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THE ALLIANCE BETWEEN AI AND BLOCKCHAIN

WHAT THE FUTURE HOLDS FOR BUSINESSES

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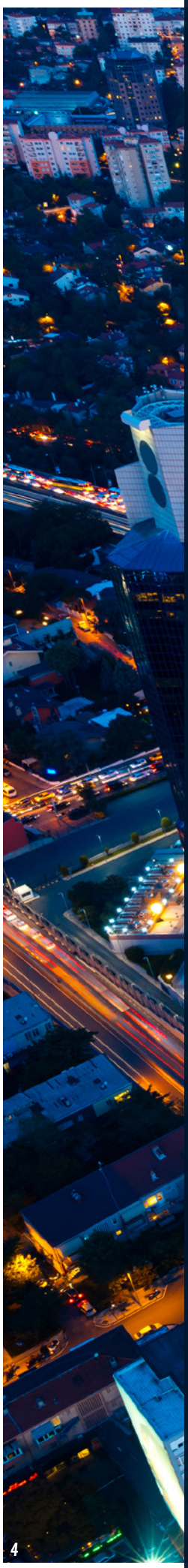

"The only way of discovering the limits of the possible is to venture a little way past them into the impossible."

ARTHUR C. CLARKE
FICTION WRITER

Blockchain Innovations in Healthcare

BY WENDY CHARLES, PHD, CIP, CCRP, CBP

Healthcare transformation

The healthcare industry is rapidly evolving from a hospital and clinic centered approach, where data were controlled by health systems, payers, and large service providers, to a new approach where healthcare services are increasingly more remote and controlled by patients.

Data are created by billions of people, devices, applications, and organizations every single day. These sources of data are used to help doctors make informed decisions, help researchers make new medical breakthroughs, and help developers build smarter and more personalized medical products. Data are also used by patients to guide actions related to health services, from treatments to proactive resources. This shift has profound implications for how organizations manage data, engage with consumers, build trust, and maximize operational efficiency.

> **"The healthcare industry is pushing towards a future in which healthcare services are accessible, equitable, and personalized. This future will rely on products and services that are data-driven, connected, and trustworthy." - Brian Jackson, COO of BurstIQ**

In the past five years, distributed ledger technologies, that include blockchain, have been explored as a solution to health information management. While a thorough description of blockchain is beyond the scope of this article, blockchain combines methods of decentralization, data storage, and encryption in a novel way, providing security, trust, consent, and governance.

Furthermore, blockchain data storage mechanisms are quite different from the traditional, relational, and NoSQL databases allowing for more flexible data structures. Therefore, the introduction of blockchain technologies requires a flexible mindset regarding how data can be managed and shared. (Please note that while the terms "blockchain" and "distributed ledger technology" have different meanings and applications, this article uses the term "blockchain" collectively for simplicity.)

As with the introduction of any new technology, perceptions about blockchain vary from great enthusiasm to skepticism. This article describes firsthand work experience in a blockchain company to explain the evolution of blockchain technologies within healthcare, including examples of current blockchain implementations.

Evolution of blockchain in healthcare

While blockchain is sometimes referred to as a "nascent technology" for healthcare, a few mature blockchain platforms have been in full production for health information, including BurstIQ, Hashed Health, and MedicalChain. These platform solutions exceed the basic blockchain features of audit trails, timestamping, and distributed storage into new impactful solutions for the healthcare ecosystem. This section describes how blockchain solutions designed for healthcare have evolved beyond the early blockchains designed for cryptocurrency.

For storing or processing health information, blockchain must protect the privacy of health information, and today there are more options and combinations available. While blockchain technologies were originally designed as two dichotomous types – public ("permissionless") and private ("permissioned") – this binary distinction is now largely obsolete. For example, public blockchains have evolved to offer permissioning with new governance options (e.g., Private Ethereum). Organizations can now also select among consortia blockchain designs or hybrid solutions that utilize a private/consortium blockchain to process data and then post a "snapshot" of aggregate data or metadata daily or weekly to a public blockchain for additional attestation.

There were also initial concerns that a blockchain would be too transparent to store health information on the blockchain ("on-chain"), so initial blockchain designs for healthcare stored data in a separate database or data lake, while the blockchain managed only time stamping and metadata. However, as blockchains have evolved beyond transactions for cryptocurrency, there is increasing realization that permissioned blockchains can meet the privacy requirements for health information. Further, on-chain storage has matured to offer data protections that are as secure as - or more secure than - electronic health record systems.

Additional planning for blockchain-based health information involves speed and cost. Healthcare settings require high-speed transactions for adding and querying health information with consideration that many healthcare organizations have. Blockchains designed for cryptocurrency tend to involve slow block generation and require a digital currency fee to process information. However, private and consortium blockchains now offer high-speed transactions without individual transaction fees because these blockchains are designed and maintained by private organizations. While some may argue that private or consortium blockchains could lead to collusion and data falsification, there is no greater collusion

risk than that of traditional collaborative electronic systems enforced by legal contracts and regular monitoring. Further, regulatory agencies require organizations that create or maintain health information to undergo rigorous data quality evaluations involving internal and external audits, reducing prospects and opportunities for data falsification.

When blockchains are used to process, store, or transmit health information for healthcare organizations, they must meet the same health information privacy regulations required of conventional health record systems. Therefore, blockchains must be designed to address the Health Information Portability and Accountability Act (HIPAA) Privacy and Security Rules as well as state or regional privacy statutes, including the California Consumer Privacy Act and the General Data Protection Regulation (GDPR). Some blockchains have been independently audited and verified as meeting these requirements, including the GDPR "right to be forgotten." Furthermore, as of 2021, there are 6 published methods by which blockchains are successfully addressing the right to be forgotten using technical and/or procedural methods.

Modern uses of blockchain in healthcare

Rather than describe theoretical applications of blockchain, this section describes two advanced developments for blockchain technology in healthcare with real-world examples.

Advanced data exchange

Blockchain has accelerated the use of connected data exchange networks. Blockchains designed to facilitate health information exchanges are required to meet the Trusted Exchange Framework and Common Agreement (TEFCA) and health data interoperability frameworks by connecting existing electronic health record systems while controlling access permissions and data flow efficiently. The most sophisticated enterprise-level blockchains currently:

- Define data ownership and customizable permission-based data sharing from a single data point to petabyte-scale data sets. Consent contracts, a specialized form of blockchain-based smart contracts, are now built into many blockchain platforms to manage permissions and automate data flow. These advanced smart contracts can be designed to specify the amount of time a receiver has permission to access data, the data elements being shared, and who has the ability to build new information based on the data shared. Far beyond fine-grained controls and complex "spaghetti networks" of blockchain communication channels, state-of-the-art blockchain-based consent contracts automate layers of informed consent and governance. This level of personalized control, integrated with AI, has greatly facilitated patient-centered data access and sharing.
- Provide the ability to apply different data standards using a schema-on-read approach, enabling the blockchain to maintain raw data integrity while tailoring query outputs to meet the unique requirements of compliance reporting, analytics, and/or system integration.
- Integrate artificial intelligence (AI) algorithms efficiently for real-time continual machine learning and personalized analytics.

As an example of a current enterprise-level blockchain-based data exchange, Intermountain Healthcare, a hospital network located primarily in Utah, sought to reduce both cost and clinical variation in surgical services. In 2017, Empiric Health (now a division of Olive) utilized the BurstIQ blockchain to connect electronic clinical records, claims data, surgical supply chain, quality analytics, and staffing details. The blockchain provided highly complex, granular data sharing and governance, a highly flexible rules engine, automated data workflows and processes, as well as coordination of data exchanges between electronic data systems. After aggregating data using blockchain-based automated tools, Empiric Health staff applied AI, such as natural language processing, to compare cohorts of surgical patients. Empiric Health surgeons and surgical nurses then engaged Intermountain Healthcare surgeons with personalized insight and data-driven outcomes to create surgical best practices. This blockchain-based analytics solution saved Intermountain Healthcare $90 million over four years, and Empiric Health has since rolled out this methodology to healthcare organizations across the United States.

