay-Z, and Katy Perry are already

investing in alternative meat companies like BiteLab and Impossible Foods, presenting an opportunity for lab-grown meat companies. Celebrity partnerships have helped fast food companies attract new customers from younger generations and could do the same for lab-grown meat companies.

General consumer perception of lab-grown meat will be dependent on the branding of products, in particular, the terminology which is used to label these products. Suggested labels include "lab-grown", "cultured", or "cell-based" meat. How these products are branded will impact the willingness of consumers to try these products. The labelling rules will be determined by the FDA and USDA, which are jointly in charge of regulating lab-grown meat.



## Laws and regulations

As these challenges are addressed, the

adoption of lab-grown meat will have further economic implications for the agricultural industry and businesses. The process to create lab-grown meat is extensive, and there is strong regulation surrounding the creation. As the industry continues to grow, there is a unique regulatory process that has been implemented to ensure the safety of consumption. The cell culturing process will have strict oversight, the Food and Drug Association (FDA) will have jurisdiction over the pre-harvesting activities, and the United States Department of Agriculture (USDA) will oversee the post-harvesting processes.

However, according to the Federal Meat Inspection Act, a product can only be defined as meat if it is derived from a carcass. Since lab-grown meat does not abide by the definition stated, lab-grown meat will not be treated as a meat product. This leads to the Food Safety and Inspection Service (FSIS) drafting regulation for the labelling of lab-grown meat, and the specification of language that can be used in the labelling process.

Regardless of this, the European Union has adopted a different approach with their regulatory process. The framework that is used is dependent on the type of cells that

are used and can fall under the EU Novel Foods Regulation or the genetically modified organism (GMO) legislation. The Novel Foods Regulation states when there can be requirements regarding labelling, in order to fully inform the consumer, for instance by describing the food or its composition, that must be addressed before being added to the Union list of authorized novel food. The current EU regulation on FIC (Food Information to Consumers) states that meat is made up of, "skeletal muscles of mammalian and bird species recognised as fit for human consumption with naturally included or adherent tissue." Based on this definition, it is likely that lab-grown meat will not be labelled as a meat product in the current EU legislation.

In the lab-grown meat industry, there has not been a significant amount of intellectual property that has been claimed. There are two patents that have been declared by Eat Just Inc, which are for the industrial process, and methods for production. There could potentially be utility patents filed for the manufacturing process, machines used, cell lines, and chemicals used throughout the process. Design patents can be filed for the "look" of the lab-grown meat like the shape of T-bone steaks, chicken breasts. Patenting

these technologies can lead to reduced innovation and information sharing, which will likely slow the progress to making lab-grown meat more affordable.

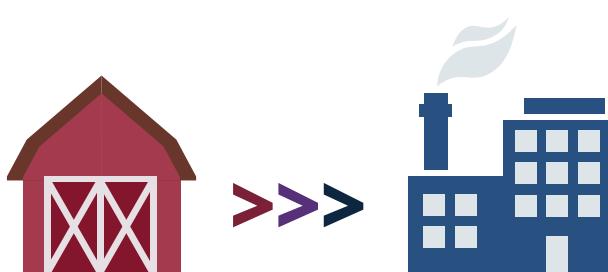
## Next Steps

Lab-grown meat has the potential to see significant growth in the industry's future, however, there are some difficult obstacles that are preventing the development. The next steps in order to successfully get to market and be successful, are addressing the economic implications that the farming industry and businesses will face. The goal of the lab-grown meat companies is to coexist with the current farming industry, rather than replace it. The belief is that while farmers could benefit from the emergence of this industry, there is no guarantee that a new system would be fairer, more equitable, or beneficial to individual farmers. The increase in the use and production of lab-grown meat would likely cause the loss of several jobs within the traditional farming industry.

Farmers will not be able to keep up with the production abilities of large companies, they will also not have the skill set to be able to transition to this new form of meat production. With lab-grown meat reaching a high level of scale, the production of traditional meat will drastically decrease and the price of traditional meat will likely go up. The next steps for businesses are to potentially create ways to alleviate world hunger as well as seek methods beyond agriculture to develop meaningful climate change mitigation. If lab-grown meat is able to reach a high level of growth, there could be a significant shift in livelihoods, operations, and supply chains across multiple industries beyond agriculture.

## Conclusion

The continued growth of this sector will likely bring considerable social, political and economic implications for multiple and various stakeholders. It seems reasonable to argue that the production of small-scale lab-grown meat products of edible quality should be achievable in the near future and in some regards is possible now. However, the timeline for delivering this at a price competitive enough to compare with existing processed meat products is less determinate as a result of the scaffolding, scale and cost of production.



## TECHNOLOGY

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Given that the production is diffuse, complex, and multifaceted, the understandings attached to lab-grown meat could be reshaped by many factors that are beyond the control of the field itself. If lab-grown meat technology does reach the scale proposed by some that enable it to deliver meaningful climate change mitigation, this could be part of a significant and potentially global-scale shift in livelihoods, practices and supply chains across multiple sectors beyond just agriculture (e.g. steel and transport).

# Business Strategy: Private Equity: A New Player on the Field

Sanovar Singh Bajwa  
Zoey Ahuja



Illustrated By  
Hita Vaizers, Diane Xiong

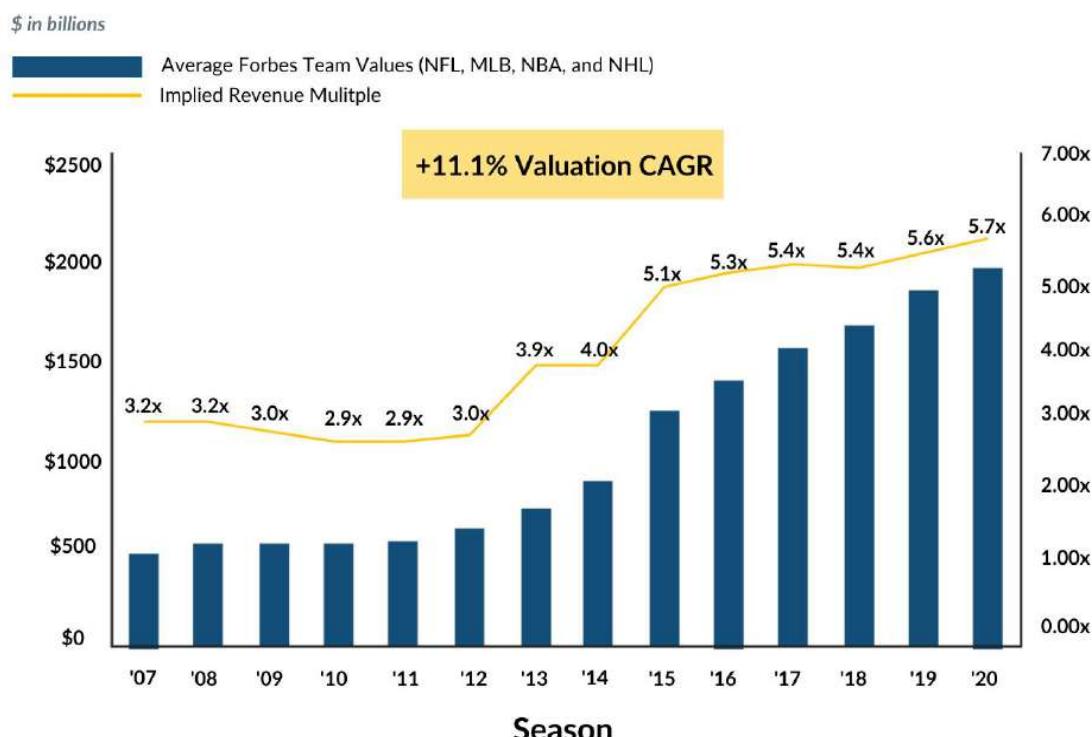
## Introduction

Dry powder in private equity has swelled since 2013 to almost \$3 trillion. With this record amount of dry powder and recent run-up in asset prices, firms are eyeing alternative assets to capture uncorrelated returns and diversify their portfolios. Over the past decade, sport franchise values have skyrocketed and grown rapidly when compared to nearly every other asset class. Continual increases in long-term television rights and media rights renewals have pushed professional sports team values to record levels. However, these sky-high team valuations have posed a challenge to limited (minority) partners seeking liquidity.

