

## How is Machine Learning going to Impact Decision Making and Organizational Strategy

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### Abstract

*Machine learning has taken over every aspect of business be it production, marketing, finance or HR. This paper looks at how this technology has been utilized in various organizations and the benefits it has provided like predictive KPIs (key performance indicators), marketing and customer service enhancements, predictive maintenance, and many more. We also look at various issues involving successful implementation of machine learning in organizations including human capital concerns, privacy concerns, etc. There are different companies that have leveraged Machine Learning and Artificial Intelligence to their advantage. Tech companies have been very aggressive in their digitalization approach and have even been actively investing in startups to become more machine learning ready. . They are taking big bets, and developing next generation products using AI and ML to increase customer insight and thereby customer experience through enhanced offerings. On the other hand, non tech companies are also resorting to extensive adoption in machine learning and artificial intelligence in order to streamline their business operations and to increase and enhance their product and service offerings. They are doing this more cautiously, and mainly focus on their main markets and sectors. They keenly follow the innovations and potential disruptions to remain competitive. They follow the route of in house development and new product technology testing. They also selectively invest in start-ups or establish partnerships with tech companies, and use machine learning services from them. ML is helping in making the world a better place to live in. In its own dynamic way it is contributing to resource utilization and environment preservation. The use of ML in Uber has helped the individuals and the environment is far reaching with services like ride share , thus reducing the number of cars on the road at a given time and also by recommending best route to the driver and thus saving on fuel and money. Therefore, not only ML is helping transform organizations but also the society.*

**Keywords:**Machine learning, Artificial Intelligence, Organization, Key Performance Indicators, Predictive Maintenance, Digitalization, Uber, environment, technology adoption, human capital, privacy, customer experience, marketing

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## **Introduction**

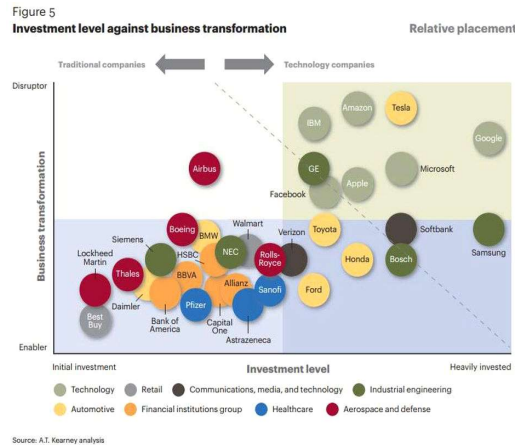
### **Machine Learning - Extent of Adoption**

In this era of digital revolution, a successful digital transformation will require visionary leadership, with management executives who deploy cognitive technology as part of their strategic efforts. These companies will need to be driven by a strong corporate culture of innovation, with their top leaders continuously supporting R&D and in-house venture capital units. The companies will have large and growing storehouses of data, advanced algorithms and large-scale processing capabilities, and more importantly an entrepreneurial spirit to make machine learning (ML) productive for them.

The extent of adoption of new and smart technologies is different for different companies and sectors. For tech companies, speed is an imperative where they take risks, fail, and then move on to the next investment or product iteration. Amazon, Apple, Google, Tesla, and Microsoft are leading the tech industry sector by a wide margin in machine learning and artificial intelligence (AI) investments. They are taking big bets, and developing next generation products using AI and ML to increase customer insight and thereby customer experience through enhanced offerings. In their quest to do so, they have been scouting for technology disruptors and start-ups with innovative offerings. For e.g. Google has acquired machine-learning start-up Halli Labs and computer vision specialist AIMatter. Amazon has acquired AI innovators, including cybersecurity firm Harvest AI and photo-recognition company Orbeus. They are always at the forefront of innovation and are spreading their investments in machine learning and AI across sectors, coming up with a wide array of innovative products and services. Their in-house R&D is complimented by acquisitions and they also have open innovation models wherein they collaborate with outside developers, universities and research labs.