Transforming data into smart data with blockchain

Blockchain-based "smart data" contain all of the context, auditability, access rights, and security for data to be trusted, no matter how that data moves or evolves over time. Data owners or controllers can control who or what can access their data, including revoking access permissions.

Even if data are added to electronic health record systems, immunization registries, or wellness apps on a smartphone, those ownership/controller and access rights stay intact.

"Smart data will really drive the future of artificial intelligence. It allows AI engines to use any data, anywhere, and derive deeper insights from that data. So all of the experiences we create, like engagement apps, practice optimization platforms, and consumer diagnostic products - all those things get smarter." - Tyson Henry, CTO of BurstIQ

A number of blockchain companies are getting close to implementing smart data. Verified credentials (VCs), badges and other trusted data packages are becoming a common method for establishing some degree of context and trust in data. In the case of BurstIQ, a more comprehensive form of smart data called LifeGraph® has been implemented by combining blockchain with machine learning methods. In this type of implementation, blockchain technology creates a very different approach to data security and management. First, a full smart data implementation such as BurstIQ's LifeGraph is able to enforce better data security, ownership, and control. The design allows solution providers to not just to claim their products are trustworthy; it enables them to prove it. Second, smart data allows AI and machine intelligence tools to capture deeper context for how people, places, and things relate to each other. This additional layer enriches AI and other intelligence algorithms, so solutions are smarter, more personalized, and more optimized. Building smart data into a full network model, such as what BurstIQ has done with LifeGraph Network, allows AI and AI-enabled solutions to leverage any data, anywhere, without needing consolidation or reformatting. These solutions can easily coordinate with other solutions, tap into additional data sources, or create more enriched experiences for their users.

One example of how smart data technology is being implemented can be seen in the collaboration between the National Center for Advancing Translational Sciences (NCATS), a division of the National Institutes of Health

(NIH), and BurstIQ. In May 2021, NCATS integrated a LifeGraph Network with their computational infrastructure so that researcher collaborators could share data with each other while maintaining ownership and traceability of their contributions, which is critical for maintaining intellectual property rights.

This blockchain-based solution demonstrated that by increasing researchers' ability to collaborate with each other quickly and confidently, the collaborative research network could streamline the translational research process and accelerate the pace of research.

Cautions

Blockchain technologies offer great opportunities to enhance healthcare data management, but it is important to realize that blockchain is software, not magic, and cannot solve many problems inherent with health information. Specifically:

- Health information is notoriously inaccurate due to many factors, including data entry errors, patient non-compliance, or the difficulty of keeping records current among multiple healthcare providers. One pharmacy professor explained to the author that a patient's medical record becomes inaccurate soon after the patient walks out of the clinic. While blockchain-based information can be appended with corrections, blockchain technologies are not designed to improve the quality of the original health information.
- While blockchain technologies are very secure, they are not impervious to all malicious attacks or programming bugs. When used for health information, blockchain technology requires the same level of scrutiny and oversight as other health information technologies.
- When blockchain technologies are used to offer patients more control of their health information, it is valuable to note that patients may have limited access to computer devices or could face barriers due to age, language, education, or physical characteristics. While blockchain enables technology and data connections, this technology is not likely to overcome traditional obstacles to technology and data accessibility.

Conclusions

As blockchain technology becomes more widely used as a data management solution for healthcare, health leaders should examine current blockchain uses and value propositions. The growth in blockchain will not only lead to advancements in smart data, but to advancements in data intelligence, personalized medicine, and autonomous systems. These technologies may prove critical to foster patient-centered designs that allow patients more control over accessing and sharing their health information.

The future of healthcare will be driven by data, and blockchain technology is the enabling foundational technology. -Frank Ricotta, CEO of BurstIQ

Ultimately, organizations should carefully evaluate how blockchain could enable more flexible data models, infrastructure, governance, and security protocols to maintain compliance with evolving healthcare regulations and technology needs. It will be necessary to educate healthcare stakeholders about the potential benefits of blockchain and proactively consider implementation and oversight.

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A Blueprint for Sustainable Innovation

How do you balance opportunity and risk? Johan Grundström Eriksson (Advisor to the European Institute of Innovation & Technology Manufacturing) explains why creative collaboration flourishes under ISO 56002.

Innovation is the fuel that drives a successful business. Organizations that give their managers and employees the tools to respond to and make the most of opportunities, both internal and external, are well placed to grow profits, improve the health and well-being of their employees and, thereby, the wider society. With effective innovation management systems in place, organizations – both large and small – can not only be in a better position to achieve their business growth goals, but also more agile and better prepared in their response to unexpected challenges and disruptions.

But how does this hold up against a global health crisis? The COVID-19 pandemic has disrupted all our lives, shutting down economies as it swept the globe. George Day and Gregory Shea, professors at the Wharton School of the University of Pennsylvania, noted in a blog published by the World Economic Forum in June 2020 that the pandemic had triggered "intense" innovation activity. "Companies are moving faster and taking bigger risks than could have been imagined a few months ago." They pointed to the shift toward online working practices, for example, and how 3D printing helped to keep supply chains resilient: "The digital transformation of industries did not pause for the crisis."

The steady, if uneven, roll-out of vaccination programmes is another powerful example of an industry that has shown a remarkable response to the crisis in bringing innovations to market so quickly. But as the world starts to slowly emerge from the pandemic, one big question is how do we avoid reverting to old practices and establish trust in new systems for our "new normal"? Johan Grundström Eriksson, an international expert of technical committee ISO/TC 279, innovation management, as well as advisor to the European Institute of Innovation and Technology (EIT) Manufacturing and on the Advisory Board of UNOPS Global Innovation Center Sweden, says ISO 56002 has many of the answers.

ISO: How can ISO 56002 help lay the groundwork to ensure greater resilience to future shocks?

ISO 56002 has many of the answers.

Johan Grundström Eriksson: The ISO 56002 innovation management system guiding standard was published and released just in time for the disruption of global value chains of 2020. The standard fits right into post-COVID action plans and existing management system structures.

By adopting the concepts of ISO 56002, manufacturing companies and institutions can get a running start in their endeavors to innovate and transform. This adds new value to the supply chains that are being reshaped and allows more focus on technical uncertainty.

The effects of the pandemic have exposed existing vulnerabilities in supply chain services, processes, and product supply. The global health crisis has opened up the need for industries to come together in interdisciplinary communities to take action and create new solutions and collaborations that were not considered before COVID-19. To transform manufacturing in Europe, for instance, we can't just do more of what we used to do.

There is a need to train all of the available workforce to collaborate in parallel, with high degrees of automation and flexibility, and, where value chains are digitalized, using innovation enabled by 5G, virtual and augmented reality, artificial intelligence (AI), and machine-learning technology.

ISO: In the post-COVID recovery, how can ISO 56002 maintain its role as a key driver of sustainable growth and value?

Johan Grundström Eriksson: The growing importance of, and need for, managing innovation in these times of accelerating digitalization can partly be grasped by looking back at how product cycles and software solutions in telecom and software industries accelerated to almost unmanageable speed, affecting all other industries, in the past three decades. Running your business at this speed requires a robust business model, stability in core processes and know-how, but also a very high degree of flexibility to respond and adapt when volatility strikes. With COVID-19 and its impacts floating up to the top of corporate governance agendas in every business, in every country and in public-sector organizations at all levels, one thing is clear: they don't want to be as unprepared and reactive next time a crisis happens. Owners, investors and Boards want to be sure their organizations are prepared, and not only for reactive mobilization and mitigation.

Resilience, adaptability and sustainable profitability are words often attributed to withstanding volatility and uncertainty, but how do you become fit for the future when you are stuck in your existing structures? This is where the release of ISO 56002's innovation management system was very timely and is extremely handy for organizations that must still manage the change agendas and operational excellence of their existing business. Now they can ensure that they explore future sources of revenue in parallel, before further disruption or crisis causes permanent red numbers.