It has been a struggle for these owners to find buyers who are able to purchase their franchise stakes and tolerate the potential risk of operating losses and capital calls. As a result, leagues have adjusted their regulations and opened the floodgates to allow institutions to take advantage of this elusive investment opportunity, despite fan pushback.

The best example being in early 2021 with the European Super League and the disarray it caused among fans. The idea was motivated by money, since each founding member stood to gain approximately \$400 million, not including any commercial income they would generate throughout

## Increase in Average Sports Franchise Value



the season. Fans saw this as a greedy move made by Wall Street that sacrificed tradition for the opportunity to generate additional profit, which led to the proposal quickly being scrapped. However, private equity deal activity within the realm of sports has just begun to heat up, with Dyal Homecourt Partners investing in the Phoenix Suns, Fenway Sports Group acquiring the Pittsburgh Penguins, and Arctos Sports Partners purchasing a 13% ownership stake in the Golden State Warriors. Further, several first time funds are being established for the sole purpose of sports investments, with other institutional investors tailoring their funds to meet requirements set out by leagues. With all this investor attention and dry powder, what does private equity mean for fans' experiences? Will Wall Street once again put profit before people and wreak havoc on sports?

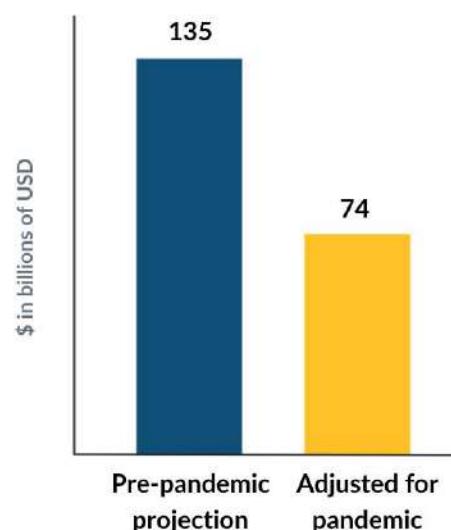
### History of Private Equity Investment in Sports

Private equity firms are investment managers that deploy capital to acquire ownership in companies not publicly listed on stock exchanges. Historically, professional sports franchises were largely owned by sole proprietors and families. As the popularity and value of the franchises

grew, ownership of sports franchises became syndicated through local affinity. At one point, institutions like newspapers and entertainment conglomerates owned majority stakes in professional sports franchises, but were forced to sell due to internal governance, which led to diminished franchise values in the marketplace. North American leagues subsequently disallowed institutional investors from acquiring ownership stakes in teams for the better part of a decade.

Over the past 18 months, the lockdown measures imposed by the COVID-19 pandemic have forced leagues to halt gameplay, which has significantly impacted

### Effect of COVID-19 Pandemic on Sports Industry Revenue Worldwide in 2020



revenue streams with obsolete game-day revenues and deterioration of media and

merchandise revenue. As a result, sports teams have been strapped for cash and needed to find new sources of capital, which is one of the catalysts for the recent change in ownership regulations. In addition, several North American leagues have opened doors to institutional capital and loosened restrictions because of rising sports team valuations, which have made selling minority stakes challenging due to a limited buyer pool. The sports and live entertainment industries are also in the middle of several prolific industry trends, which require additional capital in order to fully capitalize on high growth opportunities. Leagues have taken an innovative approach to allow for private equity firms to make investments in multiple teams and leagues through specially designed institutional funds.

## Why Invest in Sports?

When comparing major sports teams to stock market indices, it's evident that the growth of sport franchise values have outpaced annual market returns, while historically being more stable investments with a high degree of predictability and

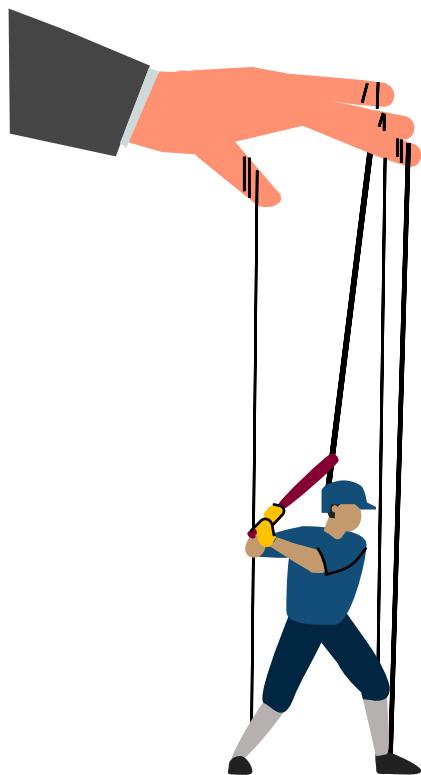
When comparing major sports teams to stock market indices, it's evident that the growth of sport franchise values have outpaced annual market returns, while

historically being more stable investments with a high degree of predictability, unlike any other alternative asset class.

Sports platforms are an attractive investment for private equity firms because of strong industry tailwinds and stable cash flows. The market opportunity for investments in professional sports franchises and all of their related assets in the 5 major North American sports leagues and the premier global sports platforms around the world is immense, with an estimated total addressable market of \$400 billion. The sports ecosystem sits at the center of a series of compelling secular trends, including live events, digitization, data analytics, and international growth, with strong tailwinds that have even accelerated post-COVID. Furthermore, sports have historically been uncorrelated with other asset classes, as a result of high recurring revenues (70%-80%) and an endless supply of live content, which provides premium intellectual property rights. The MLB and the NFL have each signed lucrative renewals with their television partners recently, which are projected to increase investor interest in sports franchises due to the scarcity of these assets. In addition, there is constant innovation and evolution in the business of sports, with the advent of digital

## BUSINESS STRATEGY

technology and growing financial sophistication in the space. Moreover, strong customer loyalties shield franchises from demand risk and revenue volatility. There is no other programme aside from sports that delivers a guaranteed audience of a specific demographic at a fixed time.



Customer loyalties within sports span generations and are increasingly becoming global, which gives teams strong pricing power. The word fan is synonymous with the word fanatic, which is a very unique type of customer due to the emotional equity that is generated from the experience of watching sports. Dedicated fans scream in unison over the hatred or love for different teams, paint their faces,

and sometimes even riot over what they believe to be bad calls. This type of devotion cannot be experienced anywhere else. Additionally, sports franchises each operate in one of the best markets in North America and have legal monopolies with geographic exclusivity through their ancillary businesses and fan base, which provide extensive opportunities to build a comprehensive platform.

### Transaction & Fund Structure

Many traditional fund structures and architectures have limitations when underwriting sports investments. Private equity firms typically acquire businesses through leveraged buyouts and use significant amounts of debt to structure their deals, but this is not favorable for sports franchises due to increased default risk. As a result, leagues have set regulations restricting the use of leverage, which means deals (minority or majority stake) have to be fully funded by equity. Investors are also prohibited from using a franchise's assets as collateral in back-levering situations. Although there is little to no leverage involved in sports investments, return profiles are still attractive with average internal rates of return (IRR) of 15%-20% over a 10+ year holding period, which is comparable to core

private equity investments from giants like Blackstone and KKR. Private equity firms also face restrictions in the influence they can have as owners. In contrast to their typical role as control owners, leagues want firms to be passive, long-term investors who provide resources to teams whenever possible, which is difficult for traditional fund architectures to follow. Many leagues like the NBA only allow sub 30%, non-controlling interests in franchise purchases and require private equity firms to have at least 10 years left on their fund life in order to be considered for league approval. Additionally, private equity investments in sports franchises are expected to have longer holding periods or utilize an evergreen model structure, which is an open-ended fund structure that has no termination date. Capital for many future private equity sports deals is expected to be raised via evergreen funds because they don't put as much pressure on teams to hit investors' return-on-investment targets. Arctos Sports Partners are an example of the ideal investors, as they are committed

to non-controlling interests with sub 20% stakes in teams.

