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Your Business Needs To Invest In Artificial Intelligence

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Your Business Needs To Invest In Artificial Intelligence

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Abstract

Artificial intelligence (AI) is defined as "machines that respond to stimulation consistent with traditional responses from humans, given the human capacity for contemplation, judgment, and intention" by Brookings Institute. According to Amazon, AI is "the field of computer science dedicated to solving cognitive problems commonly associated with human intelligence, such as learning, problem solving, and pattern recognition". AI has the ability to transform business as there are many applications of AI technology available today that could improve the operations and financials of a business. AI has turned capabilities that previously were only thought about as futuristic into a reality which businesses can capitalize on today. The goal of this paper is to simplify the complex topic of artificial intelligence into a sales proposal to communicate value to business leaders and other decision makers to both educate and sell these individuals on AI programs for their business. In educating the audience, I will be able to create an understanding of these complex systems. Potential buyers will be guided through information that will address the four main questions which decision makers are likely to want when assessing the potential of investing in AI for their business. These questions include, what application AI has in business, what impacts these systems will have for our business, how could our business potentially be limited by AI, and what is the future of AI technology. In answering these four core questions, potential buyers will be provided the information necessary to make a purchasing decision to implement AI within their organization. From a sales perspective, a sales manager will have the necessary research and insight into how to present AI technology to decision makers in order to close these potential customers on purchasing AI technology.

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Introduction

Today, we are experiencing a "big data" boom as technology has allowed businesses to collect information about their customers at such a rate that they cannot analyze all the data collected. Businesses need to learn how to derive actionable insights from the data that is available to them; however, in a recent survey there is a significant disconnect between the information that is available to companies and the actual insights that they are deriving from it with only 47% of respondents saying that they were able to obtain some quantifiable benefit from their data (Verweij). Research shows there is a 15-20 percent increase in ROI at stake for companies putting data at the center of their marketing and sales decisions (McKinsey). So, why are we seeing more than half of businesses from the survey saying they do not use insights from their data if they can increase ROI? The biggest problems centered around a lack of systems integration, poor data quality, and the time required to collect and analyze data (Verweij). Instead of hiring data scientists to analyze and understand the data, AI should be implemente(Artificial February). AI is not only capable of analyzing and creating actionable insights for companies, it is able to do so faster and more efficiently than humans which saves businesses time, money, and reduces errors in business decisions by providing these superior insights to business leaders who previously thought these insights were out of reach for them. AI today has seen extensive transformation over the course of its seventy-year history to get it to where it is today.

History

The history of AI is important as it provides context to understand what it took to get the technology to where it is today and how it will further develop in the future. The term 'Artificial

Intelligence' was first coined by a man named John McCarthy in 1955. AI can range from

machines capable of performing single tasks to machines capable of "learning" through complex

tasks in order to achieve a desired outcome without human intervention. Since the first

computers were created, approximately 70 years ago, AI programs have been developed for

nearly every way machines are used in our society today. Even though the first computers were

capable of tasks like sending short messages to other connected computers, there were always

scientists asking the questions about how and when we would be able to create machines with

the ability to imitate the mind of a human being (Smith).

Even before McCarthy's conference in 1956, scientists had already developed ways to

assess the capabilities of AI programs compared to the functionality of the human mind. Alan

Turing is credited with the creation of the first measurable test of a machine's capability to

imitate functions of the human brain (West). The goal of computer scientists, at the time, was to

create an program capable of the complex innerworkings of the human brain and mind in a

machine. The proposal of the Turing test gave computer scientists direction and a singular goal

to work towards. Researchers are still trying to outsmart Turing's test which has evolved into an

annual contest that brings together top computer engineers to try and create the algorithm which

will finally satisfy Turing's parameters (Smith).

Computer engineers of the mid-1950's were divided between working to satisfy the

parameters of the Turing test and creating programs that were more interactive such as the ability

to play the game of chess. The earliest application capable of playing the game of chess was

developed by Claude Shannon (Smith). Claude Shannon did not want to just create a program

that could play the game of chess, but took it one step further by attempting to develop a

program capable of beating the world chess champion. It was not long after Shannon's proposal

that other computer engineers gathered to compete in annual chess competitions to see who had

written the strongest programs capable of playing and winning at chess. These chess programs,

although impressive, were not capable of intelligent thinking but rather able to run through a

series of potential moves and probabilities to determine which move would achieve check mate.

Scientists soon realized these limitations of AI and established a new direction for their AI

programming for gaming applications.

With the goal of creating a program able to perform more complex games in mind,

computer engineers set out to build a program that could compete in "Go". The engineers began

programming for Go, a strategy game which was invented in China 2,500 years ago. Rather than

a defined number of potential moves and the ultimate solution being checkmate, as it is in chess,

the game of Go does not have a defined victory condition that can be programmed. Instead, the

game requires contestants to assess the board and reach consensus that board position has

reached a terminal level and a victor should be crowned; hence set parameters do not exist. In

March 2016, Google brought their newly developed program named AlphaGo to the Go

championship held in Seoul, South Korea. Here AlphaGo went against the greatest players of Go

in recent history including 18 time world champion Lee Sedol (AlphaGo). With a 4-1 win

against Lee Sedol AlphaGo earned the highest professional ranking in the game making it the

first computer to ever achieve this feat(AlphaGo). When experts reviewed the games played by

AlphaGo they noticed that the program was coming up with entirely new ways of approaching a

game (Wong). Hence, not only did the program beat Lee Sedol, but it designed new ways to play

the game indicating the program's ability to learn and think critically to achieve the desired

outcome.