In other non-tech industries, companies are more cautious, and mainly focus on their main markets and sectors. They keenly follow the innovations and potential disruptions to remain competitive. They follow the route of in house development and new product technology testing. They also selectively invest in start-ups or establish partnerships with tech companies, and use machine learning services from them. This is a mutually beneficial relationship wherein tech companies provide their AI-ML and computing expertise while the traditional company provides vast data warehouses across customer segments and manufacturing knowhow. For e.g. Traditional industrial companies like GE and Ford have understood the value of

cognitive technologies in bringing about digital transformation of their core businesses. They are using AI and ML not only to make new products but to deliver better value-added digital services. These non-tech disruptors, for e.g. automobile companies like BMW, Ford, Honda, Tesla, and Toyota are using AI-ML to not only develop new products but also to enhance their business models and service offerings. General Motors for instance is exploring the ride sharing services market with their self driving cars. Many other industry giants like Bosch, GE and Samsung are investing heavily in machine learning, IoT and cloud services to bring about their digital transformation. These new technologies are creating new products and service offerings, transforming organizations, industries and markets, and bringing down geographical and scalability barriers. AI-ML technology still in its early stages is reducing the cost of entry even for smaller players and positioning them in front of large market players as opponents with more agile capabilities. Companies across industries are utilizing this machine learning with human reasoning capability and inexhaustible processing capacity to automate a gamut of processes.[1]



Organizations are gaining a competitive advantage in their industry by using machine learning to enhance KPI-driven decision-making. Machine learning is making KPIs more predictive and prescriptive instead of the traditional historic reporting approach by bringing forth the hidden variables that project key performance. This futuristic reporting enables strategic leaders to leverage strategic key performance measures as building blocks for machine-learning algorithms to optimize business processes. This approach of using KPIs as inputs fed into algorithms for ML is opposed to the traditional approach of using KPIs as outputs and more goal oriented.[2]

This adoption of disruptive technology like Machine Learning does not mean a mere purchase of the software and implementing the system. It means a complete overhaul of process and reorganization around AI to keep pace with this fast evolving technology, and garner the benefits of this transformational technology. See

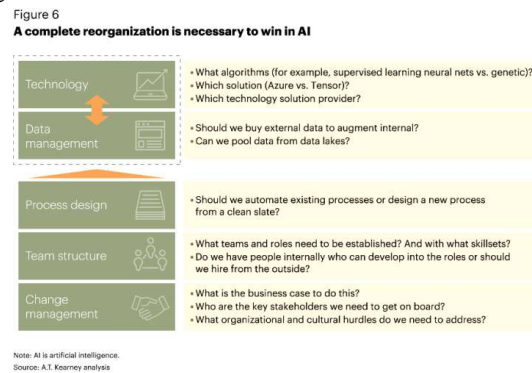


diagram below:

### **Robots vs.Humans**

For the past several decades (at least), we've heard about the looming threat of technological advancements leading to unemployment. This was a widespread fear when computers started being adopted in a big way. However, the last couple of decades have shown that computerization led to the growth of several new industries like Software Development, Information Technology and others, leading to creation of a huge number of new jobs, and offering new, better opportunities to young talent. Similarly, AI-ML is finding its way into an ever-increasing number of domains, once again raising fears of disruption in the employment landscape.

Additionally, according to McKinsey study, the more technical the work, more it is apt candidate for automation and technology can accomplish it better i.e. machines are more of tactical applications. On the other hand, work that requires a high degree of imagination, creative analysis, and strategic thinking and is more difficult to automate requires human understanding. That is, - "Humans Are Strategic; Machines Are Tactical".[3] As per McKinsey, activities requiring managing and developing people have 9% automation potential while activities requiring expertise to decision making, planning, or creative work have 18% automation potential approximately.

