EVOLUTION OF OUR FUTURE

WHITEPAPER

ABSTRACT

A Recent study shows that communications infrastructure enables LTE and 5G, AR/VR, personalized services, blockchain and connected public spaces, which are critical to innovation, opportunity and wellbeing. Digital Value at Stake is about wireless mobility & collaboration across departments supported by govt to deliver a seamless digital experience for all citizens beyond 2030.

The 5th Digital Reaction

In association with

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EXECUTIVE SUMMARY

As the Fourth Industrial Revolution unfolds, companies are seeking to accommodate new and emerging technologies to reach higher levels of efficiency of production and consumption, expand into new markets, and compete for a global consumer base composed increasingly of digital natives of the human kind. Yet in order to harness the transformative potential of the Fourth Industrial Revolution, business leaders across all industries and regions will be given the call to generate revolutionary advances with long awaited high technology yet, challenged to ensure comprehensive workforce strategies are built into the digital response. Will leaders meet the challenges of this new era of accelerating change and innovation? This process, we call the 5th Digital Reaction.

This paper researched the impacts of the emerging technologies on the future of work, education and economic mobility. To include identifying what new demands and opportunities these developments may present to our society.

INTRO

People often think that our future is all about flying cars, robots and space travel. Well, yes this is true yet, today we are faced with the immediate challenge of the right solutions that will set the course for the next century. Have the outcomes of the 4th Industrial Revolution been remarkable? In areas of AI, Robotics, Automation, Cloud Computing, AR, VR, and Blockchain I would say "yes" there has been amazing leaps forward and with the promise of 5G and IoT the "tip" has become technologies' "iceberg."

Companies are investing massive amounts of their budget toward research and development of emerging technologies. This indicates that companies and governments are eagerly pursuing ways to achieve new technological advancements that would shift the economies. Societies advancing smart digital cities without removing the human capabilities. We've seen the impetus to the digital revolution--The Internet--giving way to a never before seen velocity of global information disbursement. This was only the beginning. Internet 3.0 is in the "GO" position and ready to further disrupt the way we communicate. The nextgen revolution is our digital reaction.

1: 4TH INDUSTRIAL REVOLUTION (4IR)

Industrial revolution; started with the use of steam and emerged to internet and automation… the advent of web 3.0 and digitization is the new era bringing in a new revolution poised to dramatically change the world.

Now we enter our latest industrial revolution, where the impact will be larger, and more significant. Over the next few decades, we will see a greater transformation to humanity and our businesses than we've seen in the entire life of human civilization.

The 4th Industrial Revolution is here and defined by the confluence and convergence of emerging technologies. This period drives significant adoption of technologies and new ways of living. As new technologies and ideas emerge, they have four dimensions:

- **Scope:** deep and wide changes on a global scale.
- **Impact**: what these technologies essentially effect.
- **Velocity:** the speed of change – with technology transformation is occurring in months which normally would have taken years
- **Convergence:** It won't only be AI or AR/VR or IoT or 5G on their own; the real transformation will come at collective innovation in unprecedented scale and velocity

“It’s not just AI or Blockchain on its own; we are witnessing a new evolution of intersecting technologies that will be driven by human creativity at the center of a digital reaction.”

Which industry has been ‘revolutionized’ to date, fundamentally changing how it operates?

Transportation is one of the areas of society that is being revolutionized. Just looking at one subset, automotive, you can see how transformation is happening very quickly. New cars are designed differently using Digital Twins, allowing the car to be built virtually before we ever do anything physically. Additionally, we can now go on to drive that car on any road, in any condition, around the world, and understand what parts we need and what materials we need, well before it is built.

Also, there are of course Autonomous Vehicles (AVs); AV driving will change the nature of cars in so many ways. Ask yourself, what will we do within cars when we don’t have to drive them?

We are then transferring from carbon-based transportation to renewable, with our automobile industry moving very quickly towards electric vehicles. Also, ride-hailing, we see the emergence of ride-hailing on a global scale. And finally, we are trending towards the end of car ownership, where vehicles, in general, will just be on-demand as opposed to owned.

And what does the 4IR mean for the way global economies operate?

Think about the role that transportation has in every society and the high number of occupations based on driving. The number of jobs will be displaced by AVs, effectively displacing a whole industry. The negative consequences are quite significant but there is, of course, an upside; based on data, AVs will reduce death and injury, and the use of EVs will reduce the carbon footprint, benefiting the entire planet.

Which are the most ‘disruptive’ technologies that’s driving the 4th Industrial Revolution?

Although there is a very long list, I have selected three:

- **AI:** there is no doubt it must be on the list. It becomes a way in which human activity is augmented in every respect: the way we live, work, and play.
- **Digitalization:** the digitalization of the world is not trivial, and we have so far to go still…so much of the world’s industry is still analog-based, using a lot of paperwork, and bringing the downsides of bureaucracy.
- **Automation:** in general, it is an important and disruptive characteristic of the 4th Industrial Revolution. In automation, digitalization plays a part, as does robotics, and it leads to the emergence of the Internet of Things, and in turn, data-driven decisions.

CHAPTER 2: ARTIFICIAL INTELLIGENCE

“AI: There is no doubt it must be on the list. It becomes a way in which human activity is augmented in every respect: the way we live, work, and play.”