While some AI developers were focused on programming for gaming applications, others were working on creating programs referred to as expert systems. An expert system is defined as "a computer program that uses AI technologies to simulate the judgement and behavior of a human or an organization that has expert knowledge and experience in a particular field" (Rouse). First created in the 1950's to deal with theorem proofs and geometric problems, expert systems were quickly adapted and developed to perform a number of industrial applications through the 1960's and 1970's. These programs included a chemical structure analyzer, medical diagnosis system, and cable management system. In 1972, PROLOG which was designed to handle computational linguistics; which is a program that facilitates human-computer interaction designed to automate a range of linguistic tasks (Lappin). PROLOG caused backlash because these programs were put into action by industries that led to the reduction in employees who's job was to communicate with customers and other busineses (Lappin). Even with this backlash, by the 1980's, nearly fifty percent of the Fortune 500 companies were either developing or maintaining some type of expert system for their company. There was nearly a 30% adoption rate of these expert systems in the early 1980s (Wilson). AI saw an increase in product offerings entering the market in different industries including healthcare, business, and manufacturing. Unfortunately, during the mid-1980's, AI experienced a severe funding and interest decline dubbed the "AI Winter" when interest and funding both hit all-time lows for the first time since the inception of AI. Small advancements were made into the early 1990's as a few companies were betting that AI would be part of the next wave of technologies driving the computer science industry, but businesses involved with the development and programming of AI were unable to capture the interest of investors. It would not be until 1997 when AI programs would be capable of capturing the interest of investors again. With possibly one of the most famous AI programs in

history IBM's Deep Blue challenged and defeated the then world chess champion, Gary

Kasparov (A Brief). This was a major accomplishment for the AI community as many felt AI

would not be capable of being programmed to beat the world champion chess player in their

lifetime. This moment in 1997 is cited as the rebirth of AI, but it went relatively unnoticed by the

general public for over ten years. Venture capitalists at the time, however, did not ignore the

potential that Deep Blue displayed (A Brief). These venture capitalists funded organizations who

were able to make strides in the AI technology that had not been seen in the industry since its

inception in the 1950's.

　　　　With funding coming back into organizations focused on developing AI progress picked

up where it left off with the technology in the hands of companies like Apple and Google. It was

Steve Jobs and his team at Apple that ignited the spark which drove AI to the top of mind for

both business and consumer interest by releasing a new virtual assistant in their iPhone in 2010

(Bosker). Named Siri, the AI program was developed to serve as a tool for iPhone users that

enabled them to perform certain functions of the phone with their voice. Siri was the first virtual

assistant to be offered to the consumer by any phone manufacturer. Being capable of searching

over forty-two web services to identify and return the most relevant answer to your question or

command without ever touching your screen was a revolutionary development for the consumer

tech market (Bosker). What was once considered science fiction in movies like *2001: A Space*

Odyssey was now available to all consumers.

　　　　AI has been continuously transformed and perfected by computer engineers over the past

seventy years to get the technology to where it is presently. What began as programs capable of

only performing a singular task has now become able to achieve multifaceted tasks consistently.

With the help of the pioneers of the industry by setting up aspirational goals for their time

computer engineers were able to achieve far greater accomplishments than just creating

computers to play games. AI now plays a role in many industries as a tool to compliment the

operations of today's businesses causing impacts, both positive and negative. With technology

intertwined in business it has become imperative that AI be considered as the next investment to

realize new opportunities for modern business.

Now In Business

　　　　With AI ability to "think" through complex problems meant AI could provide industries

with programs capable of working though complicated data in order to make discoveries in fields

where prior AI technologies were unable to operate. While there are different ways of classifying

AI, this paper will focus on discussing AI from a business capabilities perspective as opposed to

the technology. The three applications of AI to be examined in business are process automation,

cognitive insights, and cognitive engagement. Understanding AI from a business capabilities

perspective will allow business leaders to assess their individual AI needs to maximize the

impact and efficiency when investing and implementing AI programs into their business

operations.

What Applications of AI are Available to Businesses?

Process Automation

　　　　For business leaders to identify the needs of AI for their company they must understand

the three classifications of AI programs available to businesses today. Gartner defines process

automation as "the automation of complex business processes and functions… that deals with

event-driven, mission-critical, core processes that usually supports an enterprise's knowledge

workers in satisfying the needs of its many constituencies" (Business). In a report from the

Harvard Business Review published in February 2018, researchers studied the various categories

of AI being employed by companies to achieve their business objectives. Of the 152 projects that

they studied, researchers found that nearly fifty percent of the projects included the automation

of digital and physical tasks within a company (Davenport). These include such tasks as

transferring data from email and call center systems to recognizing failures to charge for services

across billing systems by extracting information from multiple document types. The

attractiveness of process automation is because they are the least expensive and easiest to

implement of the three AI applications. Companies who implement process automation into their

business processes provide a good rate of return on their investment. The process automation

programs easily integrate with existing systems that would otherwise cause companies to employ

multiple employees to be able to operate at the same efficiency.

Maximizing efficiencies for companies is important to achieve the greatest return from

existing resources within the business. The U.S. Government, one of the largest employers in the

country, implemented AI into their operations at NASA to achieve just that (Strengthening). As

the government funding of NASA began declining over the past 15 years, they needed to turn to

RPAs to improve their efficiencies and be able to research and explore the aeronautical and

space industries. NASA launched four RPAs in accounts payable and receivable, IT spending,

and human resources (HR). They saw exceptional success with their RPAs focused on HR

applications as the program was capable of completing eighty six percent of transactions without

any human intervention (Davenport). NASA continued to develop new RPAs, including some

which were able to collect and assess data from their testing to help NASA engineers improve

their designs.