Every industrial revolution involves displacement and adjustment of the workforce, not just replacement, and this newest cycle is no exception. Venture

capitalist Bruce Gibney explains “Jobs may not seem like ‘existential’ problems, but they are: When people cannot support themselves with work at all — let alone with work they find meaningful — they clamour for sharp changes”

Strategic leadership in machine learning will allay these fears of workforce with new job offerings that utilize their higher levels of learning and expertise. New job opportunities in the fields of big data analysis, decision support analysts, remote-control vehicle operators, customer experience experts, personalized preventative health helpers, and online chaperones, managing online risks such as identify theft, reputational damage, social media bullying and harassment, and internet fraud are providing a brand new domain requiring humane skills. This will be part of a transformed human resource development agenda to bring forth the innate workforce capabilities which the machines lack.

According to Jerry Kaplan[4], Fellow and Visiting Lecturer, Dept. of Computer Science, Stanford University, many executives spend most of their time doing mundane repetitive tasks, like reviewing lab test results, drafting simple contracts, filling out paperwork, etc. If the job involves a narrow, well-defined set of tasks which can be easily automated by AI-ML, then that is at risk. But jobs having broader responsibilities involving human touch — expressing sympathy or providing companionship, basically the humane and intrinsic value, then it’s not a generic automation. As Wise, the roboticist, stressed “We can choose to use AI and other emerging technologies to replace human work, or we can choose to use them to augment it.”

### **Machine Learning and Customer Privacy**

Many consumer privacy issues abound in this age of data boom like there are issues with the data gleaned by smart speaker devices like Amazon Echo and Google Home. The former has been known to record personal conversations of users which is an invasion of privacy. Some would argue so, but others would say when you buy a device like that and install it in your home that you are agreeing to terms of service which nullifies a right to privacy. Biometric security offers another case in point: Is it reasonable to ask an employee for their fingerprints or is that too an invasion of privacy?[5]

To what extent can a vendor of technology services to a hospital use the patient data to develop more effective services? Should a cloud provider be entitled to access data it does not own to enhance its offerings? With the right level of openness, cooperation and creativity it should be possible to enable those vendors to use their insights from the provision of the services and still retain their role as

processors. The key thing to remember here is that the legitimate interests ground places the onus on those wishing to exploit the data to show that no matter how clever and useful the outcome of that exploitation, it must not place an intolerable burden on people's right to privacy.[6]

Although many companies have adopted AI and ML (for example, 82 percent of senior executives say they plan to implement AI-related technologies by 2020), many potential customers still have substantial fears. Nearly two thirds (63 percent) of respondents in the consumer study worry that AI will make decisions that will impact their lives without their knowledge. Moreover, 58 percent of people surveyed do not feel comfortable with companies using AI to access their data to personalize and improve their experiences with a brand.[7]

"AI is a game-changer to improve the customer experience, yet real challenges remain regarding trust and privacy," said Sanjay Srivastava, chief digital officer, Genpact. "To encourage adoption, the key is to have visibility into AI decisions, and be able to track and explain the logic behind them. Companies need to break through the 'black box' to drive better insights for their business and give consumers the assurance they need." Even with explosive growth of home digital assistants, chatbots, smart sensors, etc., consumers still perceive they have little contact with AI. Less than half of those surveyed say they interact with some form of AI regularly (i.e., once a week or more). In addition, two in five (41 percent) believe that AI has made no difference to their lives. Gen X are more amenable to AI and ML interactions. They are twice as more likely than older people surveyed to say AI is making their lives better. Younger generations also don't need the human touch quite as much: Only one third of Gen-Z and millennials strongly agree that they prefer human interaction rather than AI, compared to 57 percent of baby boomers leading us to believe privacy could be a generational and demographic issue.