## Due Diligence

Although there are unique intricacies that need to be considered when analyzing sports platforms, the due diligence process as a whole is very similar to that of traditional private equity investments. A discussion with Robyn S. Slutzky, a Partner and the Head of Capital Solutions at Arctos, provided additional insight on the due diligence process and the key criteria the firm evaluates. Based on the conversation, sports investors aim to identify the best assets and management teams with incredible visions for growth and build a portfolio of exposure across leagues, metropolitan markets and ownership groups to diversify idiosyncratic risk and deliver enhanced returns to investors.

When conducting due diligence, Arctos aims to find "growth assets with compelling financial and operating performance and an opportunity to provide liquidity and growth capital in a historically inefficient market." Key characteristics Arctos considers are sophisticated ownership groups with long-term vision, strong management teams with proven business-building execution,



**ARCTOS**



## BUSINESS STRATEGY

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attractive markets with demographic tailwinds, strong brand and fan loyalty, a deep local buyer base and/or concentration of wealth, ancillary assets such as real estate, and additional revenue growth opportunities.

For Arctos, the due diligence process starts once the firm has identified a potential partner or counterparty and have had some reasonable discussion regarding their terms. The scope of diligence falls into three key categories; the league, the franchise, and the platform assets the franchise owns. Depending on the league, 40%-80% of a team's economics are generated at the league level, which makes it crucial for Arctos to take a holistic approach to diligence. Regardless of the team, they already know about 40%-80% of its value since the firm has previously completed league-level diligence. One distinct difference in their diligence framework is their statistical and probabilistic approach to analysis, which results in wide variations and outcomes for each variable, especially with longer time horizons. Through this analysis, they are able assess the reasonability of their desired growth and plans post-acquisition.

The firm's overall process is very similar to any direct investment underwrite, with

Arctos spending a lot of time speaking with the ownership group, management, and third-party consultants. The firm meets with managers and control owners of the team, so they can focus on aligning their investment goals with the franchise's interests. Throughout the process, Arctos meets with their comprehensive roster of senior advisors, who each have decades of deep operational experience and leadership around the areas that impact revenue and value creation, such as sponsorship, ticketing, media rights, real estate, and legalized gambling. They also evaluate the likelihood of a control transaction happening in the next 5 to 20 years. The due diligence process is quite straightforward once the firm has access to a prospective investment's information, people and key decision-makers. However, gaining access to those resources and being granted league approval to invest is very difficult, which creates a strong moat around this investment strategy.

### Investment Strategies

From a financial standpoint, there are three minority stake investment strategies that are utilized to support sports platforms; growth capital, acquisition financing, and liquidity solutions. These investment strategies are the primary focus for limited



### Growth capital



### Acquisition financing



### Liquidity solutions

partners, like Arctos. Growth capital, also referred to as operating capital, provides financial support for these businesses to achieve their growth targets and operating objectives organically. Acquisition financing helps sports businesses with inorganic growth to acquire additional assets and become larger platforms, integrate other franchises to develop economies of scale and capture revenue and cost synergies, and provide capital to control owners, so they can acquire their first platform asset. Historically, potential growth from a pipeline of high return on investment (ROI) opportunities could only be funded through operational cash flow and new equity injections from shareholders. Since there are currently several high growth opportunities in the sports and live entertainment industries, growth capital and transaction financing can help sports platforms realize step function growth.

### Value Creation

After a private equity firm makes an investment, they focus on value creation

initiatives during the holding period by making operational changes to the business. A unique aspect behind investing in North American sports franchises is that

“

**These are some of the best assets in sports with some of the best operators in sports,**

”

Robert Klein, a Partner at RedBird Capital Partners explained after the firm acquired Fenway Sports Group. "This is not the case of a mismanaged business or an under-managed business. This is the case of something that's already really great." However, rising asset prices and new ownership structures will require a greater emphasis on disciplined financial management and greater operational effectiveness, which are areas where private equity firms can step in to create value.

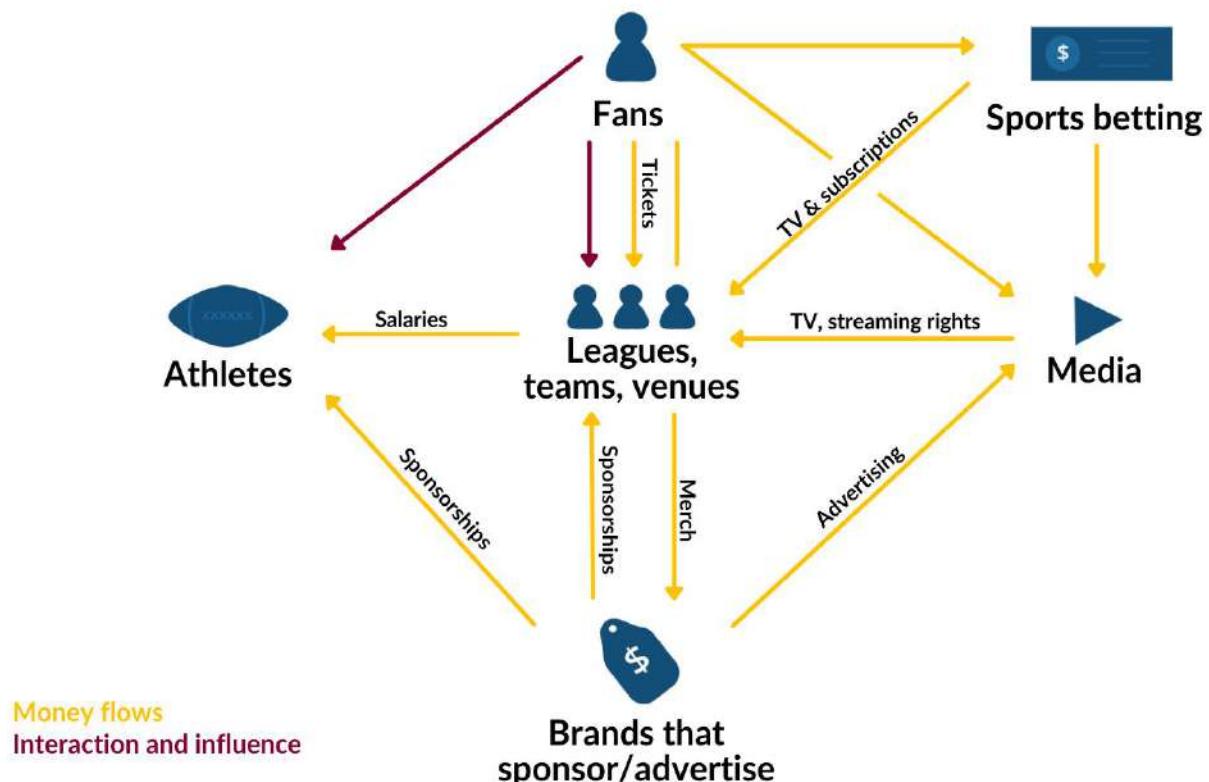
One of the core components in the investment thesis behind deploying capital into sports franchises and leagues is the investment in a broader sports ecosystem and portfolio of assets in a fragmented industry that could benefit from greater operational efficiencies. Institutional investors use team properties as anchor assets within broader content platforms