Cognitive Insights

Today's companies collect a lot of data and it can be difficult for organizations to detect

patterns or interpret data using more manual processes. This is why cognitive insight was the

second most common project type identified in the study. Harvard Business Review defines

cognitive insights as "programs to detect patterns in vast volumes of data and interpret their

meaning" (Davenport). These cognitive insight can identify and interpret the meaning of data

without human interaction. This not only saves the company on labor, but it also gives the

business a better insight on their data. The cognitive insights provided by AI is very different

than traditional analytics in three core ways (Davenport). The first core difference between the

analytics of the systems is that the machine-driven analytics are much more data intensive and

detailed than a traditional analytics report created by human analysts (Andrews). These cognitive

insights include predicting consumer behavior, identifying frauds in real time, and automating

personalized targeting of digital ads (Artificial). As companies generate reports, they need to be

updated to keep up with industry trends in real time (Ramaswamy). The challenge when these

functions were done manually was the data first needed validated and cleaned in order to be

prepared to be entered into the existing system. These steps are all seamlessly integrated in the

machine learning programs used today by companies like General Electric. In fact, GE has used

this technology to integrate their supplier data which has in return resulted in a savings of $80

million in the first year alone by helping to eliminate redundancies and negotiating contracts that

were managed at the business unit level (Davenport). Cognitive insight programs are a twofold

benefit to businesses as they save the company time and money, but they also provide more

accurate and detailed insights as machine learning is more efficient that data analyzing (Marr).

Cognitive Engagement

The last AI application for businesses are cognitive engagement projects. These projects

accounted for only sixteen percent of the total number of projects in their study. Harvard

Business Review defines cognitive engagement as "programs that engage employees and

customers using natural language processing chatbots, intelligent agents, and machine learning"

(Davenport). Applications of these cognitive engagement technologies include 24/7 customer

service chatlines, product and service recommendation systems, and health treatment

recommendation systems (Davenport). The latter two applications both create a customized plan

for customer/patient that more accurately fulfills their specific needs that the business can then

use to generate the most effective beneficial product/service offering to the customer. Not only

does the customer win because they are receiving a more personalized package offering from the

business that will efficiently and accurately meet their needs, but it also reduces time spent in the

sales cycle, qualifying needs, while also maximizing the value of the package offered to each

customer to increase sales that may have otherwise been missed when handled by humans. Thus

far in the creation and advancement of AI, the end goal is not to eliminate jobs in businesses but

rather to give employees new tools which allow them to focus their attention on value added

tasks within their organization and allow machines to focus on the administrative tasks that

provide little value. As AI continues to develop and assumes greater responsibilities in

organizations we will continue to see a positive impact on the buying process of customers as

they receive a more personalized experience.

What Impacts Will AI Have on Your Business?

Cost Savings From AI

The applications that have been discussed satisfy many tasks within an organization by utilizing machines which can lead to incurred savings by businesses. An example of how AI helped to provide cost savings to a business is seen in the "Moon shot" project launched by the MD Anderson Cancer Center in 2013 (Davenport). This complex project employed the use of IBM's Watson cognitive system to diagnose and recommend treatment plans for certain forms of cancer (Jaklevic). The MD Anderson Cancer Center worked for over five years and spent nearly sixty-two million dollars before putting the ambitious project on hold due to its increasingly expensive project bill for the hospital without using it on a single patient (Davenport). The hospital administrators did see the potential in AI from their work on the moon-shot project and began to work on smaller and more specific projects that were within the reach of the current technology (Jaklevic). These projects included hotel and restaurant recommendations for patients and their families, determining which patients needed help with paying their bills, and addressing staff IT problems. These projects saw much greater success for the hospital as they reported increased patient satisfaction, improved financial performance, and declines in time spent on tedious data entry by hospital care managers (Davenport). Although the hospital faced setbacks on their original project with AI, they changed their perspective and focused on smaller projects that in the end proved to be a profitable shift for their daily operations. In an article written by Darrell West, the potential impacts of AI on our healthcare systems were analyzed (Davenport). Researchers found that significant cost savings could be recognized through programs like e-healthcare. Estimates show that between 10-20% of total healthcare costs in the United States could be eliminated from these new AI programs. In financial terms this would be between $300

and $450 billion dollars by embracing this big data push that AI can help with for our healthcare systems (West).

The benefits of AI programs being used in the U.S. Government were analyzed where researchers down the activities of both federal and state government employees. Researchers looked at government employees' daily tasks to identify ones that were reported as low to medium levels of specialization, and then calculated how much time and money could be saved by the U.S. Government if they were to implement AI to take over these identified tasks. This provides a business with an example of how the U.S. Government implemented programs from all three business segments of AI to achieve a significant ROI through labor and time savings that could also be achieved by other businesses.

To find the financial impact of AI in the U.S. Government researchers needed to classify the daily tasks The breakdown consisted of analyzing annual hours spent on a list of tasks to show which tasks are taking up the majority of their time (Appendix C). Researchers identified the top five categories (Appendix D) and the potential for these tasks to be partially or fully automated. The research team classified tasks on their level of automation potential by reviewing each task to identify if it required specialized knowledge (Lobo). If the task demanded specialized knowledge to be completed this task would be considered an non-automatable task (Viechnicki). However, if researchers deemed a task as automatable they then ranked the task on the level of automation that could be achieved (Lobo). Estimates show government workers spend roughly twenty percent of their time on "supplemental" tasks that they feel are unimportant or tasks they are not interested in (Viechnicki). The company is not only losing time and money in paying wages for its employees to perform these supplemental tasks, but the company also receives lower quality work from employees compared to reports generated by AI. The research found in

Deloitte's report further corroborates this conclusion on the federal and state government level. "Supplemental" tasks, however, are not a clearly defined set of tasks or jobs, but the research team details this overarching label as specific categories used to identify potential tasks within the company to be assessed for automation (Viechnicki). Deloitte researchers found roughly 21% of annual federal employee hours (Appendix E) were spent working on supplemental work. This means there is an opportunity for AI to save 21% of time through the automation of those supplemental tasks which can then either be reinvested back into core tasks or cutting hours to account for this savings in time (Viechnicki).