The term artificial intelligence was coined in 1956, but AI has become more popular today thanks to increased data volumes, advanced algorithms, and improvements in computing power and storage.

Early AI research in the 1950s explored topics like problem solving and symbolic methods. In the 1960s, the US Department of Defense took interest in this type of work and began training computers to mimic basic human reasoning. For example, the Defense Advanced Research Projects Agency (DARPA) completed street mapping projects in the 1970s. And DARPA produced intelligent personal assistants in 2003, long before Siri, Alexa or Cortana were household names.

This early work paved the way for the automation and formal reasoning that we see in computers today, including decision support systems and smart search systems that can be designed to complement and augment human abilities. And ultimately in 2020 RoboKind was able to create Milo, a robot for autistic kids.

In 2016, the World Economic Forum claimed we are experiencing the fourth wave of the Industrial Revolution: automation using cyber-physical systems. Key elements of this wave include machine intelligence, blockchain-based decentralized governance, and genome editing. As has been the case with previous waves, these technologies reduce the need for human action but pose new ethical challenges, especially for artificial intelligence and the human bias that gets inadvertently programmed into the learning.

With progress in AI, automation and workforce transitions have changed opportunities for businesses and called into question the future need for office spaces. We ask ourselves do we need conventrional office spaces? Or will a “pay-as-you-go” be the office model of the future? So how does AI and automation impact remote work and productivity? Will the future of work be an automated professional service and/or remote workspace? For example, “LiquidSpace” has transformed the traditional commercial real estate office building into the solution for many companies looking for office space. They provide an online interface to transact office space for startups and fortune 500’s alike. The remote worker is not confined to their home anymore. They say office space is now yours with a click. You can pay by the month, by the year without a lease and no hassles. This is the office model of the new normal.

WHY IS ARTIFICIAL INTELLIGENCE IMPORTANT?

• AI automates repetitive learning and discovery through data. But AI is different from hardware-driven, robotic automation. Instead of automating manual tasks, AI performs frequent, high-volume, computerized tasks reliably and without fatigue. For this type of automation, human inquiry is still essential to set up the system and ask the right questions. To help advance the need for human set up, RPA or robotic process automation is put in place and programmed to perform the set up and prompt the right action.

• AI adds intelligence to existing products. In most cases, AI will not be sold as an individual application. Rather, products you already use will be improved with AI capabilities, much like Siri was added as a feature to a new generation of Apple products. Automation, conversational platforms, bots and smart machines can be combined with large amounts of data to improve many technologies at home and in the workplace, from security intelligence to investment analysis.

• AI adapts through progressive learning algorithms to let the data do the programming. AI finds structure and regularities in data so that the algorithm acquires a skill: The algorithm becomes a classifier or a predictor. So, just as the algorithm can teach itself how to play chess, it can teach itself what product to recommend next online. And the models adapt when given new data. Back propagation is an AI technique that allows the model to adjust, through training and added data, when the first answer is not quite right.

• AI analyzes more and deeper data using neural networks that have many hidden layers. Building a fraud detection system with five hidden layers was almost impossible a few years ago. All that has changed with incredible computer power and big data. You need lots of data to train deep learning models because they learn directly from the data. The more data you can feed them, the more accurate they become.

• AI achieves incredible accuracy through deep neural networks – which was previously impossible. For example, your interactions with Alexa, Google Search and Google Photos are all based on deep learning – and they keep getting more accurate the more we use them. In the medical field, AI techniques from deep learning, image classification and object recognition can now be used to find cancer on MRIs with the same accuracy as highly trained radiologists.

• AI gets the most out of data. When algorithms are self-learning, the data itself can become intellectual property. The answers are in the data; you just have to apply AI to get them out. Since the role of the data is now more important than ever before, it can create a competitive advantage. If you have the best data in a competitive industry, even if everyone is applying similar techniques, the best data will win.

HOW ARTIFICIAL INTELLIGENCE IS BEING USED

Every industry has a high demand for AI capabilities – especially question answering systems that can be used for legal assistance, patent searches, risk notification and medical research. Other uses of AI include:

- Health Care

AI applications can provide personalized medicine and X-ray readings. Personal health care assistants can act as life coaches, reminding you to take your pills, exercise or eat healthier.

- Retail

AI provides virtual shopping capabilities that offer personalized recommendations and discuss purchase options with the consumer. Stock management and site layout technologies will also be improved with AI.

- Manufacturing

AI can analyze factory IoT data as it streams from connected equipment to forecast expected load and demand using recurrent networks, a specific type of deep learning network used with sequence data.

- Banking

Artificial Intelligence enhances the speed, precision and effectiveness of human efforts. In financial institutions, AI techniques can be used to identify which transactions are likely to be fraudulent, adopt fast and accurate credit scoring, as well as automate manually intense data management tasks.

WHAT ARE THE CHALLENGES OF USING ARTIFICIAL INTELLIGENCE?