The world is exploding with these transformational technologies that have capability to take your business s and organization to a whole new elevated level, changing the traditional processes and decision making. With a host of tools and technologies at their command, business leaders are on several crossroads:

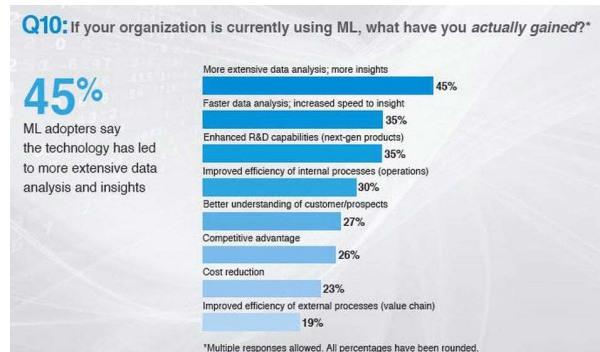
- Which ML tool to utilize,
- which processes to automate,
- whether to overhaul the entire systems, completely reorganize the business processes and organization around these automations
- how to better align employee goals with the organizational goals,
- how to enhance the current product portfolio,

- how to expand the product and service offerings, bringing complete digital transformation and overhauling the value offering
- how to best manage the customer insights derived by the ML algorithms
- Machine Learning is a powerful tool that can help address many of these areas, and play a key role in strategic decision making

The AI and machine learning market is predicted to be a \$100 billion industry by 2025. [8] Companies are continuously developing new ML solutions in order to stay competitive. For example, an AI-ML powered job search feature was launched by Google on its search results page. Companies are increasingly leveraging AI-ML in various areas like automating marketing tasks such as email marketing and lead management, customer service using Chatbots, fraud detection using machine learning predictions. Machine learning is getting widespread implementation with 60% of US companies at varying stages of adoption. Almost 45% ML adopters find the technology providing extensive data analysis & insights.

### Importance of Machine Learning in Current Context

Based on analysis of large amounts of past data, AI- ML will be able to understand the key drivers in customer behaviours and decision making, and predict future outcomes more accurately. It can also provide us some lead indicators to make interventions for modifying potential outcomes. Further, 35% organizations had faster data analysis and increased the speed of insight, delivering greater accuracy to their organizations. 35% of these organizations said that machine learning improved their R&D capabilities for future products.[9] (please see the chart below). Thus, AI and ML will provide new insights about market dynamics and decision making thereby assisting companies to change their organizational strategy for improved performance.



SOURCE: GOOGLE & MIT TECHNOLOGY REVIEW STUDY: MACHINE LEARNING: THE NEW PROVING GROUND FOR COMPETITIVE ADVANTAGE

According to **Harvard Business Review** [10] , there are different ways in which Machine Learning is creating value in companies:

- **Marketing and Customer service enhancements:** Machine Learning is improving customer centric data and insights by utilizing historical customer service data, natural language processing, and algorithms that continuously learn from interactions. Nowadays, customers can ask questions and get high-quality answers and almost 44% of U.S. consumers are talking to chatbots. Now organizations have host of customer insights using ML at their disposal including customer reactions and behaviour, transactions, and social sentiment data to identify customers who are at high risk of leaving and with profitability data, the companies can strategize how best to retain those customers and enhance their experience. ML can be used to predict shelf planning and aid in retail management providing insights for sales promotion activities based on previous buying patterns.
- **Human Resource:** ML software can quickly shortlist through thousands of job applications who have the right credentials that are most likely to achieve success at the company based on the criteria for the algorithm thereby undermining the human bias
- **Finance:** With AI and ML, invoices can be matched faster reducing the data processing and outsourcing work and costs and enabling the employees to focus on strategic tasks. In addition, machine learning algorithms can use pattern recognition to spot anomalies, exceptions, and outliers and detect and prevent fraudulent transactions in real time. This is both predictive and preventive.
- **Predictive maintenance:** In manufacturing, machine learning can detect anomalies in processes and machines and trigger preventive maintenance requests, thereby saving huge amount of money and time. Also, using ML technology, drones equipped with cameras can perform regular inspections of areas and structures and installations which are hazardous or previously inaccessible by humans.