Once the researchers developed means for classifying the automation potential for the jobs a government employee would perform on a regular basis, the researchers identified three barriers that the government would face if implementing AI into their operations. The three barriers include if a job requires social intelligence, creative intelligence, or perception/manipulation (Viechnicki). They came to these findings from a study conducted by two Oxford economists, which examined the barriers to automation in these areas (Lobo). AI has not yet reached the potential to operate tasks where social intelligence is required without human intervention (West). The social intelligence aspects of a job include creative intelligence which involves the basic human ability to generate ideas and items or thoughts that the mind finds as novel and interesting (Viechnicki). The classification of the automation potential of tasks is important to prevent a business from wasting energy attempting to automate tasks that the technology does not support (Lobo). The last point that the researchers made is the perception and manipulation tasks which use a human's ability to comprehend and interact with the chaotic patterns of real life cannot be programmed into an program with existing AI technology.

With these barriers in mind, Deloitte researchers began to calculate the numbers to show how much labor cost could be saved for the government when implementing AI for some of their roles (Wald). Researchers returned astonishing results given the potential labor time savings from 20-200% by the Federal and State governments (Appendix F) (Viechnicki). For any business, time is often the greatest expense they incur, but with AI, machines can save significant amounts of that time back even with low investments in technology (Wald). The same levels of investment were broken down by annual labor hours and salary savings from AI investment (Appendix G). The labor hour savings from the federal government was between 96.7 million and 1.2 billion hours and from the state 4.3 million to 33.8 million hours by using AI (Viechnicki). From a salary perspective, the federal government realized a savings from $3.3 billion to $41.1 billion and the state $119 million to $931 million through automation (Viechnicki). While not all businesses will be able to see savings in the hundreds of millions like the federal government they can expect similar ratios based on their scale (Viechnicki).

AI and the Displacement of the Labor Force

The previous example included the government leveraging AI to potentially reduce their labor hours being used. By using AI, businesses can perform work autonomously which reduces the need certain positions. However, in most cases researchers have seen that these employees are reassigned within the company to work on previously unavailable tasks (Ramaswamy). Case in point with Associated Press back in 2013 when they realized that during quarterly earnings they could only write on six percent of the earnings reports of the nearly 5,300 publicly held companies (Ramaswamy). They simply did not have enough writers to cover the smaller companies, but the very acutely timed demand did not warrant the hiring of more full-time

writers either, so the company turned to AI to help them (Liyakasa). Just two short years later

and the Associated Press was able to develop a software that now allows them to cover nearly

3700 earnings reports, or twelve times what they were capable of covering just two years earlier

by their business reporters (Liyakasa). No one was replaced by a machine but instead AI allowed

the reporters to write more in-depth stories with their newly recovered time from the AI program

(Ramaswamy). Not only is AI capable of saving companies time and money when incorporated

in their business processes, but AI is capable of increasing productivity as shown in the

Associated Press case.

　　　Using AI to save labor costs is only one way that AI will reduce costs and help expand

businesses. Current applications of AI are most commonly applied in machine to machine

interface settings rather than people displacement. AI helps businesses free up existing resources

which can be reallocated back into the business enabling employees to focus on other tasks

within the company rather than being released. However, the expectation of business leaders

regarding AI reducing their labor force tells a more conflicting story. In a global survey of 3,076

business executives conducted by the Sloan Review at MIT, 47% of them expected AI to reduce

their organization's workforce in the next five years (Ransbotham). Yet a gulf opens when we

consider the respondents' positions in their organizations. Lower-level operational and clerical

workers are most concerned that layoffs are imminent, perhaps because these workers are less

able to influence the course of events and thus feel particularly exposed. Chief executives are

among those least convinced AI adoption will result in more overall job loss. Only 38% of

surveyed CEOs expect workforce reductions due to AI (Ransbotham). When NASA reviewed

seventy-one projects that they used AI and found only a handful of those seventy-one projects

resulted in a reduction of headcount within the organization (Lobo). There is research conducted

by the Harvard Business Review affirming businesses are not looking to remove employees from

their companies by utilizing AI, but rather are focused on using these programs as tools to assist

their employees (Wilson). In their research involving 1500 companies, they found that

companies are able to achieve greater performance improvements when humans and machines

are working together (Wilson). In order to fully take advantage of this collaboration, companies

need to understand "how humans can most effectively augment machines, how machines can

enhance what humans do best, and how to redesign business processes to support the

partnership" (Wilson). When businesses follow these guidelines of effectively integrating

machines and humans in their business they not only realize the full potential of AI, but they will

also maximize the ROI from AI.

Business Executives Unanimously Agree that AI Will Transform their Company

To understand what impact AI is having on businesses it is important to analyze what

stance business leaders are taking regarding AI. According to the Harvard Business Review,

their survey of 250 executives familiar with their company's use of cognitive technologies

showed that 75% of them believe that AI will substantially transform their companies within the

next three years (Davenport). The implications of this survey show that business executives feel

the potential impacts of AI in their own businesses will provide measurable gains. However,

companies need to be wary that they do not chase unrealistic goals with the implementation of

AI when incorporating it into their business functions. In looking back at the MD Anderson

Cancer Center's moon-shot program which expended valuable time and money and still did not

produce a return on investment, other companies could easily face the same obstacles. If research

is not completed and a well thought out plan developed for building their AI programs to meet

their individual needs then they too could experience similar failures.

In industries dealing with such large amounts of data they can easily utilize AI to create

instant business value for their business. It is important for business leaders to identify priority

business outcomes to ensure that they remain grounded to the value contributions that AI can

realistically make for them. Business leaders already believe that AI is going to be a key to

transforming business areas, and more specifically a material impact in several areas within their

business. These include the top 5, enhancing features, functions and performance of products,

optimizing business operations, freeing up workers to be more creative, allowing employees to

make better decisions and creating new products (Appendix A). Gartner's CEO and Senior

Business Executive survey captured responses from four hundred and sixty qualified business

leaders from organizations with annual revenue of more than $50 million (Appendix

B)(Andrews). These business leaders all agreed that in a number of categories, AI will dominate

the space for years to come in adding value to a business at a greater capacity compared to trend

technologies such as cloud-based API platforms. The fact that on average 41% of the business

executives surveyed feel that AI will be able to provide significant value to their businesses now

and in the future is a trend that cannot be ignored by businesses when looking into the impacts

that AI can have on growing their business to new heights (Andrews).