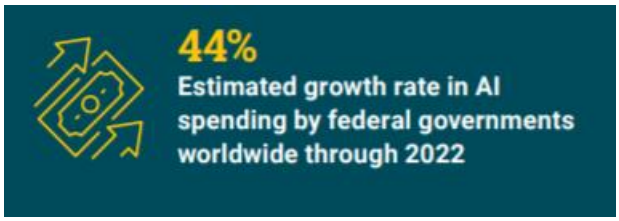
Artificial intelligence is going to change every industry, but we have to understand its limits. The principle limitation of AI is that it learns from the data. There is no other way in which knowledge can be incorporated. That means any inaccuracies in the data will be reflected in the results. And any additional layers of prediction or analysis have to be added separately.

Today's AI systems are trained to do a clearly defined task. The system that plays poker cannot play solitaire or chess. The system that detects fraud cannot drive a car or give you legal advice. In fact, an AI system that detects health care fraud cannot accurately detect tax fraud or warranty claims fraud. In other words, these systems are very, very specialized.

The MIT-IBM Watson AI Lab's efforts on shared prosperity are drawing on recent advances in AI and computational cognitive modeling, such as contractual approaches to ethics, to describe principles that people use in decision-making and determine how human minds apply them. The goal is to build machines that apply certain human values and principles in decision-making. IBM scientists also devised an independent bias rating system that helps determine the fairness of an AI system.

How do you think the increased sophistication and wider adoption of AI will change the characteristics of the 4th Industrial Revolution?

If you go back to the four characteristics I shared, AI is a positive catalyst for each one. You include AI into any one of the dimensions and it creates a magnifying effect which adds enormous value.



Essentially, AI will show up everywhere. Taking on the role as an augmentation woven inside various types of automation and robotics in our new normal.

One thing to recognize, is that we are in the early, early stages of AI and the amazing things are still ahead of us. We are still several years away from the true power of what AI can do. There are a lot of incredible and beneficial uses that are already making our lives easier. For example, in healthcare, the ability to track and accurately diagnose disease while including machine learning to the formula. This has the ability to contain future communicable diseases as well as pandemics. Will AI, robotics and automation threaten certain jobs? Yes, but this opens the door to the future of learning and skilling; reskilling and upskilling. A report from the WEF said that "No less than 54% of all employees will require signifigant re and upskilling by 2022." We must stay aware of consequences brought on by advanced tech of Industry 4.0.

AI is making significant changes to industrial operations

In the manufacturing space, AI is already helping with optimization. It is interesting in this pandemic of 2020, that one of the areas we are becoming acutely aware of is the supply chain, the global supply chain. The shortages revealed during this time show that the supply chain was not agile, leading to today's problems within it. I think optimization done right can help. With the market changing quickly, a manufacturing company must be agile and able to shift its production and distribution with no delay, and this is accomplished with the power of AI.

CHAPTER 3: BLOCKCHAIN TECHNOLOGY

Blockchain, as its name suggests, is a virtual chain made of blocks, where each block contains information.

Alternatively, it can be described as a digital ledger, where each block of data represents a distinct transaction on that ledger, with the transactions occurring across a decentralized peer-to-peer/P2P network. This peer-to-peer network consists of a network of computers (each called a "node") connected together, which allows the participants in the blockchain to transfer information across the internet without the need to involve any centralised third party. Each block in a blockchain is comprised of:

(i) The transaction data

(ii) a timestamp recording the creation of the block and

(iii) a cryptographic hash which is unique to each block, akin to a "fingerprint". When a node initiates a transaction, it sends across a message to the other nodes in the network. Each transaction is verified by the nodes, *without relying on any external party* for authentication, before it is added to the blockchain. This verification process is as follows. Each node in the network has its own set of public and private cryptographic keys. Whenever a transaction is initiated by a node, it generates a digital signature with its private key. The digital signature is proof of the authenticity of the data present in the block. Once the transaction has been examined by every node, there is an electronic vote amongst them to decide the validity of the transaction. If a majority of the nodes hold the transaction to be valid then we have what is called a "consensus" and it is written into a block and the newly created block forms a part of the chain.

Supply Chain Providence. Blockchain is widely researched but yet to go mainstream in the manufacturing sector. That is the reality now but in three years, I think the situation will be very different. Where we are seeing usage in manufacturing has a lot to do with the supply chain. One of the areas we see usage is product tracing, or raw material tracing. In certain electronics, some rare metals and chemicals that are used come from mines where conditions poor. So, how big corporations are using Blockchain is to validate the source of certain products, to certify that they come from ethical origins. Tracing is beginning to see real benefits from using Blockchain; that's what Blockchain does well. The US Postal Services is an example of a US based company that uses blockchain within their supply chain. In an article titled, "4 Ways Blockchain can be used throughout the supply chain", USPS identified 4 key areas their processes could benefit with blockchain; smart contract, tracking, fraud and theft prevention and transaction processing."

64% of supply chain professionals say that a lack of information on the tracking of product origins has caused inaction or indecision.

“It is interesting in this pandemic, that one of the areas we are becoming acutely aware of is the supply chain, the global supply chain. The shortages revealed during this time show the supply chain was not very agile.”