ISO: What do you see are the lessons and opportunities of the global health crisis and how can ISO 56002 ensure these are not squandered?

Johan Grundström Eriksson: The challenges and uncertainty caused by the pandemic have been a wake-up call and owner representatives and directors are now asking for new ways to ensure resilience and long-term growth. However, making the most of new opportunities is not just a matter of broadening perceptions or mindset. There also needs to be deep engagement to make new bets and address challenges ahead and, in the absence of agreed ways of working, there is now a need for a support and follow-up system, which can take years to agree and implement if you have nothing in place already.

ISO 56002 offers the framework to gather together and pick the best pieces from what you have already and build the rest when you need it. Additionally, when you identify that new expertise is needed, onboarding at several levels of the organization, as well as adding new suppliers or partners, will require some kind of synch and declaration to ensure engagement and to open up multiple operative ways of working.

What ultimately filters up or down your corporate governance today tends to be bundled with existing business matters that fit the scope of yesterday's business, which will squander most opportunities. This leaves "white space" innovation to new entrants from other industries and competition that know how to collaborate through innovation. The only way to open up to new opportunities beyond today's business scope is to agree on which ones to go for at Board and owner level, and that requires a more systematic way to manage opportunities.

Really, if you are already aware that ISO 56002 exists, the only thing missing to get going is mandate and appointments. The rest is something for the organization to learn as you go along because uncertainty is something everyone will need to learn to accept and take action to handle.

ISO: How can ISO 56002 help to restore sustainable economic growth?

Johan Grundström Eriksson: The societal vulnerabilities exposed by the pandemic, both at the macro- and micro-level, have not only brought lockdowns of countries and borders, inflicting economic harm, but also clearly demonstrated what we can achieve as communities when we collaborate towards a common goal. The collaborative efforts to mobilize for production and procurement of protection gear and the development and distribution of vaccines at super speeds demonstrate the ability to react to disaster. However, this has been done at a tremendous cost, and with considerable effort and strain on societies and economies that we cannot afford over time.

These reactive capabilities will be needed again and again as we focus on the "new normal" ahead of us, and for other societal and climate challenges. The increasing awareness that peace and security in society are a prerequisite for business in a global environment helps most global companies that are already engaged in human rights and sustainability work throughout the supply chain. This awareness ties in closely with the 17 United Nations Sustainable Development Goals (SDG) and companies are understanding that they can help to achieve the SDGs in the course of business activities.

UNOPS, the operational arm of the United Nations (UN), for instance, started work to use its procurement power to refocus on innovation (i.e. finding proactive solutions to large problems instead of simply reactively buying blankets, tents and equipment for crisis and catastrophic events). Many regulatory hurdles exist, preventing the UN from efficiently collaborating for innovation, but examples such as UNOPS rolling out Global Innovation Centres as lighthouses for societies and companies that have solutions and start-ups that address the problems and challenges ahead stand us in good stead for the future.

This way, by bringing the solutions much closer to the real problems at hand, we don't lose as much time and the work towards achieving the UN's Agenda 2030 and its Sustainable Development Goals speeds up. It also shows that it's possible to configure organizations for collaboration. In the case of Sony, where I held roles such as deputy head of Management System & Audits, Corporate Strategy, and headed up Partnerships and Sponsoring in Europe at Sony Mobile, we already had innovation infrastructure in place to collaborate with UNOPS at multiple levels. These included the strategic, collaborative mandates and support of Sony's top management, a long software tradition and mentality of adapting to the fast-paced telecoms industry, a way of working that allowed flexible, iterative processes and the corporate start-up accelerators in place in Japan and Europe.

The years 2020 and 2021 may seem like completely lost years, but we now have a common understanding and valuable experience to learn from and to use as an example when we turn our focus again on to the SDGs, using the content in ISO 56002 as ingredients in creating their variants of sustainable innovation.

To make this happen in the fastest way possible, innovation should be expected by the owners and Board executives and allowed as a mandate. Throughout organizations, the management of innovation needs to be integrated into strategies, policies and regulatory frameworks.

And new processes need to be put in place because the real work being done today is ultimately carried out by people in organizations that are run by frameworks, management systems and processes that are configured for other purposes. This is where ISO 56002 serves as a blueprint for organizations that want to build and integrate innovation capability that is compatible with their existing frameworks and future goals.

ISO: As our world heads for what some are calling "a great reset," can ISO 56002 help to shape the new reality?

Johan Grundström Eriksson: Most of the multinational corporations that have adjusted to the digital era or have managed to maintain a dominant position in their industries are attached to value chains, business models and dependencies on regulatory requirements evolving since before the millennium shift. This means the management systems and structures currently running the world are inherited and built up from copies of binder-resembling repositories and that all of us working in business management, governance and legislation will not change overnight.

As the existing ISO frameworks for management systems, such as the Annex SL, have already been aligned for some years, adopting companies have decreased the complexity and cost of implementing enforcing structures and can look forward to faster, better and less costly automation and integration of management systems.

To quote the speculative fiction author William Gibson: "The future is already here – it's just not very evenly distributed." This means most of what will constitute change in the short to mid-term is what we already have or what we decide to engage in. In essence, AI will augment us in Board work, in prediction-making and management decisions, in reporting and in auditing.

This is a trend to be confirmed by more scientific research. But of all the existing frameworks and management systems, the innovation management principles of ISO 56002 – and the innovation management family of standards with its future focus – are the framework needed to create and align synergies and opportunities that arise from predictive automation and reporting of compliance-related requirements within and across industries.

What limits us at all levels is not just a lack of curiosity, imagination and know-how. It's also mandates and methods to explore the best ways to manage uncertainty and supporting structures that balance opportunity, risk and resources across the organization.

That is why ISO 56002 and ISO's innovation management series are a very good framework to start with, to apply, adopt and integrate with other management system standards. Not only for managing risks associated with information security, quality, environment, occupational health and safety, but also with a broader engagement through social responsibility (ISO 26000) and reuse through better asset management (ISO 55001).

A better reuse and alignment of the supporting structures and the engagement of employees that already have this know-how can accelerate results and amplify the overall effect across organizations when collaborating internally to solve the real problems at hand. We will see many ways to combine innovation management principles and mechanisms in the future, to address uncertainty and risk in existing business, and, more importantly, to create flexible, robust and resilient value chains and new revenues from sustainable business models.

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Blockchain and Cloud Computing: A Powerful Mix

BY GOVINDA MENGJI

Blockchain is an indispensable technology that is hitting the headlines due to the popularity of cryptocurrencies like Bitcoin and Ethereum. Is Blockchain just about cryptocurrencies? The answer is an emphatic no. Blockchain technology has moved beyond cryptocurrencies to another level.

Do you know that many companies are utilizing blockchain technology in the supply chain, tracking goods digitally across international borders in real-time? This technology has also enabled artists to safeguard patents and copyrights. Entities are using distributed blockchain ledgers to enhance the security of document verification. Blockchain solutions, if used at an initial stage, have the potential to reduce healthcare costs

Innumerable industries, be it healthcare, supply chain, insurance, finance, media, and entertainment, etc., are all gravitating towards blockchain technology as it enhances trust, security, transparency, and the traceability of data shared across a business network.

The power and usage of blockchain technology in combination with cloud computing has enhanced significantly. Let's understand these concepts.

Blockchain

Blockchain is an immutable shared ledger technology and its application is decentralized. There are multiple blockchain platforms available, for example: Ethereum permissionless, Hyperledger fabric permissioned, R3 Corda permissioned, etc.