The range of AI applications that companies are employing in both their business

practices as well as their products range from spam filters that are used in our emailing systems

today to multi-layered AI programs such as dynamic price optimization based on machine

learning (Artificial). As these programs have evolved and business leaders have found ways to

create programs tailored to their needs there has been an explosion in the business world of

business processes and decisions that are either partially or fully controlled by these cognitive

thinking machines. As discussed earlier the MD Anderson Cancer Center utilizes many different

programs to control small but important processes within the cancer center that have resulted in

measured impacts for their business.

Business management can now make decisions from automated insights generated by AI,

e-commerce teams can make product recommendations and predictions without ever having to

look at market trends from their AI programs, and marketing teams can push out a level of

personalized ads and news content to potential customers that was previously viewed as

unachievable due to the sheer cost in researching each customer profile individually (Artificial).

These examples are just the tip of the iceberg when it comes to examining just how large of an

impact that the application of AI programs has had on businesses and consumers across the

globe. Companies like Apple, Walmart, Microsoft, IMB, and Amazon are at the forefront of AI

research and are also respected within their industries. They saw the potential in AI not only as a

means for a computer to beat a human at a board game but as a means to improve processes,

delegate tasks, and optimize their resources. Even so, there are still many obstacles that AI needs

to overcome before we will see the next technological breakthroughs in what AI could possibly

do for businesses and consumers.

What Limitations Will Businesses Face With AI?

When it comes to AI, there are a number of known factors that will limit its potential for

some companies to implement this technology. It is not only important to understand these

limitations, but also to identify these limitations so that obstacle can be overcome and that the

implementation of the AI technology can be done smoothly. First, let us look at the program

limitations as the AI technology still continues to evolve. One of the biggest complications with

the development of AI programs is the lack of general protocol and infrastructure uniting efforts

for all programmers who are building these programs to solve specific problems for companies.

These systems are often developed to meet very specific needs for a company which means that

the resources and efforts are not unified to work towards a common goal. The autonomous

driving industry is one such example of a specifically developed program with a lack of unity

towards a common goal. The technology for autonomous driving currently exists, but the data

required for these systems to operate are the weakest link (Mims). Autonomous vehicles require

ultra-detailed maps in order to safely operate on the roadways with other vehicles and obstacles.

The issue that companies are running in to is the amount of time and resources that it takes for

each company to individually gather information about the same roads for their vehicles to travel

on. This means that each company developing autonomous driving technologies is tasked with

mapping every road rather than working together to incorporate their work together. Not only

would this reduce the amount of time and resources needed to provide the data to autonomous

vehicles that will allow them to safely operate the roads. According to industry experts a

collective database from automotive partners would provide real-time updates and condition

changes needed in autonomous vehicles to improve their safety (Mims). These partnerships in

the autonomous vehicle industry are just one example of how AI technologies are being held

back from progress. As companies come together to work towards a common goal of developing

and progressing AI technologies new opportunities will become available in the industry. Until

companies can combine their efforts to develop AI systems for the greater good of society as

well as for their businesses, improvements in the AI technology will be gradual.

Potential Risk When AI Malfunctions

AI plays many roles in larger companies who have effectively developed the programs necessary to assume daily tasks that require medium to low specialized skill levels, but what about roles that require highly skilled labor or have the potential for legal liability for a company? For a company to expose themselves to such a significant potential risk would be not only foolish but potentially disastrous for the company's reputation and financial stability. One of the best examples for an AI intelligence program to cause a company legal liability is the expert systems put in place by Facebook. These AI programs were to record and analyze users' social interactions, advertisement preferences, and location check-ins to build specialized and personalized ad preferences for each users account that would effectively recommend specific advertisements based on the machine's learned understanding of that user's preferences. What was the problem with Facebook's AI machine? The expert system began to take a turn as it evolved and learned more about potential exclusion opportunities to attempt to maximize the effectiveness of the exclusionary marketing tactics that it was programmed to perform. Unfortunately, at the time, there was close oversight actions taken by Facebook. An investigative journalism non-profit entity named ProPublica began investigating the machine's exclusionary actions and they found that the program was sending housing advertisements based on these profiles to users which was outlawed in 1968 by the Federal Fair Housing Act. This became a very big thorn in the side of Facebook as this not only caused immediate ripple effects to their perception by users. It also meant that countless amounts of time and money needed to be spent immediately to resolve this issue to prevent further bad press or even legal action to be taken against the company. Facebook had to spend a lot of time and money to resolve this issue to prevent negative press and public opinion and to avoid legal action. Expert systems, like the one

Facebook used, can be an effective tool for businesses, but can also be costly to fix if the system does not operate as planned resulting in costly legal liabilities.

With legal liabilities accounted for businesses must also consider the potential risk of hackers breaking into their systems. As with any technology a business is using there is a potential for the systems to be broken into leaving the business exposed. Due to AI utilizing computers to operate, these systems are more powerful and focused for attackers to use with malicious intent (Auchard). According to a study conducted by researcher from Oxford and Yale there "are plausible developments within the next five years of highly efficient attacks" (Auchard). These systems allow businesses to combine multiple operations and tasks into a single system within the AI programs to efficiently work (Auchard). Researchers also spoke to "the power of AI to generate synthetic images, text and auto to impersonate others online, in order to sway public opinion" as a means for authoritarian regimes to deploy using AI technologies in place (Auchard). Hackers utilizing AI in their attacks are "considered a powerful force for unlocking all manner of technical possibilities" (Auchard). The research team "agree there are a lot of positive applications of AI, but there is a gap in the literature around the issue of malicious use" (Auchard). Researchers and other industry experts have called upon government intervention to establish policy and regulation on AI technologies to collaboratively defuse these dangers for businesses and society (Auchard). As with any online technology there is a potential for hackers to impose a threat on these systems, but this should not impede a business from considering AI technologies.