Looking more into the supply chain, within the supply and manufacturing sector of lessons learned during the pandemic, there’s a huge amount of dependencies – no single company makes the end products anymore, they have to source things from 10 to upwards of 100 of vendors to make a finished product. For example, to assemble a plane or phone, you must get parts from a lot of different sources. Therefore, you need to know when deliveries are going to be made, where products are, at all times, and you need to validate that all the paperwork has been properly completed. This is where Blockchain in the manufacturing and supply chain are starting to see some usage. Because Blockchain has the characteristics of being a distributed database with immutability – so you can’t delete the entries – and every transaction is recorded, it means that it’s a very strong solution for parts supplies in the global manufacturing supply chain. For example, if the president of the US wants to make sure every agency follows his orders and ban use of Chinese electronic equipment, the best way to make sure of the origin is via blockchain technology. This would be a prime use case within the government.

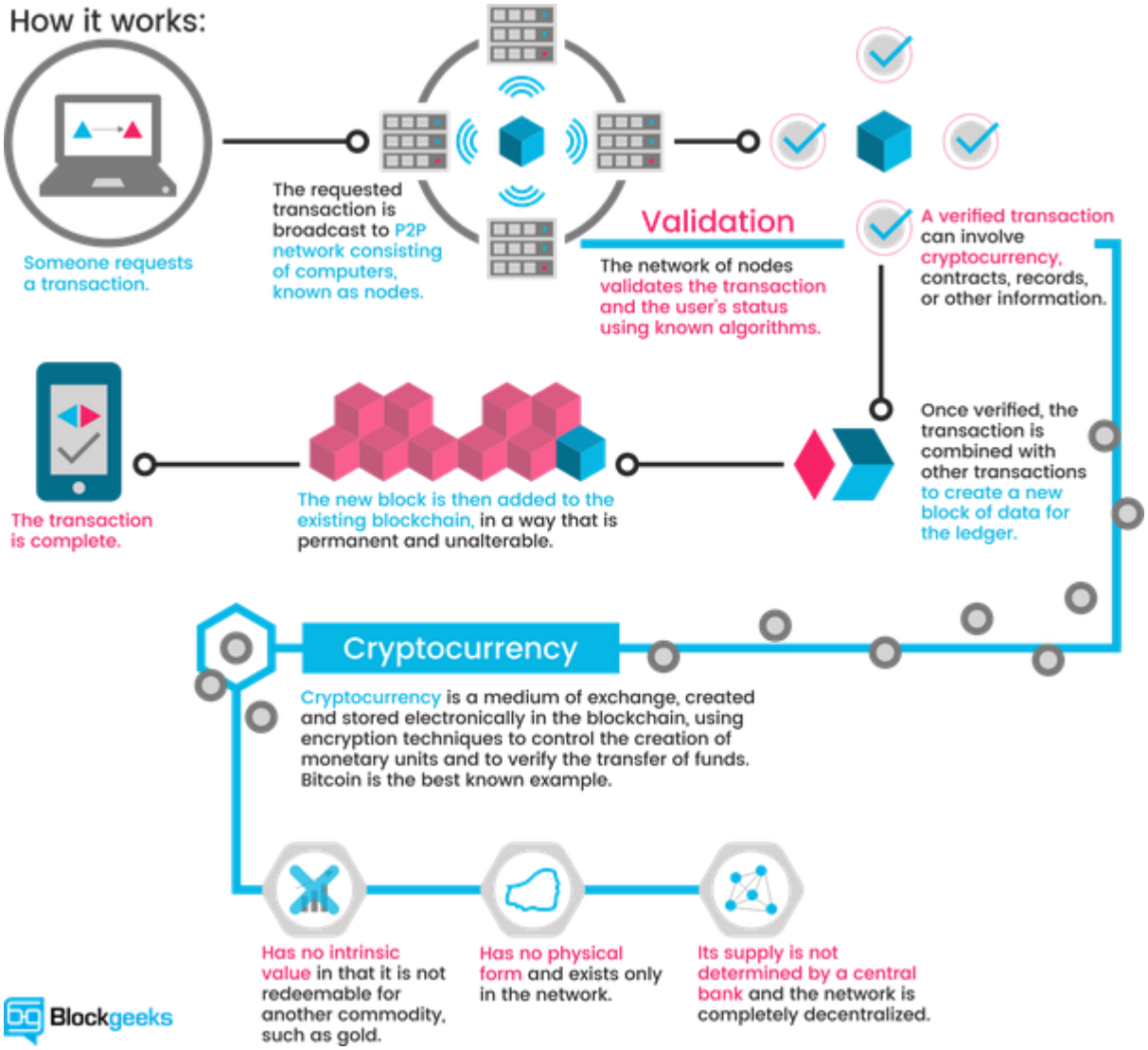
DECENTRALIZATION MAKES THE BLOCKCHAIN STRONGER

A blockchain establishes a decentralized network that allows the participants in the blockchain to transfer information across the internet without the involvement of any centralised authority. The US Postal Service uses blockchain for transaction processing. “Blockchain allows all parties to view and validate the same information at the same time, creating consensus and reducing the risk of disputes. This speeds up transaction processing, while the unalterable nature of the database enhances security. With blockchain, intermediaries are no longer needed to process and cross-reference complex supply chain transactions, and waiting for payments to be processed becomes a thing of the past.”

TYPES OF BLOCKCHAINS – PUBLIC AND PRIVATE

A public blockchain is one in which anyone can join the blockchain network and participate within the blockchain. **Public blockchains** are decentralised and permissionless, whereas no one has control over the network. This is the intent of “open source” networks. Bitcoin and Ethereum are examples of public blockchains.