Let's unlock the key concepts of blockchain:

- **Distributed ledgers:** A distributed ledger is a database that can be found across all participants nodes. Unlike a centralized database, a distributed ledger is decentralized, which removes the need for a central authority or intermediary for processing, validating, or authenticating transactions
- **High Security:** It's highly secured because it offers special disguise cryptography. Added with decentralization, cryptography adds another layer of protection for users. The information on the blockchain is hashed cryptographically and hashing is irreversible
- **Immutability:** A concept wherein the ledgers are unalterable and the user is assured of uncorrupted ledger which is the need of the hour
- **Smart contract:** A smart contract is a program that runs on each node. It's a collection of code and data that resides at a specific address on the blockchain. The objectives of smart contracts are the reduction of need in trusted intermediates
- **Decentralization:** Decentralization is not a new concept; the network is decentralized as it isn't controlled by any or a single person, organization, and/or entity. All the node members maintain the decentralized network which is also referred as peer-to-peer (P2P) network
- **Consensus mechanism:** Consensus is a general agreement. Blockchain consensus mechanisms help to guarantee that all nodes on a network are synchronized and its transactions are legitimate. Consensus is responsible for validating the blocks, ordering the blocks, and ensuring everyone agrees with them. The consensus protocol is the core to the existence of blockchain platforms, behind every blockchain, there is a consensus algorithm

Consensus mechanism algorithm

Two significant, widely-used consensus mechanisms are:

- **Proof-of-Work (PoW):** PoW validates the block of data nodes that is essential in solving the puzzle, it works on rewards with high energy consumptions. PoW prioritizes security over speed. It requires 51% of patricians to agree on data to add it to the block
- **Proof-of-Stake (PoS):** With PoS, there is no question of guessing the puzzle. PoS algorithm pseudo-randomly elects a node (anyone who owns the coins) to propose the next block to the blockchain. It works on low energy consumption rewards. The transition process is fast compared to PoW.

High energy consumption in blockchain technology is considered a drawback and is criticized. However, we need to understand that it is due to Proof-of-Work (PoW) consensus. Moreover, the consensus can be upgraded. Due to high energy consumption and other challenges of PoW Consensus, Ethereum is upgrading from PoW to PoS as it not only consumes less energy compared to PoW but also increases the speed and efficiency.

Cloud computing

Cloud computing provides on-demand access to compute resources like Bare-metal servers, virtual machines, security, storage, networking, database, software, etc., via the internet. In cloud computing, we have three major types of computing services like Infrastructure-as-a-service (IaaS), Platform-as-a-service (PaaS), and Software-as-a-service (SaaS). Similarly, cloud service providers are offering blockchain-based technology which is known as Blockchain-as-a-service (BaaS).

Blockchain on cloud

When blockchain is deployed onto the cloud, there will be immense leverages in scalability, reliability, security, fault tolerance, data management, computing capacity with pay as you use model. Additionally, blockchain infrastructure can be created in a few minutes where nodes can be hosted in multiple availability zones and cloud-based blockchain solution can be easily integrated with other cloud services.

Blockchain frameworks like Ethereum, Hyperledger, R3 Corda, etc., are available on Cloud and provided by multiple cloud service providers (CSP).

The best thing about deploying a blockchain application onto the cloud is that all the required infrastructure to support a blockchain network (computing, storage, virtual machine, containers, etc.) is provided and managed by the cloud service provider (CSP) and the organization needs to focus only on developing the blockchain application.

Currently, even mining is being carried out using cloud computing. Approximately 25% of the Ethereum workload all over the world runs on the cloud.

Public and private blockchain vs public and private cloud – how do they differ?

The terminologies of public and private cloud are different from public and private blockchain. Now the question arises, if blockchain is implemented on a public cloud, is it a public blockchain or private blockchain?

- **Public cloud:** Is a pool of resources owned and managed by a cloud service provider with pay-as-you-use model.
- **Private cloud:** All the resources like hardware, software, etc., are owned and managed by a dedicated entity or organization with high capital expenditures and operational expenses.
- **Public blockchain:** Is an open network, where anyone can join the network, all the transactions are public, and all the nodes are equal, which is even called a permissionless blockchain, such as Ethereum.
- **Private blockchain:** A restricted network where the specific and approved participants are allowed to join. Applications tend to be less decentralized; the blockchain is controlled by a central authority for accessibility. An example of private blockchain would be Hyperledger.

The next question that arises is when designing a solution, what type of blockchain is needed, whether all participants are considered equally or whether they should have special permissions?

The guiding source to use a permissioned or permissionless blockchain technology are:

- Public / Open
  - Everyone can write ledgers, only a few can read ledgers
- Public / Closed
  - Everyone can write ledgers, everyone can read ledgers
- Private / Open
  - Only a few can write ledgers, many can read ledgers
- Private / Closed
  - Only a few can write ledgers, only a few can read ledgers

The usage cases of permissioned or permissionless blockchain technology:

- **Public and open:** Digital currency, online library, gaming, etc.
- **Public and closed:** Whistleblowers, voting systems, etc.
- **Private and open:** Supply chain, insurance, etc.
- **Private and closed:** Law enforcement, government financial records, etc.

Blockchain audit on cloud

Organizations can audit blockchain solutions on the cloud. In the blockchain technology, each and every transaction is validated and recorded with a timestamp, therefore auditors can easily verify and trace the previous records by accessing any node in the distributed network. Each transaction can be relatively traced to previous transactions. It improves the traceability and the transparency of the data stored in the blockchain.

Challenges of blockchain on cloud

- **People:** Lack of awareness and understanding of technology
- **Process:** Limited number of reference architecture like high level, low level design architecture, and security reference architecture
- **Technology:** New threats/vulnerabilities, using shared infrastructure/security solutions, and managing blockchain operations

- **Business & Governance:** Lack of regulations, governance/data sovereignty

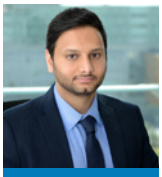
Conclusion

Every technology has pros and cons hence the organization should evaluate the risks and challenges of adopting the blockchain technology.

Prior to migrating from traditional application to blockchain application, the foremost requirement is to clearly understand and define the existing database/technical challenges and business requirements.

The wise decision would to consider conducting the Proof of Concept (POC) of blockchain on cloud whereby organizations can test their use cases before investing on blockchain infrastructure. Once they are familiar with blockchain technology and if it meets their technical and business requirements then the organization can head towards blockchain-based application on cloud.

Whether blockchain blocks the path or clears the passage is based on an organization's timely decision. As blockchain and cloud are a powerful mix, in future, there will be an accelerated increase in the demand for the blockchain technology on the cloud.



Govinda Mengji
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Govinda Mengji is a senior specialist at Deloitte - Cyber & Technology, Risk Advisory. Govinda has a degree in computer science and is a senior specialist technology consultant. He has implementation experience in technologies like cloud and virtualization. He has experience working with multiple industries such as aviation, health insurance, stock exchange, oil and gas, and banking sectors across the GCC Region.

Govinda is blockchain and cloud certified and supports organizations with cloud strategies, technology vendor evaluation, cloud security audit, technology resilience, and IT disaster recovery (DR).

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How Your Organization Can Achieve Expertise and Leadership in the Times of Blockchain and AI

BY JASON JULIANO

Blockchain and artificial intelligence can have a tremendous impact on businesses and will probably drive innovation in the future. By now, companies have not only heard about Blockchain and AI, but have started implementing them as well. Some have it in production, but most are still experimenting around with it in development and testing. It is becoming increasingly necessary for all companies to integrate blockchain and AI technologies or be at risk of being left behind. As a managing director at Aponia Data Solutions, I have led customer-centric digital transformation and innovation engagements integrating blockchain and AI for customers and worked directly with the line of business and C-level executives. Blockchain and artificial intelligence play quite a role in digital transformation processes, as well as offering services to clients that want to apply blockchain technology on their products and services, and additionally, on tools surrounding the usage of AI-enabled blockchain.

Organizations and leaders on the path of innovation will encounter barriers that prevent them from digital transformation and adopting artificial intelligence and Blockchain technologies. Using these new technologies to drive digital transformation can be a challenge. Frequently, executive teams do not fully comprehend the art of the possibility, the big idea that will accelerate their business, and what they can do about it.