## BUSINESS STRATEGY

that incorporate everything from physical real estate to mobile sports betting and gaming, which provides significant potential for growth and value creation. With regard to operations, private equity firms don't interfere with the management of a team, instead, they focus on the growth of the assets associated with the franchise. For example, if a team wanted to discuss ways to renovate their stadium, acquire local real estate around their arena, or drive sponsorship growth, private equity firms would step in and support ownership groups with those initiatives. Key value creation focus areas for Arctos include:

revenue generation, platform building, M&A, deal flow, technology, shared services, sponsorship, analytics, and customer dynamics. Bain & Company indicates, "the basic principle remains that there are two ways to make money in sports: increase the number and intensity of fans [or] monetize this fan engagement through traditional and emerging revenue sources. To thrive in this dynamic environment, investors and owners need to develop a clear understanding of the sources of value within the sports ecosystem and how the disruptive pressures are changing value flows." Media rights are

### Where Money Flows in Professional Sports



the most important piece within the overall strategy for private equity firms to drive value, as the influx of streaming services and on-demand content has made live entertainment more valuable. For many professional sports leagues, media represents the biggest piece of the revenue pie, contributing 40%–60%, and is a private equity firm's main driver for returns and revenue growth. Sports remains the single greatest aggregator of live content, and sports rights are an increasingly important and strategic asset within the entertainment ecosystem, which can be seen through notable step-ups in the national media rights deals with the NFL, MLB, and NHL recently. Looking to the future, three things are simultaneously causing the value of sports media rights to increase. First, the relative share of sports viewership has steadily increased, indicating sports and live content more broadly are becoming increasingly important to the still highly lucrative linear bundle. Second, OTT providers are increasingly realizing the need for live sports as a customer acquisition and retention tool. Finally, the rise of digital experiences is changing how engagement and content is monetized and catalyzing new opportunities across sports betting, international expansion, and youth engagement to reach a new generation of fans.

## Impact of Private Equity Ownership On Sports Teams and Leagues

Private equity ownership will have a positive impact on sports teams and leagues by driving increases in valuations, supporting the growth of franchises, and improving the overall fan experience. First, the influx of private capital into the space will increase valuations by providing liquidity to limited partners, contributing to greater transaction volume, and improving the financial performance of sports teams and leagues. The exponential growth of franchise valuations has made it increasingly difficult to find individuals wealthy enough to purchase ownership stakes, however allowing institutional investment increases liquidity and significantly expands the pool of potential buyers for minority shares. This increase in demand will fuel additional competition and cause a surge in transaction volume, which further increases valuations. In addition, access to sophisticated ownership groups through private equity will give teams and leagues access to an abundance



## BUSINESS STRATEGY

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of financial and business resources that can help them increase operational efficiency. As a result, they will generate stronger revenue growth and profitability going forward, which will also contribute to higher valuations.

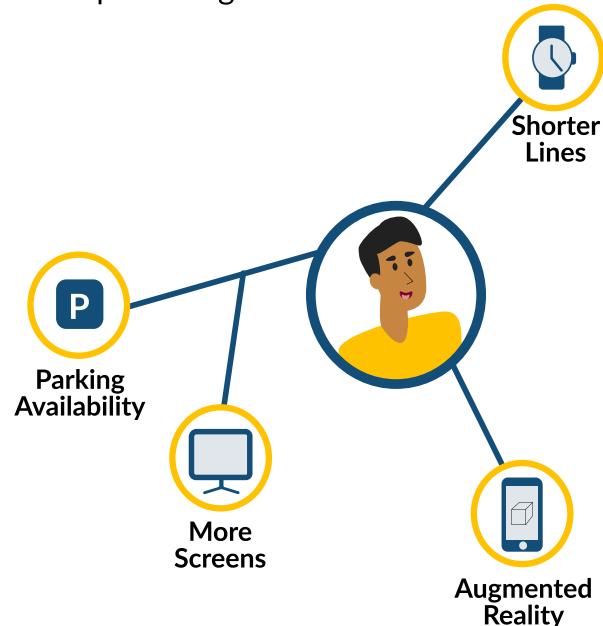
Furthermore, franchises face several financial constraints from their leagues, such as borrowing limits and cash flow reinvestment requirements, which limits their ability to take advantage of growth opportunities. As a result, the industry has historically had to fund growth organically. Capital providers in the form of private equity firms will support the growth of franchises by sharing operational expertise and financing strategic initiatives. The application of data analytics presents promising opportunities, as sports increasingly rely on direct fan engagement to generate revenue. By investing in these technologies, franchises can use artificial intelligence to track viewing behavior, develop strategies to monetize fan engagement, and use data to improve content and digital experiences for fans. International expansion also provides significant growth potential for sports franchises, with many leagues looking to establish their respective sports as a global game. Growth capital provided by private equity firms will accelerate this expansion

and help leagues reach a greater number of fans. Additionally, private equity firms will enable the growth of franchises by building broader premium content platforms. Horizontal consolidation and vertical integration across other sports, media properties, real estate, live entertainment, and hospitality would support this platformization and expand a franchise's reach and presence. Within these platforms, sports betting will play a key role in enhancing the entire sports value chain by unlocking new sponsorship opportunities and increasing fan engagement, which translates to higher media and customer lifetime values.

Finally, private equity ownership will enhance fan experiences through next generation venues, streaming, and digital channels. Deeper fan engagement is crucial to the value creation strategy for private equity firms because all revenue sources within the sports ecosystem ultimately lead back to fans and marketers. In terms of live experiences, fans can expect a more captivating environment at games with private equity firms helping franchises invest in next generation venues. These new smart venues use Internet of Things (IoT) technologies to "provide fans with a wealth of information on parking availability, bathroom and concession lines,

seat upgrades, special offers, and more. Fans get a convenient, personalized experience with shorter lines and directions to navigate faster through crowded stadiums and parking facilities," explains Intel. At the next level, these state-of-the-art facilities will incorporate contactless technology, augmented reality, interactive seats, and thousands of large screens throughout venues to ensure fans don't miss a play. The various cameras and sensors in smart stadiums will provide security staff with real-time data and improve communication between hundreds of staff members and external police, thus also improving stadium security. In addition to improving fan experiences at venues, private equity will influence how fans view matches at home. Similar to broadcast entertainment, sports will also be migrating to streaming platforms, which means leagues and teams will need to develop new direct-to-consumer (DTC) distribution models. A hybrid model with both linear and streaming features will most likely emerge, with a variety of convenient and personalized viewing options for fans to watch their favorite teams and leagues. These mediums are likely to become more advanced with access to data on player and team performance, real-time betting opportunities, and other interactive and immersive viewing modes, as franchises

look to digital experiences for deeper fan engagement. The introduction of esports and next-generation fantasy sports will provide additional ways for fans to interact with sports leagues and teams.



## Conclusion

Private equity firms have historically received backlash for the bankruptcies of several globally recognized companies - such as that of Toys "R" Us, brought on by Bain Capital and KKR. These events eventually translated over to sports through CVC Capital Partners' acquisition of Formula 1, where the firm focused on relentlessly pursuing profits at the expense of the sport. Over \$230 million of interest was payable every year after CVC made the purchase, over 50% of which was financed with debt. The firm employed Bernie Ecclestone to run the sport and his

## BUSINESS STRATEGY

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was unfavorable by the majority, with racers speaking out about his poor leadership, which damaged CVC's reputation. Despite the negative attention, they turned a \$952 million investment in 2006 into a more than \$6.7 billion return by exit in 2016, marking at least a 7x cash-on-cash return.

Overall, there's good reason for fans to be aggrieved by private equity firms as history has proven, but fans shouldn't be concerned by the emergence of private equity in North American sports. Leagues share the same skepticism as fans and have implemented regulations that ensure private equity firms will be passive, non-controlling partners over a long horizon without the use of leverage. To ensure firms can financially support the teams they've invested in, some leagues also require that funds have \$500 or \$700 million of capital dedicated to their league. In addition to constraints placed on fund structures, leagues will monitor conflicts of interest with firm leadership who may personally own stakes in teams. From an operational perspective, private equity firms can't be involved in or discuss any activities that relate to players or coaches. Firms are strictly prohibited from receiving any information regarding these topics and have built proprietary compliance systems,

very much like material non-public information (MNPI), to detect and quarantine any sensitive and competitive information about players that they might be exposed to. Many of the private equity firms entering North American sports leagues don't have any intention to take significant control, but rather to be trusted advisors. Furthermore, the success of a team on the field, court or rink matters less to private equity firms than customer experiences, the assets the franchise owns, and the market they operate in. For example, the Sacramento Kings have had the second-worst record in the NBA over the last decade, however their modern arena and extensive real estate holdings, which include a hotel, retail, and restaurant district around their arena, provide value to Dyal Capital and Arctos, who each purchased minority stakes in the franchise.