Speaking of the public sector, US federal government has tested the waters on blockchain and seems to be increasing investment by 2022. A report released by IDC Government Insights in April 2019 estimates that the federal government’s spending on blockchain will likely increase from $10.7 million in 2017 to $123.5 million in 2022. Similarly, blockchain spending among state and local governments is expected to rise from $4.4 million in 2017 to $48.2 million in 2022. The forecast excluded crypto currency investments, however, because “governments are spending little to no money on cryptocurrencies at this time.” Blockchain integration is still in the initiary stages for federal agencies, but it’s expected to grow rapidly in the coming years. Let’s see how a public blockchain works.



Still, agencies are beginning to get their feet wet with the modern record-keeping technology, which validates information on a secure, decentralized public ledger. Recently, the Health and Human Services Department unveiled a proof of concept that employs blockchain technology to securely track log files that agencies are required to report by the Homeland Security Department's Continuous Diagnostics and Mitigation program. The test case, which demonstrates how emerging tech can be used to boost security postures across federal agencies, comes a little over half a year since HHS was awarded the federal government's first authority to operate a blockchain-powered acquisition system.

"The synonyms that describe blockchain are **immutability, transparency, traceability** and **zero trust**—and those words all describe **cybersecurity**," the agency's Chief Technology Officer Oki Mek recently told *Nextgov* regarding the efforts. "Maybe finance system could use this, other systems could use this as well." The Securities and Exchange Commission also solicited the procurement of a commercial off-the-shelf subscription source for blockchain ledger data, to better observe the landscape. And the Food and Drug Administration introduced its own a modernization initiative—deemed "A New Era of Food Safety"—to advance its use of evolving technologies like blockchain to better trace America's food supply and provide more rapid responses to outbreaks of foodborne illness. Ultimately, though it will likely continue to progress in the coming years. Blockchain technology

has yet to be widely adopted beyond federal pilots. As progress continues in 2020, there will likely be much more hype—and an increasing need for strong policies and governance.

A **private blockchain** is one where only permitted participants can join. Private Blockchain is a complete contrast of public Blockchain. Because public Blockchain is open to the public in which private Blockchain is not open to all. It is centrally controlled and requires permission to access, read, write or alter. A password and 2FA is an example of this measure. Here is a diagram of a private blockchain:

SECURITY THREATS TO BLOCKCHAIN USERS

Since every node in a blockchain stores details of all transactions, which can be scrutinised by anyone in the network, malicious users may access and trace public keys and addresses to specific persons. If and when an individual user of a blockchain is traced, every transaction undertaken by such an individual through blockchain may be permanently exposed.

A person's private key is used by him/her to sign as well as verify every transaction that s/he makes on a blockchain. Each private key creates a unique digital signature for every transaction that the key-holder undertakes, thereby verifying that the key-holder has ownership of the assets which are being transacted and that s/he has the authority to undertake the transaction. Since **private keys are crucial to accessing and safekeeping assets on a blockchain**, users are required to store them safely. If the private key becomes available to a stranger, the assets stored on the blockchain could be compromised. Storing the private key on a computer, flash-drive or telephone can pose potential security risks if the device itself is lost, stolen or hacked. If such a device is lost, the user will cease to have access to his/her private key, and in turn, his/her assets, such as cryptocurrency. Storing it on a physical media, such as a piece of paper, also leaves the private key vulnerable to loss, theft or damage. So, what do you do? Choose one method and keep it safe. The latest version of offline wallets are called “hardware” wallets. These are considered the safest method of storing your digital assets. Hardware wallets store your private keys encrypted on an external device like USB. They are entirely cold and secure. Also, they are capable of making online payments, too. Some hardware wallets are compatible with web interfaces and support multiple assets. They are designed to make transactions easy and convenient, and should always be purchased from the manufacturer not a reseller.

CONCLUSION

In the first five months of 2020, crypto thefts, hacks, and frauds totaled $1.36 billion, suggesting 2020 could see the second-highest value in crypto crimes ever recorded. In a trend that continues from last year, fraud and misappropriation still make up most of the year's stolen crypto compared to hacks and thefts. Of the $1.36 billion stolen, fraud and misappropriation account for 98% of the total value—nearly $1.3 billion.

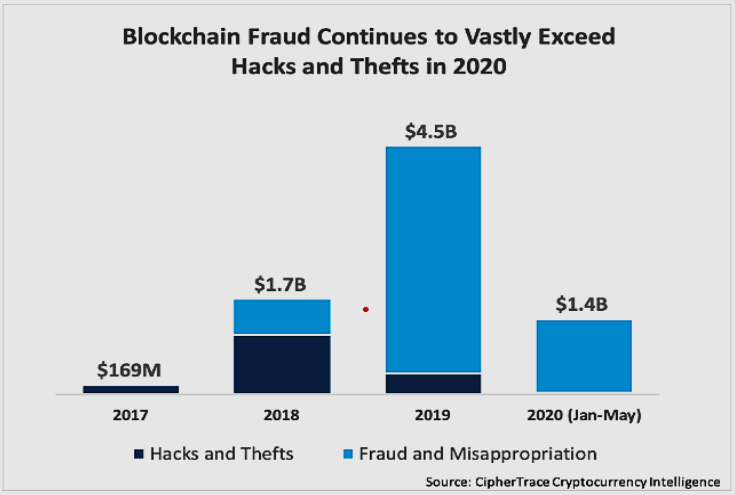


Figure 1.