A fundamental issue with several of these hurdles is the lack of skills and talent. There is still a significant talent shortage in the field of new technologies, particularly AI and blockchain. Many of these businesses now want to leverage their inability to locate qualified employees, and that means they must reskill their existing personnel. Many companies are doing a fantastic job with it since they have been able to shift their culture and embrace creativity with new employees and give their existing

talent new skillsets. This has allowed existing personnel to combine their subject-matter expertise with new artificial intelligence and blockchain technology.

Another challenge in terms of adopting new technology is a lack of a strategic approach. Many organizations have started experimenting with blockchain and AI minimal viable products (MVP) and pilots. However, none of this is coordinated well enough, so we collaborate with business leaders through design thinking exercises and coming up with big ideas to strategically use some of these emerging technologies to grow their business while focusing on providing exceptional customer value. Too many AI and blockchain pilots have been disconnected and unsuccessful. Hence, it would be best to look for a few low-hanging fruit projects based on big-idea items that connect with corporate strategy and then leverage technology to implement digital transformation. Moreover, to illustrate that innovation leads to success and a better customer experience, "fast-wins" are worth a glance. These are the most substantial barriers to digital transformation, blockchain, and AI globally, and it is best to start directly with your organization's culture.

Leaders must nurture an innovative culture to be successful with integrating blockchain and AI into their organizations. Establish a small, focused team to oversee the research of emerging technologies, development,

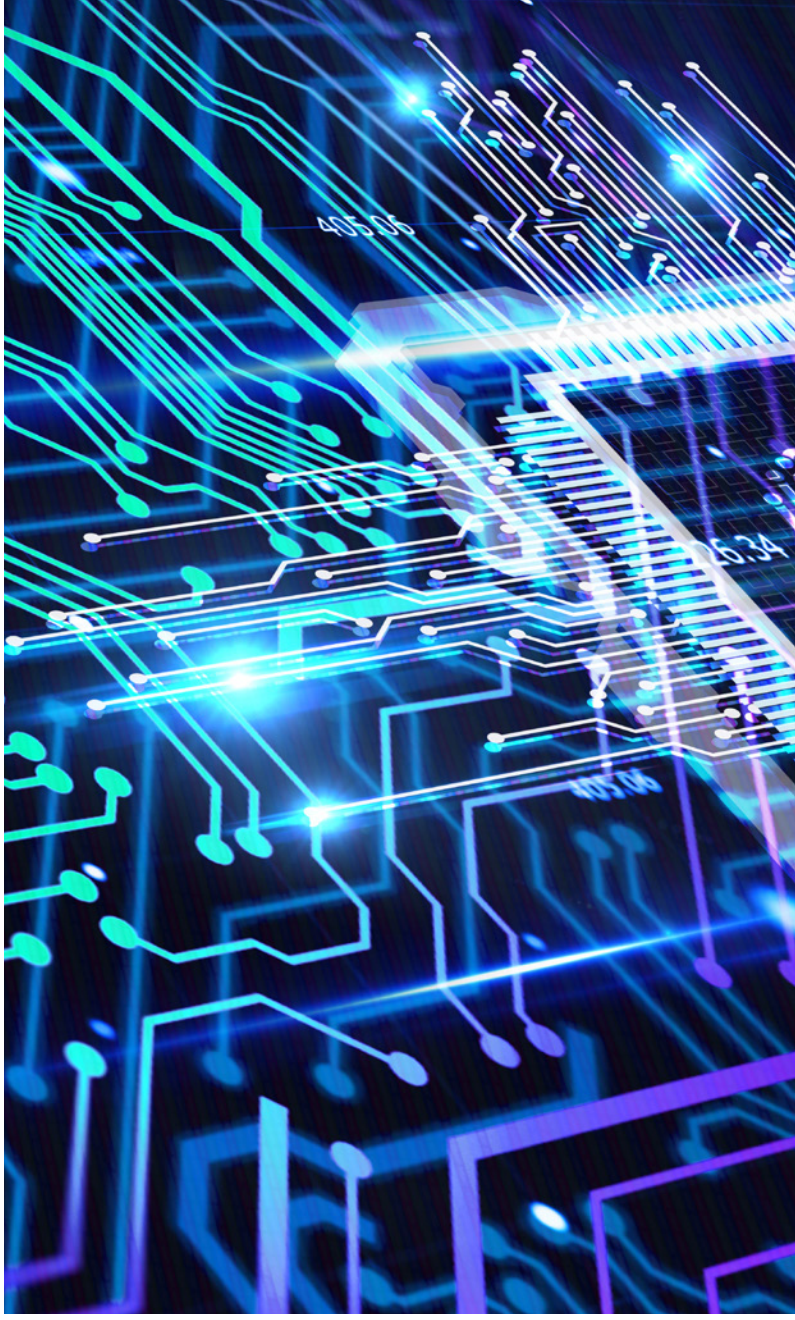
and continual enhancement of specific new ideas, products, and services to promote accountability and commitment. Creating an efficient organizational structure to support innovation must be aligned with different functions around blockchain and AI that include cross-functional teams from finance, IT, sales, marketing, and operations. Measuring the outcomes and success of innovation is critical. Leaders must also be more agile in their internal operations. The focus on innovating internal processes is as important as innovating the customer experience. It requires a change in terms of what they do in business processes and this is a very understandable fear and reluctance.

There's a great number of opportunities to finance not just large-scale infrastructures but many small-scale activities too. Many businesses can now include their products and services into an AI-enabled blockchain network with their business partners, through entering into digital contracts, and then receiving the items. This will trigger payment, and you'll be able to monitor those things from the raw materials to the end customer. That continuity of information and data exists at every step along the route, from one end of the chain, the end customer, to the raw materials.

Furthermore, we can elaborate by taking an example, such as Walmart. Walmart is an American multinational retail corporation that operates a chain of hypermarkets, and it is considering putting many of its vendors on a food blockchain network to increase supply chain transparency.

This provides Walmart unprecedented visibility into the life of every single product it sells by tracking every step, from the harvesting of raw materials to the manufacturing of a finished item, delivering the good to the store, and finally to the point of sale. Because blockchain allows for the development of an immutable audit trail, Walmart and other corporations the following suit may provide greater certainty to their customers, investors, and regulators.