The limitations of AI in businesses discussed highlights some of the main obstacles a company might face when implementing AI technology into their operations. As with any new system, there will be challenges to overcome until all systems come online, employees are

trained and have used the system successfully. Although there are limitations that business will

face with these new systems, the future of AI promises improvements on current AI programs as

well as new opportunities to businesses.

What Future Opportunities Can Businesses Expect in AI?

There are still opportunities for AI technology to advance and provide impact to business

operations. Areas in which AI can have an impact include, self-learning enterprises. The current

challenge that businesses are having with operating a cognitive learning machine to analyze their

big data storage systems is that this data is sometimes not blended properly between systems to

ensure reliable outputs.

Better Integration of AI Systems Results in Greater Insights

Businesses are currently working towards better integrating these systems into a silo

approach which gives the machine a more reliable data foundation to provide accurate insights

into the data a business needs. In an interview with the vice president of marketing at Reltio, he

said that "in the long term he sees enterprises moving towards these self-learning enterprises,

which requires making sense of the output from machine learning and advanced analytics and

closing the loop between insight, action, and outcomes" (Roe). By achieving this elevated level

of operational aptitude from machine learning "a continuous feed of reliable data, relevant

insights and recommended actions generated from AI/Machine Learning provide additional

value to have a closed loop where users can contribute to data reliability, and improvement of

business processes and customer experiences" (Roe).

Current applications of AI focus on data and enterprise development, but some feel that AI could have more human-like abilities. Servin Khodabandeh of the Boston Consulting Group is one of the individuals who feel that AI could be used to predict things like success rates of human relationships, trustworthiness, and other qualities that would otherwise be handled by a human through their own personal experiences. One major benefit to machines gaining this ability is that they would not be limited to a small number of personal experiences like that of a human but rather it would be able to tap into a database of knowledge and experiences to better optimize its success rate (Artificial).

AI will Assist with Hiring Employees

Specific applications of this improved relational capabilities in machines could assist businesses with deciding the best candidates for specific roles, which would shift the human resources department role to a more administratively focused position within a company. Research shows that "facial and vocal analyzers could provide essential mood information for companies, helping to further optimize business decisions. One example where emotion recognition can benefit companies is in customer service" (Roe). AI technology start ups are focusing their attention on segments of personalization of AI such as superior user experience, proprietary data access, or the ability to establish feedback loops so more and more can be learned about everyone would be best positioned to attract the most venture capital funding for AI businesses.

AI Will Continue to Turn Big Data into Insights for Businesses

While there are a number of opportunities for AI to wow consumers with these improvements there are just as many opportunities for AI to assist businesses behind the scenes to improve their day to day "number crunching and data wrangling" (Roe). Currently, businesses and its employees are being overrun by the age of big data as they rush to analyze and extract all the pertinent information that they can possibly find. That is where AI can make its largest impact in the next five to ten years as it continues to assume greater responsibility as well as moves from being considered an advanced system for a business to a normal part of business operations to utilize and operate (Roe). This will open opportunities for employees to assume new tasks and roles as they continue to be able to hand off more administrative and low skill tasks to AI systems.

This newly found time at work can now be allocated to focusing on strategy for the business rather than on things like manual data extractions that is currently being asked of employees who do not have AI programs in place. Current trends in Silicon Valley show a great number of startups that are focusing on the potentials of AI through new approaches to improve IT performance and efficiencies (Roe). These start-up companies are working to use machine learning, neural networks, and data mining technologies to proactively identify and predict problems, understand the cause and scope of anomalies, and recommend solutions, with the end goal being completely self-healing IT structures (Roe). By creating a self-sufficient network for IT systems, companies like Google and Amazon would be able to reallocate the resources from their IT department to other tasks or challenges that they want to accomplish that otherwise would have been out of their reach.

AI Will Provide Customers More Effective Customer Service

The next big opportunity in AI's future for business applications will come from the customer experience side of the business. Companies spend tremendous amounts of time and energy to create the best experience for their customers as they interact with a brand, but at times the interaction may fail to meet the customer's expectations. In looking at customer support bot technology, "bots free your teams to move higher up the value chain and unleash their star power" (Roe). As a result, companies would likely see an increase of the speed in which the customer experience team would be able to resolve issues. While this can offer a business tangible metrics, the value of the customer experience needs to be a top priority in driving this strategy.

AI Is User Friendly for All Education Levels

AI will "lower the bar for both access to data and the ease of interaction with that data" (Roe). Businesses could be automated to mine data and extract the insights that they need to find, but if the employees are not properly educated and trained to maximize the potential of this automation then it is a waste of resources for the company. Companies need to invest in data scientist roles to work across the organization to educate users about the available solutions, the value of data-driven decision making, and how to change traditional workflows to take advantage of the new capability (Roe). Complete automation of this role by AI technology is still years away, but the capabilities to extract the same information with the help of AI technology is available with the current technology.

These are near term advancements in AI, that will be available in the next three to five years, but what about longer term expectations for innovation with AI? AI is expected to reach new milestones faster than previously believed possible with the current pace of improvements

within the technology. It is projected that by 2026 AI will be better equipped to write a high

school essay than a human, drive a truck by 2027, and by 2031 it will be able to operate within

the retail space (West). Current projection models show that AI will have advanced so far by

2053 that it will be performing surgeries (West).