Blockchain is here today and the technology of the future and is here to stay, notwithstanding regulatory guidance and legal obstacles. Law is usually slow in keeping up with technological advancements. While the Financial Action Task Force (FATF) is often called a global anti-money laundering (AML) and counter terrorism financing (CTF) watchdog, actually has no enforcement authority. Nonetheless, when the FATF speaks, governments listen because negative reprocussions including a grey listing, a form of financial ostrasim. Last June 2019, the FATF announced a much-anticipated clarification of its cryptocurrency-related regulatory guidelines for member states. And it caused quite a stir in the virtual asset community, especially after the G20 announced full support for the recommendations during its summit in June 2019. The updated guidance rocked the cryptocurrency community because it contains several new rules for virtual asset service providers (VASPs), which the FATF said are needed to counter rising threats of money laundering and terrorism financing.

CHAPTER 4: JAPAN'S SOCIETY 5.0

What is Society 5.0?

One definition: "A human-centered society that balances economic advancement with the resolution of social problems by a system that highly integrates cyberspace and physical space."

Society 5.0 was proposed in the 5th Science and Technology Basic Plan as a future society that Japan should aspire to. It follows the hunting society (Society 1.0), agricultural society (Society 2.0), industrial society (Society 3.0), and information society (Society 4.0).

ACHIEVING SOCIETY 5.0

In the information society (Society 4.0), cross-sectional sharing of knowledge and information was not enough, and cooperation was difficult. Because there is a limit to what people can do, the task of finding the necessary information from overflowing information and analyzing it was a burden, and the labor and scope of action were restricted due to age and varying degrees of ability. Also, due to various restrictions on issues such as a decreasing birthrate and aging population and local depopulation, it was difficult to respond adequately.

Social reform (innovation) in Society 5.0 will achieve a forward-looking society that breaks down the existing sense of stagnation, a society whose members have mutual respect for each other, transcending the generations, and a society in which each and every person can lead an active and enjoyable life.

HOW SOCIETY 5.0 WORKS

Society 5.0 achieves a high degree of convergence between cyberspace (virtual space) and physical space (real space). In the past information society (Society 4.0), people would access a cloud service (databases) in cyberspace via the Internet and search for, retrieve, and analyze information or data.

In Society 5.0, a huge amount of information from sensors in physical space is accumulated in cyberspace. In cyberspace, this big data is analyzed by artificial intelligence (AI), and the analysis results are fed back to humans in physical space in various forms.

In the past information society, the common practice was to collect information via the network and have it analyzed by humans. In Society 5.0, however, people, things, and systems are all connected in cyberspace and optimal results obtained by AI exceeding the capabilities of humans are fed back to physical space. This process brings new value to industry and society in ways not previously possible.

SOCIETY 5.0 BALANCES ECONOMIC DEVELOPMENT & SOLVES SOCIAL ISSUES

It can be said that the environment surrounding Japan and the world is in an era of drastic change. As the economy grows, life is becoming prosperous and convenient, the demand for energy and foodstuffs is increasing, lifespan is becoming longer, and the aging society is advancing. In addition, the globalization of the economy is progressing, international competition is becoming increasingly severe, and problems such as the concentration of wealth and regional inequality are growing. Social problems that must be solved in opposition (as a tradeoff) to such economic development have become increasingly complex. Here, a variety of measures have become necessary such as the reduction of greenhouse gas (GHG) emissions, increased production and reduced loss of foodstuffs, mitigation of costs associated with the aging society, support of sustainable industrialization, redistribution of wealth, and correction of regional inequality, but achieving both economic development and solutions to social problems at the same time has proven to be difficult in the present social system.

In the face of such major changes in the world, new technologies such as IoT, robotics, AI, and big data, all of which can affect the course of a society, are continuing to progress. Japan seeks to make Society 5.0 a reality as a new society that incorporates these new technologies in all industries and social activities and achieves both economic development and solutions to social problems in parallel.

ECONOMIC DEVELOPMENT & SOLUTIONS TO SOCIAL PROBLEMS IN SOCIETY 5.0

In Society 5.0, new value created through innovation will eliminate regional, age, gender, and language gaps and enable the provision of products and services finely tailored to diverse individual needs and latent needs. In this way, it will be possible to achieve a society that can both promote economic development and find solutions to social problems.

Achieving such a society, however, will not be without its difficulties, and Japan intends to face them head-on with the aim of being the first in the world as a country facing challenging issues to present a model future society.

5: AUTOMATION AND ROBOTICS

Some of the biggest developments in the automation world will come from the automobile industry – self-driving cars are already being tested.

Developments are likely to come from the continued growth of the internet. The concept of the 'Internet of Things' has been gaining momentum for some years now, even decades amongst technology companies. But the idea has only recently started to break into the mainstream.