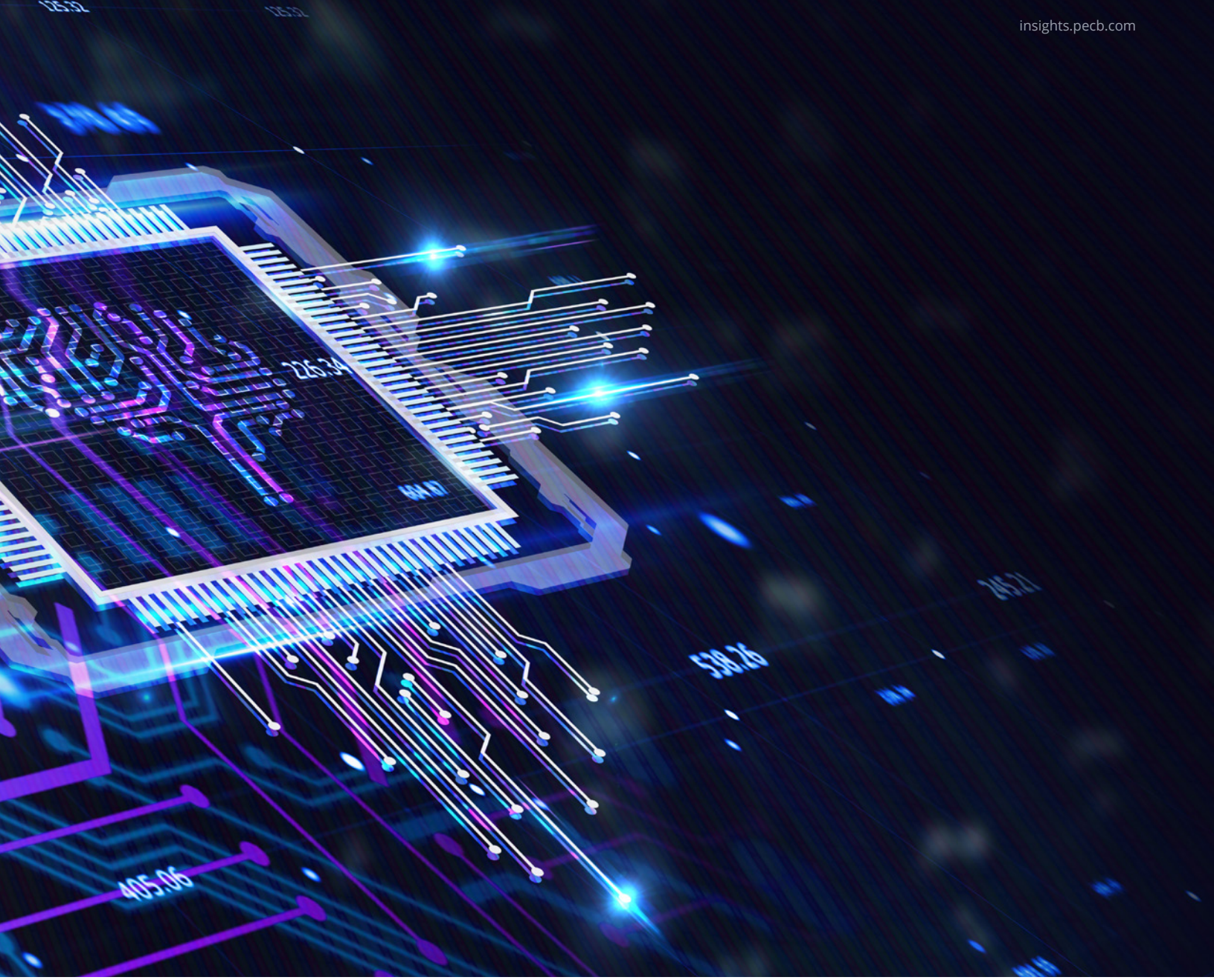
Leaders can learn from the Walmart case that having a proactive approach to project management emphasizes the necessity of the business department, not the IT department, assuming ownership. Make sure the business case is clear and that you not only understand the technology but that you also understand the business challenge. Cross-collaboration is crucial for ensuring that all departments engaged in the process are included in the execution. In any corporate change, demonstrating the value of technology and having a goal to strive for is critical. Ensure to execute those quick-win pilots first before launching your AI-enabled blockchain project on a large scale. There are many blockchain use cases where



the most difficult thing is prioritizing the one you think there's a ton of business value.

However, the healthcare industry is one of the areas that I believe will see a lot of work around Blockchains. E.g., in some states within the U.S., hospitals sustained a combined impact of billions of dollars of lost revenue and increased expenses as COVID-19 cases surged through these states. While some states struggle toward economic recovery, state hospitals have increasingly relied on the charity care subsidy program, which treats the uninsured citizens within the state. By creating an immutable digital record of the free and point of care services they provide, hospitals can recover much-needed revenue for a sector that reliably provides hundreds of thousands of jobs.

The opportunity for blockchain and artificial intelligence is enormous across several industries of all sizes. It is all about breaking down the informational silos



between companies and understanding the life cycle of technologies, not to mention the fact that these life cycles are continuing to shorten as the pace of technological innovation increases. When a company can recognize when emerging technologies are ready to go mainstream giving a maximal return on investment.

Acquiring the latest AI and blockchain technology has its benefits and its associated risks. However, not engaging in an innovative strategy can make a firm lose its competitive edge. It is crucial to identify both the potential benefits as well as the accompanying risks.

And then put those benefits and risks into a financial perspective to use open innovation strategy as a company looks into aligning their strategy with the use of artificial intelligence and Blockchain. Leaders must embrace artificial intelligence and Blockchain as the Future of Business.

Jason Juliano
Managing Director of
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Jason Juliano is a results-driven business technologist and leader in inventing “think-big” strategies that shape the market today. Jason has over 20 years of experience as a Technology & Business Executive within many industries.

Jason brings clients smarter business decisions through digital transformation and innovation practices. He has been IBM Champion since 2018, advocating and supporting the community within Cloud, Blockchain, Data, and AI technologies. He is recognized as a thought leader within Microsoft, IBM, Google, and AWS communities.

Managing Your Risks in Adopting Emerging Technologies

BY FRANK MASSEY

2021 is shaping up to be a transition year as economies recover from COVID-19. The pandemic had a beginning, and it will have an end. While we endure this pandemic, artificial intelligence, machine learning, predictive analytics, and the commercial applications of these emerging technologies keep opening doors of opportunities. As organizations explore and adopt these emerging technologies as part of their innovation strategy, what are some of the risks they face?

Based on conversations with executives in financial services, banking, and insurance, three come to mind: overcoming the dependency on legacy systems, putting into place supporting business practices, and mitigating cybersecurity threats.

> **"Managing innovation will increasingly become a challenge to management, and especially to top management, and a touchstone of its competence." Peter Drucker**

Overcoming the dependency on legacy systems

Gartner defines a legacy application as "an information system that may be based on outdated technologies, but is critical to day-to-day operations." Some organizations with legacy applications in place hamstring their efforts in adopting emerging technologies by creating a dependency on upgrading their legacy architecture.

The nature of emerging technologies is that they do not always need legacy systems to upgrade. Many can be customized with drag-and-drop components. As long as the information can be securely passed from legacy systems to new technology platforms promptly, the adoption of emerging technologies can continue. Where timeliness is an issue, proxy information can be tested and used until a workaround is developed. In this way, upgrading legacy systems can occur independently while the organization reaps the benefits of adopting emerging technologies.

The point is, dependency on legacy systems could be more of a psychological issue than a practical issue. The consequences of inaction could be playing catch-up for

years with competitors who have overcome this challenge. Therefore, the sooner this is overcome, the sooner an organization can explore and adopt emerging technologies to stay current and relevant in today's marketplace.

Putting into place supporting business practices

Once an emerging technology is identified as a good fit for an organization, another risk lies in its implementation. No matter how brilliant the technology is, the implementation will fail unless supporting business practices are put into place, notably Organizational Change Management (OCM).

Implementing emerging technology can seem like a disruptive threat to many organizations. Hence, change management concepts must be implemented early on. The human element of technological adoption is the most critical factor in a successful implementation, especially competency alignment and cultural fit. The business transformation journey is filled with rewards, including building deep, and enduring customer relationships. However, it does have many moving parts, and OCM requires full-time attention from the Program Management Office (PMO).

All significant business transformation programs will use the organization's PMO. The power of emerging technology is such that there are risks of misuse and even abuse.

Therefore, it is wise to strengthen the organization's Ethics Management Office (EMO) and align this with regulatory governance functions. This will allow for better dialogue with policy-makers, external audits, and regulators. If not already in place, organizations should consider building a PMO and an EMO to assist with OCM and address potential ethical issues. Putting into place supporting business practices is a critical success factor for adopting emerging technologies.

One Bank had selected a promising decision engine and dynamic customer journey platform with high hopes to grow their portfolios at acceptable levels of risk. However, initial implementation efforts floundered and eventually failed. Why? The implementation director had competency gaps in transformational leadership and organizational agility. The implementation team members were unable to encourage the innovative culture that needed to support the business transformation. When competency alignment and cultural fit issues were addressed, the Bank encountered a successful implementation, resulting in better customer experience and solid portfolio growth.

Mitigating cybersecurity threats

A recent poll at the Global Risk Institute in Financial Services asked executives for the most challenging issues in the following 12 to 24 months.