If anything, private equity ownership will provide more benefit to the teams, the owners and the leagues through increased valuations, substantial franchise growth, and improved fan experiences. In the end, private equity firms are likely to remain the silent partners of sports teams for the foreseeable future and fans can rest, knowing that they can continue watching their favorite teams and leagues for years to come.

# Business Strategy:

# Roblox: The Digital Las Vegas

Chiranjeev Beniwal

Matthew Leung

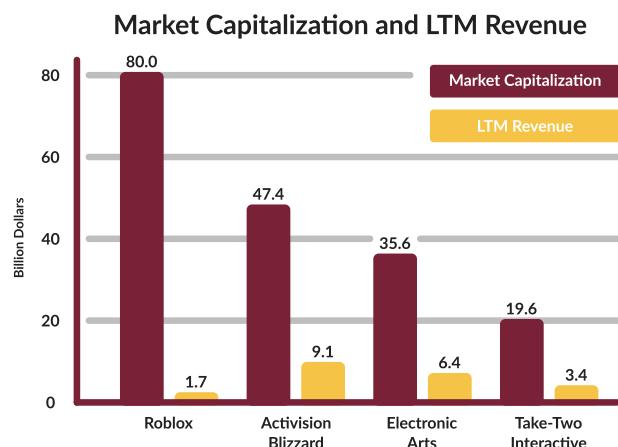


Illustrated By  
Diane Xiong  
Sam Jia

## Introduction

With nearly 50 million users active daily, Roblox is one of the most popular video games in the world. In fact, categorizing Roblox as a video game is misleading - it is one of the most successful platforms in the world, allowing developers to make their own video games on the Roblox platform.

Most kids that grew up playing video games know of a few behemoths in the industry, such as Activision Blizzard, which created Call of Duty and World of Warcraft, and Electronic Arts, which has brought out titles such as FIFA and Battlefield. However, what many may not know is that Roblox is worth almost as much as those two companies combined, which are the largest gaming companies by revenue in the world.



The significance of this is quite clear - as a standalone game, Roblox is worth more than entire portfolios of immensely popular

video game franchises, including Grand Theft Auto and Call of Duty, making it the most valuable video game in history by a significant margin.

However, not all is well in the real world for Roblox. As can be seen by the table above of several prominent gaming companies, Roblox has by far the largest market capitalization, while also having by far the lowest revenue. The sky-high valuation of the company shows that investors are expecting robust growth from Roblox, requiring revenue to increase multiple times over. The question is, can Roblox achieve such a lofty goal?

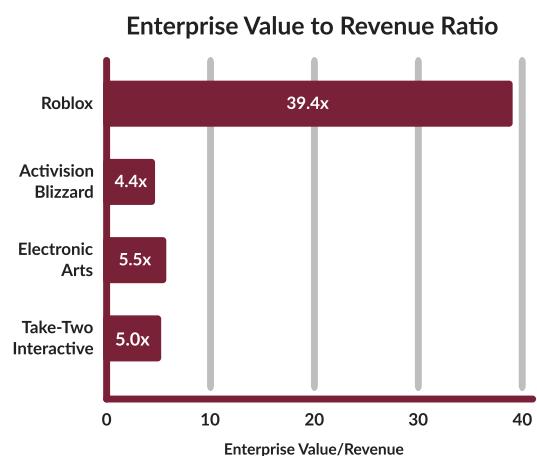
## Revenue Struggles

Roblox provides a free platform for game developers to create their own games, with its revenue consequently derived from the sale of in-game currency, called Robux, which is used by players to buy skins and other items. This, in a way, makes for more of a recurring revenue scheme compared to many other games, where they are sold to customers once and for all.

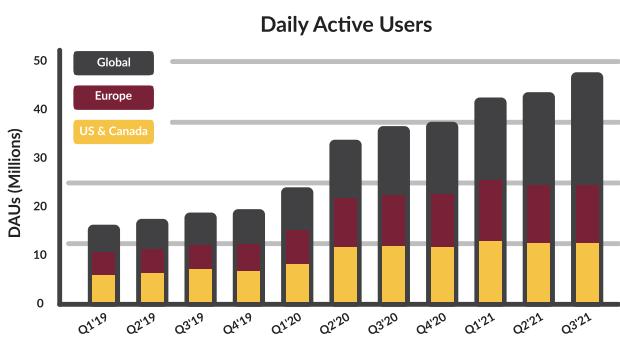
It is evident that investors expect explosive revenue growth from Roblox, based on the incredible valuation of the company. The company is valued at nearly 40 times its

## BUSINESS STRATEGY

revenue, compared to other gaming companies like Activision Blizzard, EA, and Take-Two, which all trade at between 4.6x and 5.7x (times) revenue. As such, investors expect revenue to grow by several multiples.

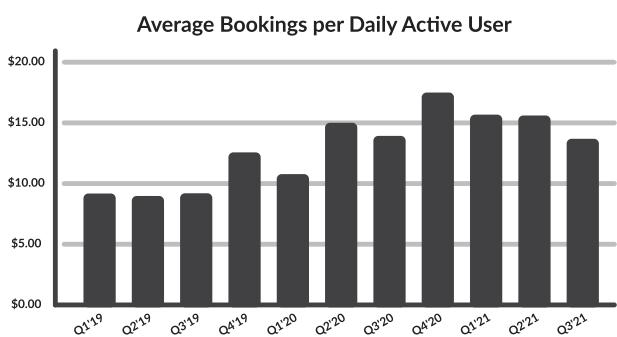


Revenue fundamentally has two drivers - volume and pricing. For Roblox, this is referred to as Daily Active Users (DAU) and Average Bookings per DAU (ABPDAU), the latter of which describes how much the average DAU spends on the game. Over the course of the pandemic, which forced people indoors and made them increasingly turn towards gaming as a form of leisure, the number of people on Roblox grew at a rapid pace, and so did how much they spent on the game.



However, cracks have begun to appear in Roblox's growth story. Growth in DAU has plateaued in core markets of North America and Europe, meaning customer volume growth worldwide has been put in jeopardy. Additionally, ABPDAU has been on a downward trend since Q4 2020, meaning each user is spending less on the game. When one puts dangerously low volume growth with decreasing revenue per user, the threat to Roblox's revenue becomes very apparent.

Keeping the above in mind, the results of Roblox failing to achieve the expected revenue growth would be catastrophic for the company. Roblox is still quite unprofitable, and requires revenue to increase to a much higher level to be able to cover expenses. Compared to an average peer group EV/Revenue multiple of around 5x, which indicates that the total value of these companies is on average five times larger than annual revenue, Roblox is valued at around 40x revenue, indicating that investors expect Roblox to multiply its revenue 8x.



## Management Plan

Management, of course, is not blind to this issue. The CFO of Roblox, Mike Guthrie, laid out a plan to drive Roblox's growth through several key areas:

- Expand to an older population
- Expand internationally, especially into Asia
- Expand platform uses beyond just gaming, i.e. virtual concerts
- Expand monetization strategies



The goals will both help bring Roblox to a wider audience, and also give Roblox more opportunities to make money off each user. However, what isn't clear is the implementation.

How can management implement a strategy to actually achieve these goals? By using the huge developer base that Roblox has access to, it has the potential to enter the online casino market in collaboration with established gambling companies.