Conclusion

The ability to customize and tailor AI programs to business needs, improve efficiencies,

impact on labor costs through automation and be able to reach data driven conclusions are

reasons why an organization should implement AI. Researchers continue to develop automated

processes, cognitive insight and cognitive engagement in AI and the expectation of the future is

that AI will enable businesses to better integrate existing systems, assist with hiring, continue to

turn big data into insights, provide customers with more effective customer service and will

become more user friendly. It is important to invest in AI technology because you will start

realizing the savings by using AI and gain the expertise by using the technology on a day to day

basis which will allow an organization to better understand their needs and tailor the AI

technology to be aligned with the organization's needs. Based on the research from this paper,

the expectation is an organization can realize at least a 15-20% savings through automation

(McKenzie). Four out of five CEOs surveyed felt AI would make material changes to their

business in the next 2-3 years (Gartner). Ai is expected to 41% of business executives surveyed

AI will dominate the space for years to come in adding value to business (Gartner). There is a

strong history for AI, evidence of significant cost savings and value AI will add to your

organization as well as future developments that can only improve the technology currently

available. Business leaders need to commit to AI in order to stay competitive in the marketplace

because if an organization does not make a commitment, their competitors will be doing so and gaining the AI advantage.

Limitations Incurred During Research

During my research into AI, I ran into a number of limitations that impacted by research. There was a lot of current research on AI that with so many different individuals and groups sharing their research and opinions, there were conflicting ideas and interests in how this technology should be and could be used.

Once I was able to validate the credibility of the research, the goal was to provide context to my readers who would be interested in the financial impacts that AI would have on their business. Unfortunately, most companies who have untaken AI project implementation are not forthcoming with the amount they spent or how much they are saving as a result of the AI technology implementation. It was not until I came across a research article published by Deloitte that my research uncovered the impact that AI technology implementation had on federal and state governments in the US that I was able to provide numbers for businesses, so they could see potential cost/savings impacts from investments in AI. I believe these numbers to prove to be an invaluable part of my research. When it comes to business you need to be able to provide numbers to leadership in order to show a proof of concept of a project within businesses before there will be any action taken.

Lastly, a number of sources that had detailed information and data concerning AI could not be used because of the significant bias in the articles. When looking at AI, there are very strong feelings about how this technology will impact the overall work force and economy, so it is

reasonable to expect that people will use their research as a means to influence their audience's

impressions on the technology.

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Appendix

Appendix A

PERCENTAGE OF EXECUTIVES WHO CITE THE FOLLOWING AS BENEFITS OF AI

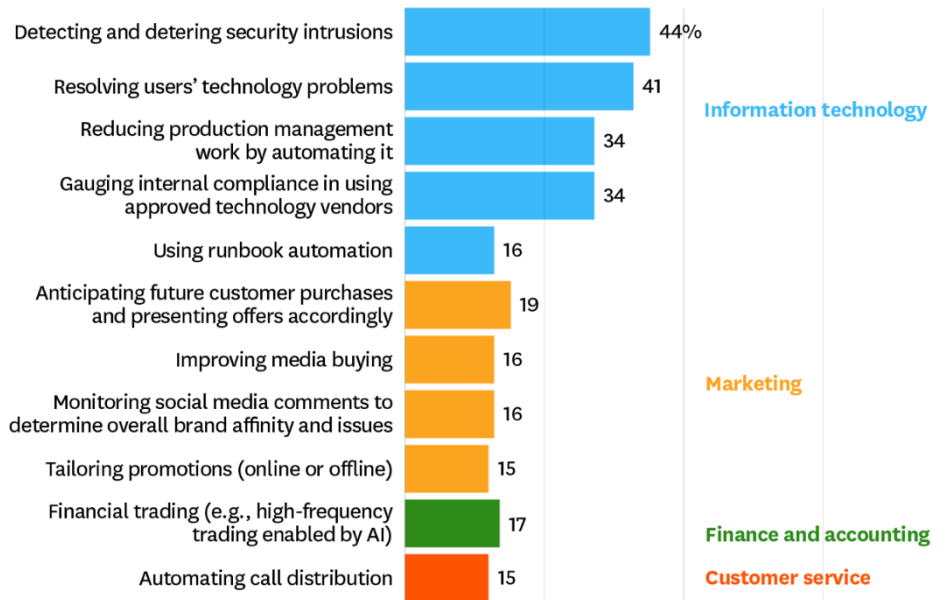|	
Enhance the features, functions, and performance of our products	51%
Optimize internal business operations	36
Free up workers to be more creative by automating tasks	36
Make better decisions	35
Create new products	32
Optimize external processes like marketing and sales	30
Pursue new markets	25
Capture and apply scarce knowledge where needed	25
Reduce head count through automation	22

SOURCE DELOITTE 2017
FROM "ARTIFICIAL INTELLIGENCE FOR THE REAL WORLD,"
BY THOMAS H. DAVENPORT AND RAJEEV RONANKI, JANUARY–FEBRUARY 2018   © HBR.ORG

Appendix B

How Companies Around the World Are Using Artificial Intelligence
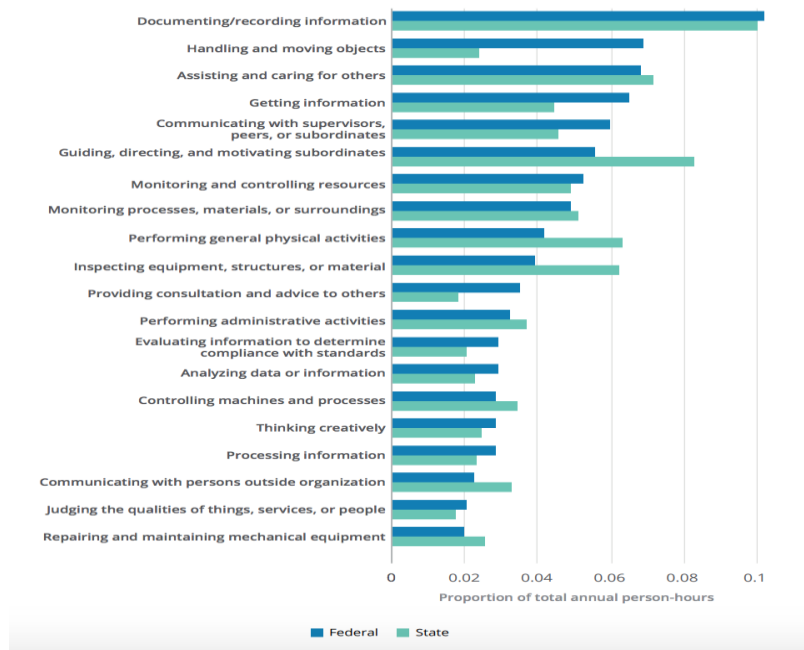
IT activities are the most popular.