The first challenge was the adoption of emerging technologies, and the second was cybersecurity threats. Cybersecurity threats include:

- Distributed Denial-of-Service (DDoS) attacks, where the aim is to flood the target's bandwidth, making it unavailable or too slow for legitimate customers.
- Person-in-the-Middle (PITM) attacks, where the attacker intercepts the communications between two parties to make each believe that they are directly communicating.
- Advanced Persistent Threats (APT), which play a long-term game of stealth to remain undetected after breaching a network.

Cybersecurity incidents continue to make headlines. Many organizations cope with a daily barrage of malicious activity, so much so that cybersecurity insurance is re-evaluated regularly, and damage control drills are practiced. The world's most valuable resource is no longer oil, but data. However, data is useless unless vulnerabilities in emerging technology are addressed to avoid compromising critical infrastructure. The selected technology needs to have complete visibility of technical infrastructure and oversight

of alerts. Many cybersecurity solutions have corresponding mobile applications that allow for continuous monitoring of an organization's technical infrastructure, any malicious activity, and security breaches.

It is crucial to monitor both incoming and outgoing data traffic, renew security certificates, and regularly install software updates and patches. Successful adoptions of emerging technology include an enterprise-level assessment of cybersecurity solutions and follow-up to address any gaps.

How well will you manage your risks in adopting emerging technologies?

Emerging technologies allow organizations to "see" online customers and significantly enhance customer experience and retention through dynamic mass customization. All people, processes, and systems of an organization can be fully integrated within a holistic ecosystem, thus reducing risk and allowing profitable scaling.

Adopting emerging technologies is not for the faint of heart. If you want to truly differentiate yourself from your competitors, there are tremendous rewards in appropriately managing your risks.

in

Frank Massey
Vice President, Enterprise Risk Management, Business Transformation

Frank Massey is a Governance, Risk and Compliance (GRC) executive with global experience in Western Europe, North America, and the Middle East. He has built a Risk Management department from the ground up and has spearheaded regulatory governance programs.

Frank has worked for American Express, CIBC, Citigroup, and Scotiabank. While leading enterprise risk management and compliance initiatives, Frank has liaised with external audits, rating agencies, and financial regulators.

Frank has presented at the CPA Ontario Association, Global Risk Institute in Financial Services, and the Rotman School of Management on "Artificial Intelligence: Optimizing Business Transformation, Reducing Risk & Scaling Profitability." Frank blends a computer science and statistics background with an MBA in strategic management and finance to help organizations with innovation, business transformation, and leveraging GRC for profit.

TECHNOLOGY

Improving Customer Experience through Artificial Intelligence

KAVI PATHER

> **“The number 1 thing that has made us successful by far is a compulsive obsession with the customer”**
> **Jeff Bezos**

We are all customers. And we all know what a great customer experience feels like. Be it the comfort of an attentive and friendly maitre’d at your favorite restaurant, the delight of unboxing and turning on a shiny new phone, or having a call center query dealt with seamlessly – in a way that makes you feel like you matter to the company.

Companies such as Amazon, now the world’s largest retailer, have owed their success, by owing to their relentless obsession with ”the customer”. In 2021, it is no longer about just providing a great customer service like Amazon used to do so well. In order to compete, build loyalty, and achieve market dominance now, companies need to ask themselves how they can shape the experience that each customer has with the brand as an individual; how they can be relevant and accessible in the right moments; and how they can predict what the customer wants next. Essentially they need to influence the things that truly affect how the customer experiences the brand and the things that really matter to them, when making a purchasing decision.

“How can companies win the hearts and minds of customers through exceptional experiences?”

AI as a technology applied to improving customer experience presents both a threat – of losing out to competitors or wasting resources through failed implementations, as well as an opportunity to out-compete rivals and delight customers. In this piece, I hope to highlight the breadth of what is possible in customer experience improvement and provide insight into common challenges that I have seen companies face when embarking on this path.

Technical note: for the purposes of this article, I refer to a broad definition of artificial intelligence which encompasses almost all algorithms associated with machine learning and data science, including, but not limited to, linear regression, deep learning, and more. From a business perspective, too much time and effort is wasted on trying to delineate artificial intelligence from adjacent fields such as statistics or vice versa. It is more useful to focus on the business value being created.

How AI is being used to improve customer experience

Customer experience is a customers' internal and subjective response to any direct, for example through purchase or use, or indirect encounters, such as adverts or branding. It covers every element of a company's offering, including advertising, purchasing, packaging, product and service features, simplicity of use, and reliability, among others. Therefore, every function of a company has a role to play in creating exceptional customer experiences. Considering this broad definition, there are four ways that I have seen AI used to improve customer experience:

1. Measuring and managing the customer experience

The two most widely used measures, customer satisfaction (CSAT) and Net Promoter Scores (NPS), fail to tell companies what customers really think and feel and can even mask serious problems. NPS and CSAT scores are often taken periodically (perhaps once per quarter) or at the end of an interaction, but they cannot be real-time.

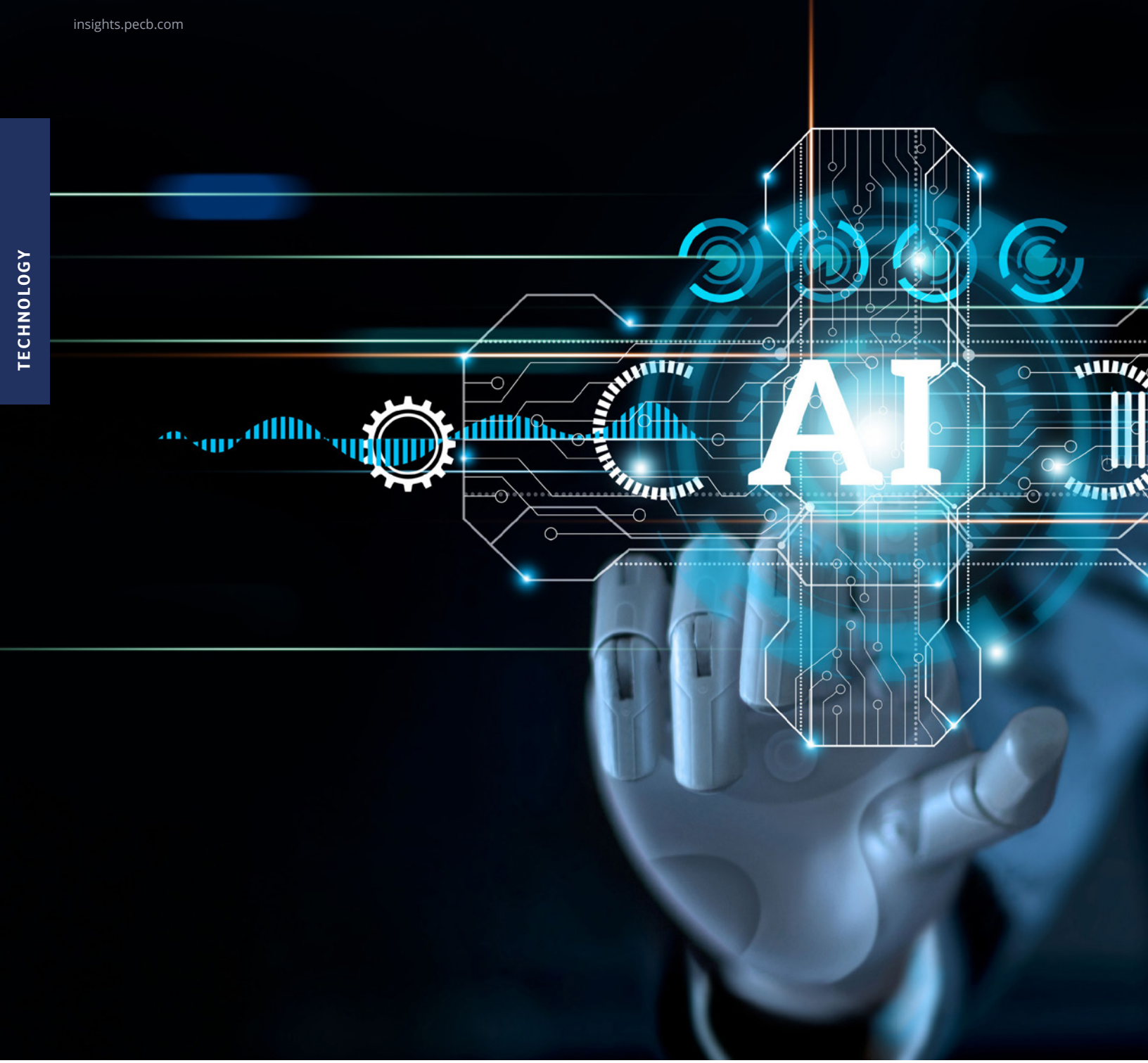
As many customers today use digital, real-time services or apps, firms can increasingly gather more real-time data about customer interactions instead of relying on simplified, single-metric ways of measuring customer experience. By combining these data with insights from direct customer comments (e.g. processed using natural language processing algorithms), analysis of customer transactions and other sources can provide companies with a deep and 360-degree view of the customer experience. For example, one customer could give a company a nine on the NPS score, but in the comments, the customer noted that “Everything was great, but I was disappointed with the check-out process and how long it takes”.