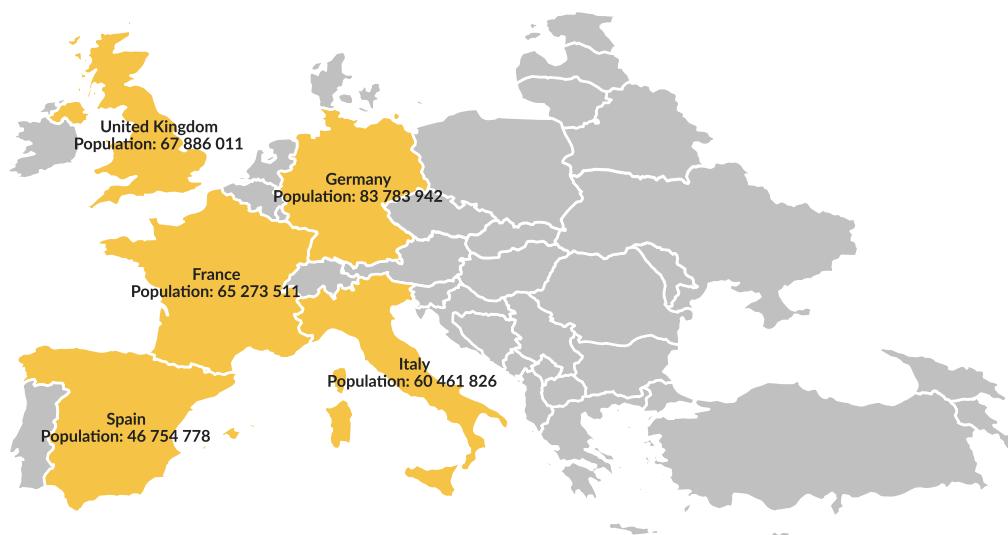
## Online Gambling

Before discussing the specifics of how Roblox can create this new revenue stream, it is important to first understand the dynamics of online gambling. Traditional gambling is quite well known - one goes to a casino, and through a series of games ranging from slot machines to wheels of fortune, the player puts in money with the hopes of winning far more. The casino takes in money from all players, and a large portion of the money it collects is paid out to the winner, meaning the casino still retains a significant chunk of the bets.

The online casino essentially provides players around the world access to digital gambling games. Instead of taking a trip to Las Vegas or Macau, one can sit at home and gamble, making online casinos far more accessible than physical casinos ever can be. In fact, the online gambling market is estimated to have generated over \$266 billion in revenues in 2021, with around \$40 billion estimated to be gross revenue for the gambling providers.

This, of course, is theoretical, because online gambling remains either illegal or in a grey zone in most countries around the world. In the US, several states, such as New Jersey and Michigan, have made

## BUSINESS STRATEGY



online gambling legal, with the total population living in these “legalized states” coming in at over 38 million. Nations like China and Japan have made it entirely illegal to run online gambling in the country, on the other hand. However, a bright spot for online gambling is Europe, which has made up around half of the \$40 billion in gross online gambling revenues due to a legal and licensed online gambling market in its key countries. The continent’s market for online gambling grew 28% in 2020, hinting at significant potential over the next few years.

Nations that have legalized online gambling in Europe include:

- UK
- France
- Germany
- Italy
- Spain

By focusing on the European market, Roblox has the potential to significantly increase its revenue over the next few years and revive growth in an otherwise-laggard geographical segment.

### Implementation and Partnerships

A strategy is only as good as its implementation - fortunately, the nature of Roblox makes it relatively easy to integrate online gambling offerings with the game. The key lies with its developers - independent programmers who can develop their own games on the Roblox Platform. These developers retain a stake in the game they make, as they make 30% of revenue generated through the sale of items, with the remaining 70% going to Roblox.

Currently, the majority of these developers make games primarily oriented towards

children. Roblox could bring in more professional developers to create virtual casinos accessible to verified adults, which would contain casino games playable with real money.

The obvious question becomes: why would someone use a casino in Roblox as opposed to simply opening up a phone app? The answer lies in the more engaging and sandbox nature of Roblox. As a Global Newswire article pointed out based on an analysis of several academic studies on online gambling, convenience is the main driver behind the proliferation of online gambling. However, there is a certain lack of trust relative to traditional casinos that is a headwind for the countless online sites. Roblox, as a multibillion dollar company, could serve as a more trusted platform to power online casinos. Additionally, there is increased relative entertainment through Roblox - instead of just spinning a spinner in an app, Roblox could allow for users to actually roam around virtual casinos and digitally experience the ambience of world famous casinos.

For example, Roblox could partner with MGM Resorts International to bring iconic casinos such as the Bellagio to life within Roblox, essentially providing a "virtual tourism" experience. If MGM hosts its own

Bellagio server within Roblox, it would be responsible for all design itself and would be using its own balance sheet for gambling purposes; however, Roblox would get a negotiated cut of revenue earned by MGM. This way, Roblox runs a high margin online gambling business without having to take proprietary risk, and MGM gets to capitalize on its brand without incurring additional costs associated with owning physical property.

The potential doesn't just stop with the gambling activities in and of themselves - with extravagant casinos built into Roblox, frequented by potentially millions of players, there exists the possibility to insert product placements and advertisements within these casinos, thus offering supplementary income for both Roblox and its casino partners.

This strategy would do a good job of meeting the CFO's goals. First of all, by turning Roblox into a platform for activities that can legally only be done by adults, this helps drive expansion into an older population segment. Additionally, this plan would result in renewed international growth, primarily within Europe and eventually other countries. Finally, this service offering would achieve the dual goal of expanding monetization strategies,

by opening a new revenue stream from casinos, and expand platform uses beyond traditional video games and into casino games.

### Conclusion

Overall, when partnering with large casino chains, Roblox has the potential to significantly increase its revenue. It is not enough for the company to keep trying to make money off of selling Robux used to purchase in-game skins and items. Instead, Roblox has the potential to capitalize off of its relatively decentralized platform that can be used to create casinos. Casino operators like MGM until now have run their operations out of physical locations owned by companies like Blackstone - what's stopping Roblox from acting like a digital casino real estate investor, except with almost no actual acquisition costs?

The financial potential is no doubt enormous. As previously mentioned, the European online gambling market in 2021 was worth approximately \$20 billion - if casino operations run on Roblox could capture even 5% of the European market, this would amount to \$1 billion earned by these operators. With the typical 30-70 split, Roblox could earn \$333 million, instantly increasing revenue by around

20%.

When factoring in the 28% annual market growth, a growing market share within Europe, and online gambling getting legalized around the world, it becomes pretty clear that if executed the right way with the requisite partnerships, Roblox has the potential to transform itself from a children's game platform to a digital Las Vegas, complete with everything from online casinos to online battle royale arenas.

# Technology: Machine Learning May Destroy Objective Truth on the Internet Forever

Lakshya Balchandani

Grace Fan

Vivian Guo



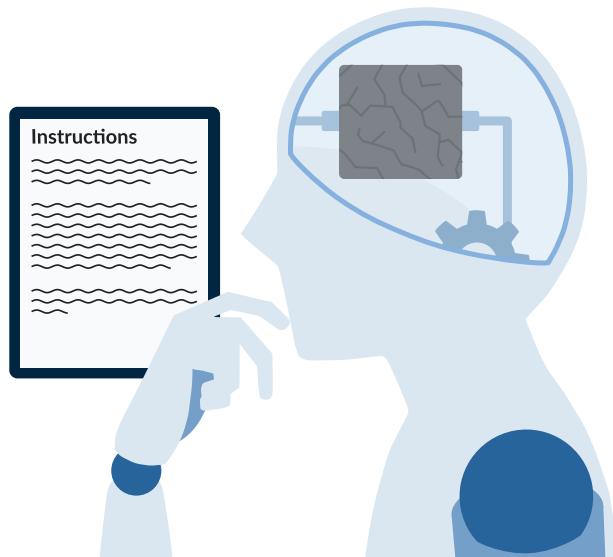
Illustrated By  
Devena Mohabir  
Viviana Basurto



## Introduction

In today's technological culture, the biggest and loudest voices are screaming about artificial intelligence (AI). While it is considered to be a massive part of the future of tech, there seems to be a lot of confusion on what exactly it is, and how it plans on achieving the future it seems to promise. In actuality, AI is an umbrella concept that refers to anything connected to making machines smarter. On the other hand, it's much less commercialized sibling, machine learning (ML) is the one that specializes in the process by which these machines can learn. ML is essentially letting an algorithm look at past data, and using the patterns that are found to predict future outcomes. As such, the philosophy behind AI is giving decision making over to machine learning and utilizing data to automate that decision making at a speed and frequency unlike ever before.