We have already seen glimpses of the future starting to creep into reality, such as the introduction of Amazon Dash. Linked to the person's account and programmed to a certain item, all you have to do is press the button and an order is placed and delivered. Of course, this process is currently only half automated; a button still has to be manually pressed and Amazon shippers still post and deliver the item. Nevertheless it certainly shows the direction in which we are headed.

But ultimately the Internet of Things can go even further than creating smart homes. For example, 'smart cities' could theoretically include connected traffic lights to control vehicle flow, smart bins that inform the right people when they need to be emptied, and even the monitoring of crops growing in fields.

HOW IS ROBOTICS CHANGING THE NATURE OF WORK?

Overall the main change in the last decade is the scale in which robots are now used. The technology is largely unchanged but connectivity has provided a great many benefits. The scale of robotics has exploded and continues to grow, applications are being created on a daily basis for all types of industries and environments.

In many instances, automation improves the quality of production by offering precise repeatability. This would be impossible to achieve by only using human labour. For example, if a potter was to make a 100 identical clay pots, despite her best efforts and excellent craft skills, each individual item would be different. This does not occur with automation because the machine works to predetermined parameters. The end result is quality that is repeated exactly each time, which is important in today's competitive business environment.

Many CNC (Computer Numerical Control) machines now use robots to load and unload the raw materials, meaning that factories can effectively run through the night with limited or no input from humans. This has a positive effect on long-term productivity.

Robots are often used in welding applications because the precision of the welds are more accurate and consistent than that of humans, not to mention quicker. When you can improve quality, speed, and cost, it makes sense to move to automation.

WHAT IS THE END GOAL OF AUTOMATION?

Ultimately, to emulate the actions of humans. People across the world engage in heated debates about whether machines will ever have the ability to think like people – artificial intelligence, which is worthy of its own exploration. I don't know whether that will become a reality in the future, but researchers are hard at work across the world trying to inch our way closer.

There are, of course, issues that arise when we try to develop machines to take over certain tasks from humans, most notably to do with quality control and the increased margin for error. Some question whether a machine, that doesn't necessarily have the capacity to consider extenuating circumstances, or react in a particular way, would be able to perform these tasks.

Let's look at self-driving cars for example. So much of driving depends on the driver being able to react in seconds to any changes around them. While AI can calculate and react faster than any human, we can't know what actions AI will take in every situation. It is therefore essential that machines are able to 'think' as close to humans as possible. If artificial intelligence and technology alone cannot achieve this, it would be very difficult for such vehicles to become road legal.

You mentioned some of benefits of automation such as the quality and repeatability, which usually leads to cost reductions. But, what are the disadvantages, if any?

As with any major development, there are always going to be people who oppose it, or at the very least point out reasons why we should proceed with caution – and with good reason.

One of the biggest, and indeed most realistic, fears that many people express, is all to do with economics and jobs. It's no secret that the world's economy has been somewhat shaky over the past few years. This has led to concern that the development of automated processes, which are able to perform certain tasks with precision and accuracy that surpasses humans and at a much faster speed, will mean that many people's jobs will become redundant.

By 2018, the Federation of Robotics predicted there would be approximately 1.3 million industrial robots working in factories around the world. That's incredible! What's your view on machines taking over jobs?

Robots will never replace humans; automation will only change the jobs people do. I think people need to take the time to understand automation and how it can be applied to our daily lives. Automation creates opportunities just as much as it may replace a job role.

In the future, we will see greater integration between robots and humans. They will work seamlessly together to achieve more effective and efficient results improved safety measures will mean people and machines will benefit from the best that each has to offer.

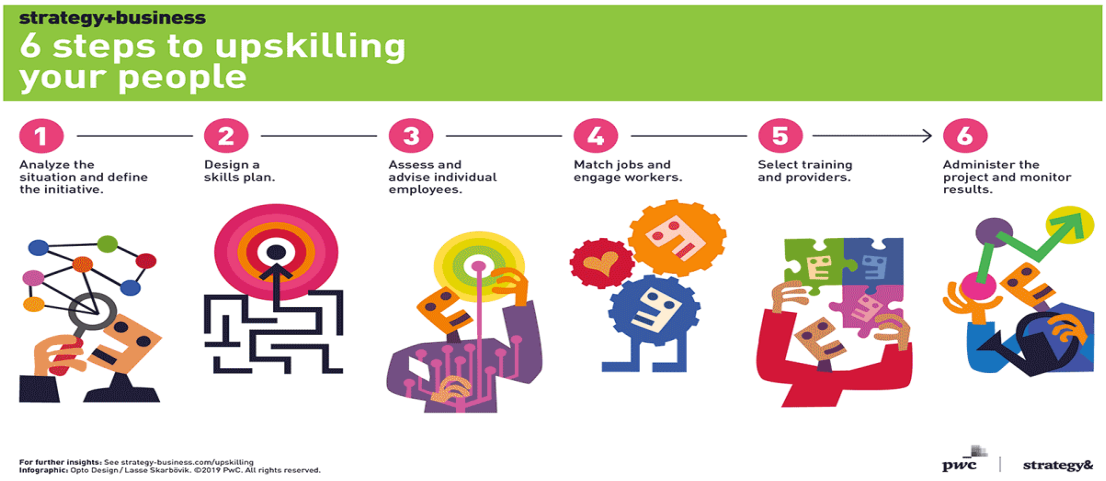
It is unlikely that we are going to see any robot uprisings any time soon. But the potential threats that an increase in automation brings to our society should not be underestimated. With the economic state of the world already so fragile, any attempts to research areas that could result in unemployment should be very carefully considered before implementation.