However, if there are opportunities, there are barriers also to ML, like availability of large quantities of high quality data that can be used to train algorithms, cultural barriers, employees' opposition, as well customer data access and privacy, among others.

Thus, machine learning and artificial intelligence are seeing a widespread adoption across businesses and sectors and processes bringing about complete digital transformation. It is imperative for organizations to understand and plan how to apply this in their organization. This highlights the importance of carefully weighing



the pros and cons of machine learning and its impact on leadership and decision making.

### **Corporate World is taking to ML**

HBR article on Augmented Reality talked about next gen technologies as one of the most important waves of innovation. It introduces concept of upskilling technologies which are a partnership between humans and smart machines that can augment workers' abilities, resulting in highly improved performance, greater safety, and higher worker satisfaction. For e.g. the industrial use of augmented reality (AR) smart glasses in manufacturing, warehousing, and field service environments are now being used in manufacturing and industrial settings and can boost workers' productivity. These technologies increase productivity by making workers more skilled and efficient yielding potential for economic growth and better jobs.[8] With growing fears in employees of machines replacing human workers, several companies have demonstrated that these smart technologies can be economic drivers helping workers perform more efficiently resulting in higher wages. For e.g. General Electric and other industrial firms have shown that combinations of humans and machines outperform either working alone. Wearable augmented reality devices are especially powerful, as they deliver the right information at the right moment and in the ideal format.

Another article for Datamining discusses that the cycle of innovation depends on data, metadata, and AI working in concert to create a system that gets smarter over time. Recently, TD Bank announced the acquisition of Layer 6, an AI startup. [11] In this way, fintech startups are putting pressure on established traditional institutions, leveraging the speed, scale, and cost of an all-digital infrastructure resulting in a level playing field. These startups are replacing human-intensive processes with a fully-automated data and analytics that delivers the competitive products and on-demand service with agility and cost effectively.

AI ecosystem also changes the composition of management team. Ant Financials recently added Michael Jordan, a UC Berkeley professor and expert in statistics and machine learning, to its scientific board. [12]

ML is helping in making the world a better place to live in. You may ask how? In its own dynamic way it is contributing to resource utilization and environment preservation. Right now, users open the Uber App and press 'request a ride' and they put where they are, type in the destination, and a car comes to pick them up and the payment is also made automatically. They have also built a model that predicts your destination because when you type in address bar, it predicts where

you want to go and even nearby locations based on your current location. This leads to a great reduction in errors and makes transactions a lot faster. It is a perfect example of how machine learning can help users in their day to day life. This makes the user and customer experience greatly enhanced and easy.

The use of ML in Uber has helped the individuals and the environment is far reaching. Currently there are almost a billion vehicles on the road in a study in USA and 96 per cent of them are not being used at any given moment and also a large portion of city land in USA almost 15 per cent, is being used to store these vehicles, in garages and parking lots. With Uber ride share, the company can efficiently chain similar trips together helping in optimizing vehicle costs from the driver's perspective as there will always be someone in their car. This would enable Uber to push prices down very low and maybe bring the world to a point where it's not feasible to own a car. This would greatly reduce the number of cars on the road with implications for big issues like traffic congestion and pollution. Machine learning can also help with recommending the best route for a driver to take, saving on fuel consumption and costs, where he will be most likely to pick up the most customers. And with further analysis of the driver's characteristics and behaviour and past data, if machine learning can help us understand who the best drivers are, then only the safest drivers will be employed making the roads and the world a safer place. According to Mike Del Balso, Head of Machine Learning Implementation at Uber, "All of this feeds into the future vision that Uber is trying to achieve: 'a smarter transportation network'. It's all about making transportation more affordable, reliable and safe." Machine learning is one of the core technologies that they will use to make this a reality[4].

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