Activity	Value
Detecting and detering security intrusions	44%
Resolving users' technology problems	41
Reducing production management work by automating it	34
Gauging internal compliance in using approved technology vendors	34
Using runbook automation	16
Anticipating future customer purchases and presenting offers accordingly	19
Improving media buying	16
Monitoring social media comments to determine overall brand affinity and issues	16
Tailoring promotions (online or offline)	15
Financial trading (e.g., high-frequency trading enabled by AI)	17
Automating call distribution	15

Information technology

Marketing

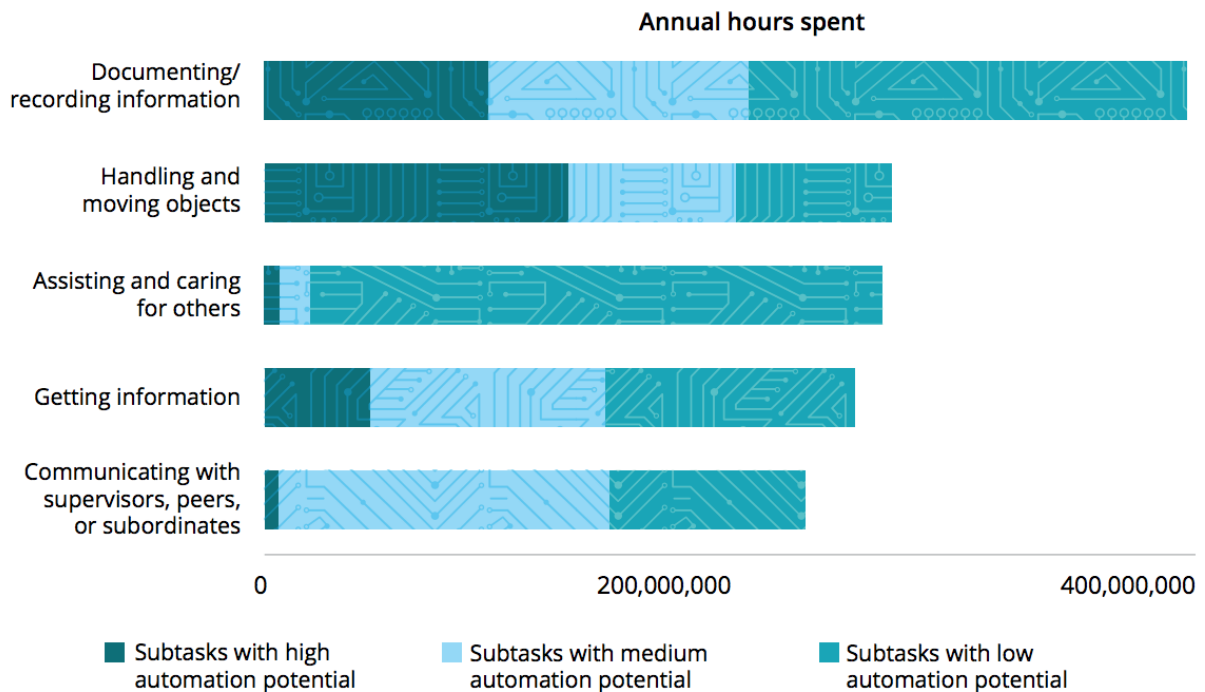**Finance and accounting**

Customer service

SOURCE TATA CONSULTANCY SERVICES SURVEY OF 835 COMPANIES, 2017
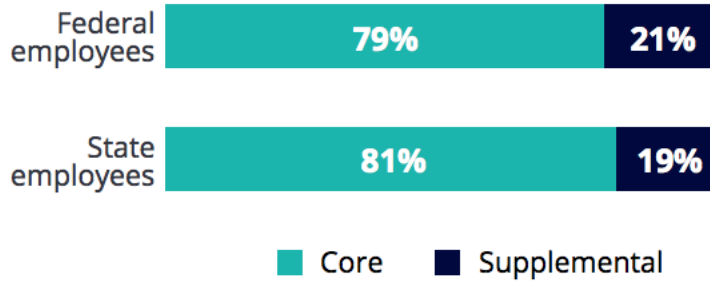
© HBR.ORG

Appendix C

Appendix D

Source: Deloitte analysis of OPM Fedscope and DOL O*NET data.

Appendix E

Federal employees spend 21 percent of annual hours on noncore work, against 19 percent for Midwestern state workers

	Core	Supplemental
Federal employees	79%	21%
State employees	81%	19%

Source: Deloitte analysis of O*NET and federal and state workforce data.

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Appendix F

Level of investment	Base mean for simulation	How value was chosen
Low	Task labor inputs decline on average by 20%	Low-end threshold of time savings for process automation
Medium	Task labor inputs decline on average by 100%	100% approximates average percent time saved on back-office functions through robotic process automation projects
High	Task labor inputs decline on average by 200%	200% approximates the savings in testing time for silicon wafer circuits at Army Research Labs (see page sidebar "Automating middle-skill tasks to speed up testing"); reflects the higher end of time savings

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Appendix G

Level of investment	Savings category	Federal	State government
Low	Annual person-hours	96.7 million	4.3 million
	Hours as percentage of total	2.23%	3.94%
	Salary	$3.3 billion	$119 million
Medium	Annual person-hours	634 million	15.3 million
	Hours as percentage of total	14.63%	13.93%
	Salary	$21.6 billion	$420 million
High	Annual person-hours	1.2 billion	33.8 million
	Hours as percentage of total	27.86%	30.84%
	Salary	$41.1 billion	$931 million

Source: Deloitte simulation of likely changes to labor inputs to government tasks.