"Robots will never replace humans"

That being said, we are living in exciting times where we are able to witness such developments taking place. So much has already occurred over the past few years that many people may not be aware of. We may not have the androids and smart-buildings as seen in the movies – not yet anyway – but with the cutting-edge research taking place across the world, the sky really is the limit.

So, with the rise of robots, what skills do we need to develop to stay relevant and maximise the opportunity offered by smart machines technology?

An area where things need to improve rapidly is within education. There is a gap between the digital skills people have and those needed to live, learn, and work in the automation world. The need to upskill — to bridge this gap — is a complex problem that will require government administrators, educators, and business leaders to come together. Clearly there is a severe shortage of qualified talent for the new digital economy. Jobs requiring knowledge of artificial intelligence (AI), robotics, and the Internet of Things are going unfilled in ever-greater numbers. Estimates suggest that U.S. software-related jobs are growing at 6.5 percent annually — almost twice the rate of jobs in general — and that in Europe, there is a high-tech skills gap of more than 500,000 unfilled positions in 2020.

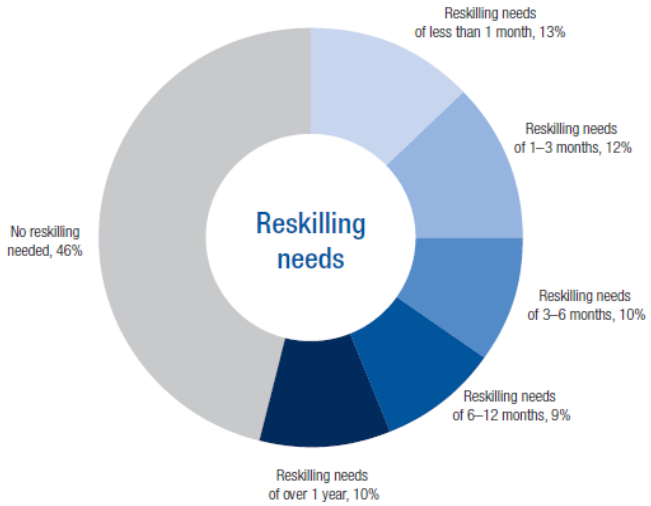


Job titles like Immersive AR Coordinator or Deep Learning Specialist and Alternative Energy Technician will be in demand in the future. Collectively, these trends have broadened the gap between the employees of the present and the workforce of the future — hence the recent interest in upskilling. The term *upskilling* refers to the expansion of people's capabilities and employability to fulfill the talent needs of a rapidly changing economy.

The rise of robotics will create a new high tech workforce who are skilled in programming and fault-finding, developing new applications and then providing support around the clock. Even though Daniel Pink says the future is human, we know there will be creatie and innovative developments because of the ingenuity of the human imagination but with limits. We must stay abreast of emerging technologies and their applications for a better future.

CHAPTER 6: 5th DIGITAL REACTION

Figure 7: Expected average reskilling needs across companies, by share of employees, 2018–2022



Source: Future of Jobs Survey 2018, World Economic Forum.

In Society 5.0, however, people, things, and systems are all connected in cyberspace and optimal results obtained by AI exceeding the capabilities of humans are fed back to physical space.

"The transference of the genius quotient agency intersects with high EQ and maximum IQ. Whereas re & upskilling for genius level innovation on the personal level in turn benefits society as a whole. Pushing strategic convergence to ensure targeted advanced technology stay front-of-mind while continuous developments are being tested for optimum augmentation by machine and algorithmic labor. Industry specific robots will be a complement to the human talent. In essence, to automate some job tasks is to complement and enhance the human workforces' comparative strengths and ultimately to enable and empower employees to extend to their full potential and competitive advantage by augmentation vs full-on automation.

Robotics, artificial intelligence and process automation will occupy each industry vertical until required renovations and modernizations have been satisfactorily established. This is the response to the 4th Industrial Revolution to realize a sustainable advanced generation of skilled communities to thrive within Society 5.0 by birthing the stages of the 5th Digital Reaction.

CONCLUSION

Progress in many of the basic computing and information technologies has been rapid in recent years, and the future of work experts do not expect the pace of change to slow down in the foreseeable future. While some technologies are reaching maturity now, many important technologies have enormous future potential.

Cities have to manage economics and rapidly evolving constituent expectations around safety, wellness and accessibitlity. A smart city's most powerful asset is a modernized infastructure that creates economic growth in public services. It is estimated that digital cities will generate $2.3 trillion globally through 2024. Whether its ATL realizing their leading Smart City initiative using big data and IoT connected with wi-fi to multiple devices to get actionable insights to make data-driven decisions to benefit their city's future scale or Seoul Korea where they're using AI to generate traffic predictions with 90% accuracy and using 5G to pilot driverless buses in the city. The new era brings an engaging and compelling digital experience and will continue to be the highest priority in the workplace second only to safety.

This is the next normal. This is the 5th Digital Reaction.

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