At this point, it is becoming increasingly clear that machine learning is starting to become a foundational technology all across the globe. With the amount of data being embedded into business operations, there has never been more potential for companies to make both smarter and faster decisions. As such, it isn't surprising when you begin to notice that modern startups



are starting to prioritize the incorporation of machine learning into their own software solutions, backed by some of the biggest companies in the world. In May 2020, Intel announced an investment of \$132 million into 11 disruptive technology startups - all of which focused on building machine learning applications.

However, startups investing in new technology is nothing new. The real kicker comes when people start to realize that this technological shift is not only taking place in startups, but in legacy institutions which are by and large the ones that wait out new technology until it becomes something largely unavoidable. For example, earlier this year, CIBC - one of the oldest banks in Canada infamously known for its outdated technological stack - announced a "Digital Transformation" which would use "scalable computing"

power for CIBC's enterprise data lake and [an] AI/ML platform to power smart, innovative client solutions." While these institutions move notoriously slow, even their choice to dip their toe into the technology means they know they need to soon traverse a data driven landscape one way or another. To add to this, they aren't the only ones. As early as 2019, 70% of companies in the USA either had a digital transformation strategy in play or were currently working on one, and these companies spent more than \$2 trillion on it. If someone follows the market, they can see where the investment is actually landing up.

"In 2020, the global artificial intelligence market size was valued at \$62.35 billion and is now expected to expand at a compound annual growth rate (CAGR) of 40.2% from 2021 to 2028." Not to mention that the global machine learning market itself is projected to grow from \$15.50 billion in 2021 to \$152.24 billion in 2028 at a CAGR of 38.6%.

The amount of money and manpower being pressed into the vacuum of machine learning proves that it is not a fad, but a reality that will manifest itself in the consumer landscape as a common tool sooner than we know. However, by the nature of ML, there is a double-edged sword that calls into

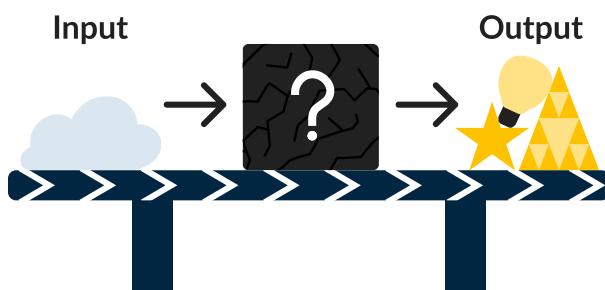
question the underlying consequences of increased dependence on algorithmic decision making.

The problem with giving any form of AI control in an already complicated digital age is difficulties in being able to enforce whether or not it made neutral and unbiased decisions. Giving the reins to ML may effectively damage this neutrality for good. The way businesses/governments operate and the way they communicate with the public would shift in incredibly dangerous ways. While the rise of machine learning plants the seeds for a new technological era, it also builds a foundation that has the potential to spread bias and misinformation to a degree unparalleled in human history.

### The Black Box of Machine Learning

The successful growth of new technologies is usually a sign of a prospering economy and a forward-minded community. The problem does not come with the renewed interest in transforming the digital landscape, but in utilizing machine learning to do so. As AI becomes more and more powerful, it's true that it can lead to extremely positive changes and transform economic, social, and political landscapes, but it can also pose significant risk and become a hotbed of unintentional misuse.

What makes machine learning different from traditional technologies is that it essentially gives up the ownership of decision making to AI. While the input and output are controlled, and thus whatever comes to consumers and used by the company is chosen by developers, it is very difficult to actually determine how the technology got to its specific decision. For example, if a banking institution utilized a machine learning algorithm to determine if users were likely to close their accounts, its input could be "transaction data", and the output would be a simple "yes or no". What is being put in and then received is controlled and measured, but how the system actually gets to that conclusion is more complicated.



What this means is that machine learning applications sometimes have the potential to develop in unexpected and undetectable ways and that makes it by its very definition, a black box technology.

"A black box is a device, system or object which can be viewed in terms of its outputs without any or limited knowledge of its actual inner workings." In many cases, deep

machine learning can be monitored by professionals. There is a long and arduous process by which ML engineers develop learning algorithms - written code that evaluates the data and makes conclusions from it. The actual programming behind ML and how it "learns" is complex and understood by very few. Hence, even in the hands of an expert, there is cause for concern in blindly initiating this technology to every industry. Even if you consider that everyone using machine learning software at every company is qualified enough to maneuver such a complex technology - which is not the case - the inherent nature of the software is all about giving AI the reins. The eventuality of such a choice is that soon it will outrun the person, no matter how closely they keep watch. The base on which AI operates is neutrality. Sometimes that neutrality itself becomes an initiator of bias and misinformation. AI has very little understanding of ethics because it is largely a human concept, and when you give it control over decision making and then lose track of how it's making those decisions, that's when the chaos ensues. When this happens, machine learning can become far more dangerous than people give it credit for.

This is when a phenomenon known as algorithmic bias comes to the forefront, and becomes something that - if undetected and

unmanaged - can significantly harm our economic, social, and political landscape as we know it.

### Algorithmic Bias

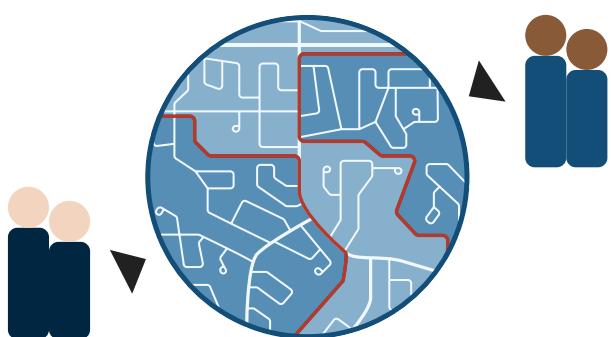
To understand algorithmic bias one needs to understand algorithms. Algorithms are a set of instructions for accomplishing a task. In relation to machine learning, they help dictate how a machine processes data to produce its predictive outputs. In other words, they are the brain behind machine learning and are the methods by which they learn to think for themselves.

Algorithmic bias can be understood as a “deviation from some standard of fairness.” Some form of systematic and repeatable error in a system that is responsible for some person’s understanding of unfair or wrongful data processing. There are a few common types of algorithmic bias:



Negative Legacy is bias that comes directly from bias present in the input “training data”. Training data is what the machine learning model uses to make its predictions. For example, a study by Princeton researchers noticed that ML models trained to perform

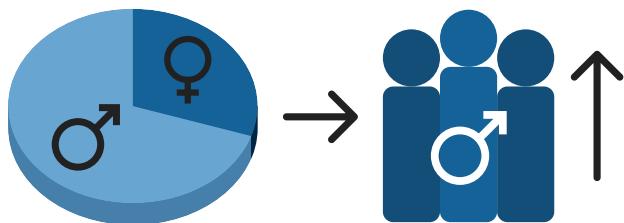
language translation tasks on a set of input texts that reflected traditional gender tropes instead of more modern ones led to output associations that associated female names with attributes “parents” and “wedding” and male names with “professional” and “salary”.



Algorithmic Prejudice is the correlation between protected features and other factors. For example, early policing algorithms did not have access to racial data when making predictions, but models relied heavily on geographic data (eg. zip code), which is correlated with race. Often, communities of the same race congregate in similar areas. In this way, models that are “blind” to demographic data like gender and race can still encode this information through other features that are statically correlated with protected attributes.

Underestimation is bias as a result of insufficient data. For example, Amazon’s earlier ML model to screen applicants in the hiring process ended up largely favouring male applicants over females because of

Amazon's disproportionate male workforce taking up a large amount of the sample input size of the model.

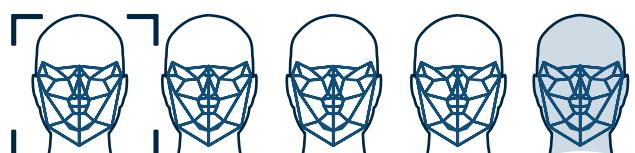


### The Parasitic Impact of Algorithmic Bias

Since machine learning is now coming to the forefront of every part of our social lives, it is affecting political choices, personal finance, health care, education, and pretty much anything you can think of. Algorithmic bias can affect society because it can unintentionally become an object of discrimination and misinformation plaguing all our most frequently used systems. The numerous instances of these are often left largely undiscussed and are swept behind the headlines of machine learning's numerous benefits.

For example, the previous iteration of Google's Vision AI image classifier first incorrectly labelled an African American couple as gorillas and later a picture of a black hand upholding a monocular as a black hand holding up a gun. The white couples were correctly classified and the

white hand holding up the monocular as well. In this case, both instances were evidence of underestimation where there was not a diverse enough sample for it to not make unintentionally racist predictions. This kind of issue might seem small in scope, but Google's Vision AI was used in multiple areas before this change was implemented; the AI was implemented by large policing forces, schools, supermarkets, and even in apartment complexes. The total number of incorrect classifications per year by computer vision and machine learning are still unknown, but some specific and horrifying examples come to the forefront. One of them was a teenager by the name Ousmane Bah who was wrongly accused of theft at an Apple Store and the other was Amara K.Majeed who was wrongly accused of involvement in the 2019 Sri Lanka bombings. On both accounts, this was because of incorrect facial recognition.



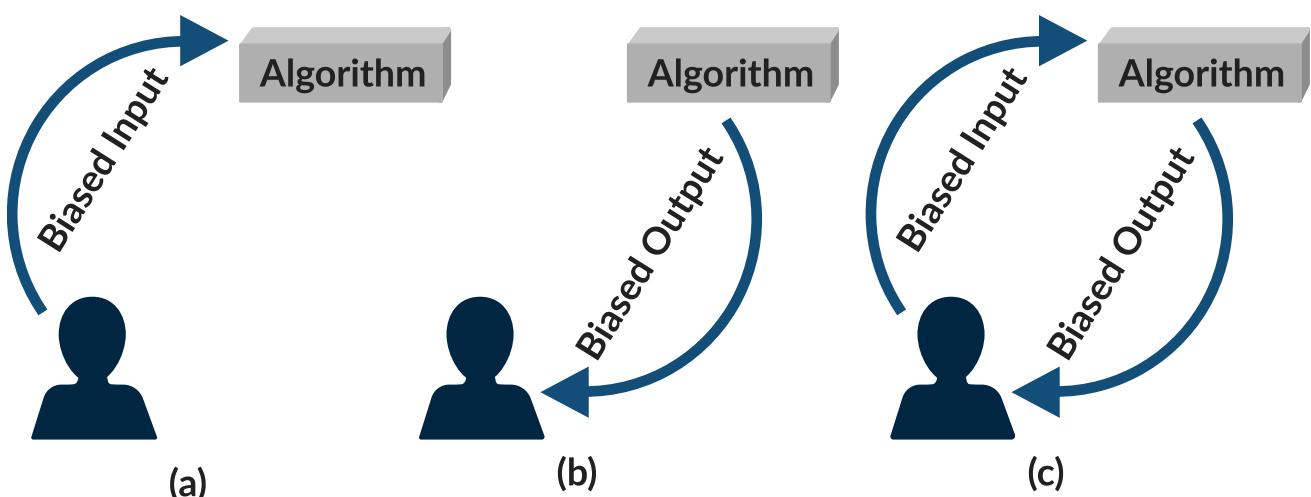
The public sector faces some of the same issues. In the USA, the Department of Justice employs machine learning in the criminal risk assessment algorithm to calculate recidivism ("the odds of

reoffending") and determine different aspects of punishment and parole. At the Data for Black Lives conference in 2018, research revealed that because there were more African American inmates in the prison system, the algorithms which would work by using the population of the prison system as input data, would tend to offer that majority harsher recidivism scores. While the idea that harsher recidivism scores can be provided to a demographic that has greater representation in the group is not unreasonable, the problem is that this group is overrepresented as a result of biased policing systems from decades of institutional racism and discrimination in the USA. The terrifying realization that the algorithm would put more African Americans in prison and then used that inherently biased data to make other predictions on other American Africans indicated a cyclical racially biased criminal system.

Without actively realizing it MALpractices are now actually sending people to jail and keeping them there for all the wrong reasons. Considering that the total reported number of inmates in US prisons was over 3 million in 2019, that is a lot of lives left to the whim of technology people don't fully understand. The consequences of technological progression are sometimes forgotten in the desire to progress and grow.

When software like this becomes problematic, it creates a larger systemic issue with the organizations that end up employing it. Companies that have used faulty ML in the past have had to deal with reputational damage, lost opportunities, and a lack of trust from users.

In regards to the reputational damage, Amazon's AI-infused hiring practices in 2018 were harshly criticized when it was



revealed that their ML model was biased against women as a result of being trained on primary male resumes.

## The Opportunity Cost Conundrum

The most common pitfall is that economic damage often plays a part when businesses respond to ML and AI related misuse. In January 2020, Facebook was ordered to pay \$550 million to settle a class action lawsuit over its unlawful use of facial recognition technology. Companies stand to lose a significant sum over a long period of time as ML may cause more and more ethical issues on larger scales. The loss of money from reputational damage can take a long time to recover from.



Reputational damage and that lack of trust from users is starkly at odds from the potential millions that can be gained with successful ML implementations. Benefits in the "form of revenue growth, time, capital and efficiency savings can range from

"between \$250,000 to \$20 million" and the "ROI (Return on Investment) on most standard machine learning projects in the first year is 2-5 times the cost".

This particular dilemma is what makes managing the demand for machine learning and the risks associated with messing it up a potential conversation for businesses - not a done deal. With end users also conflicted between the benefits of the software and then its potential privacy and ethical concerns, it solidifies that there is no easy answer available in dealing with innovative technology that can both progress and regress society.

## The Chain of Bias

At the end of the day, machine learning, like most technologies, is complicated. It remains a powerful system of change in this world, but that doesn't always have to mean that change will be positive. Living in a world already bursting at the seams with issues related to misinformation, the dangers of machine learning very accurately reflect the time. If the technology posed one and done kind of issues perhaps progression wouldn't be a concern. But one big thing that a lot of people seem to miss is that machine learning, and more specifically algorithmic

bias, form a powerful chain of events that are pervasive to every other system a company uses.

In essence, the understanding is that bias in machine learning compounds. If biased data is introduced at any cycle of the ML lifecycle of a product, it will affect every single system that it communicates with. Just as humans spread our biases, so does

should react to the era of machine learning is honestly unclear. While machine learning is without a doubt a complex and potentially dangerous technology, it's one that there might be no permanent recourse against. It seems that instead of discussing solutions against the technology, people should prepare themselves for a new world order and the same kind of shift that took place when the Internet became as crucial



machine learning. And if the technology is truly a reflection of our times, it starts to beg the question on just how wise it truly is to trust a communicating network of AI technologies to do the job that sometimes we humans can't even do.

### Conclusion

The answer for how exactly the world

to society as it is now. Perhaps more effort should be spent in accepting this and preparing for things to come instead of trying to stop the future. With the way things are going, people may not even get the chance to decide. Machine learning is coming whether people want it to or not. In fact, the new kingpin of technology is already here and we best be ready for it.



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