Using AI in this way has several benefits including, capturing emotional responses in real-time, providing deeper analysis to show what you’ve been missing, training your staff by showing them what’s important to customers, and helping you prioritize the actions important to customer experience.

2. Developing AI-enabled products and services

Personalization and contextual awareness

Here AI systems may use customer profile data, location data, browsing history, purchasing decisions, etc., in order to personalize customer experiences and deliver an optimal experience that is appropriate to the context in real-time.



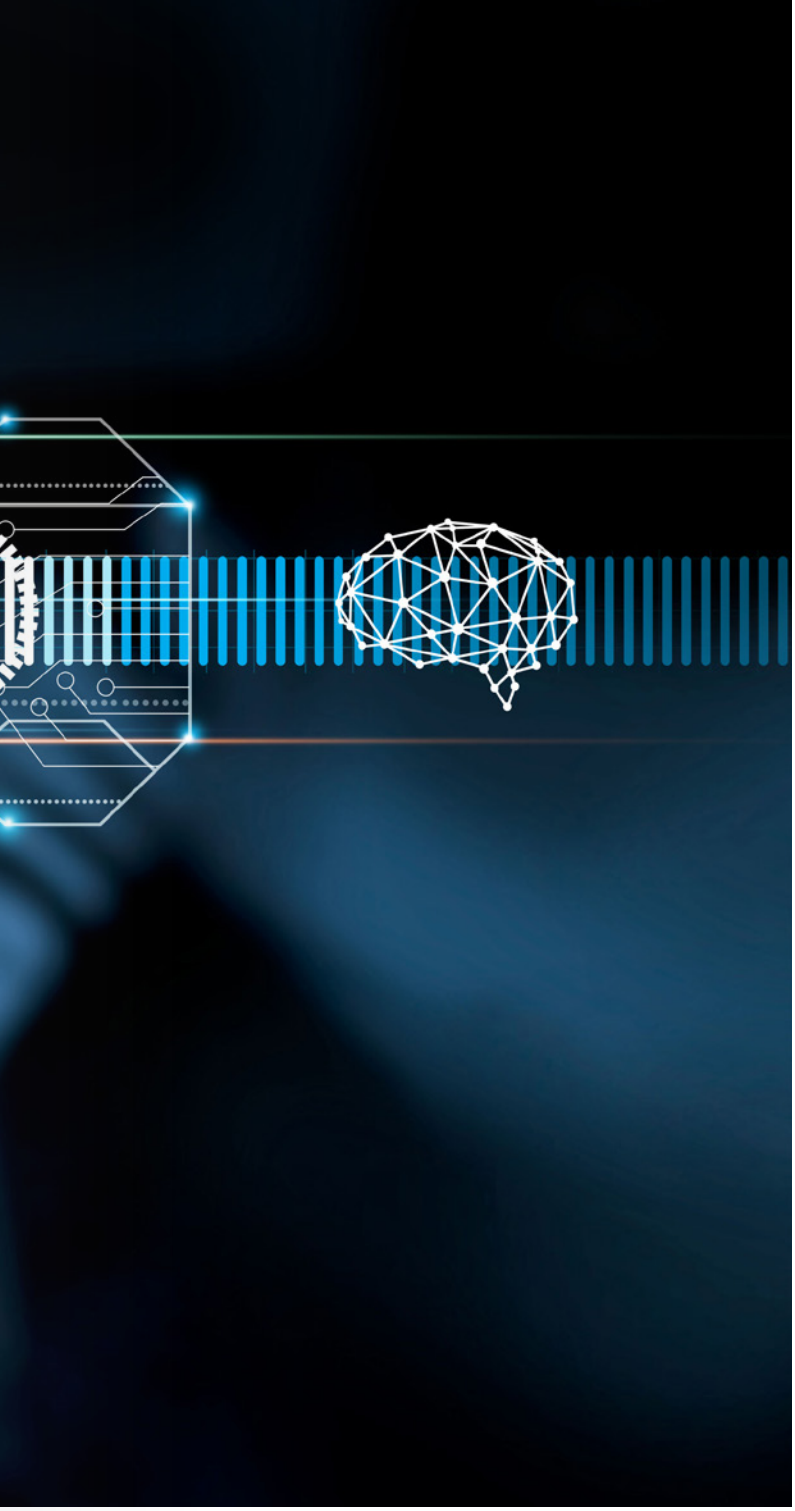
This is targeted to individual customers or small groups of customers. Imagine a hotel that can anticipate what you like and set the room up just right for you before you arrive.

Everything from the type of pillow you like, whether the blinds are drawn or not, whether you like still or sparkling water, and where the temperature of the room could be customized to just the way you like it.

But not just that, it would introduce contextual awareness by taking account of the time of year when setting the room temperature and the location and which way the room faces when setting the blinds.

Empowering self-service

A very common use of AI is the elimination of waiting "on-hold" for the next available agent to address a customer complaint (at least when it works well). Many companies now commonly use chatbots and virtual assistants to answer common customer service questions. Innovative Website hosting platform, Wix.com, has developed an ADI (artificial design intelligence) system. Customers feed the ADI information about themselves, the site they want to create, and some personal design preferences, and the site automatically generates a tailor-made site for you, making it quicker and cheaper than using traditional web designers.



Always-on available-everywhere experiences

Automating intelligent systems using AI allows for customers to have 24/7 support and access to platforms. This is something that most companies could not provide at all. Many customers do not want to wait until the start of the business day to contact them. A Stanford-developed algorithm called CheXNeXt is recently able to check chest x-rays for 14 different pathologies simultaneously and more accurately than doctors. Technology like this can one day dramatically improve patient experience in-hospital as it allows for results to be generated much quicker and at any time of the day or night. It is especially useful in remote regions where specialist doctors may not be available.

Smart user-interfaces / interactions

AI may be used to create unique experiences for customers interacting with products and systems. Smart interfaces allow the interface to adapt to the user and the context that they are operating in. Microsoft Word underwent a major interface refresh a couple of years ago, and now the interface is able to adapt not just to the size of the screen but also the context of what the user is doing and the controls they may need next.

3. AI-enabled operations to enhance customer experience

AI applications in back-end operations can dramatically impact customer experience because so many aspects of a business affect customer experience. For example, a colleague of mine was complaining to me recently about how his bank would decline his credit card transaction every single time he tried to purchase air time from a certain cell phone company; and every time he would have to call them to investigate and clear the transaction. He was clearly beside himself with frustration. I happened to be aware that this particular bank had just implemented a new AI fraud detection model – a clear example of how AI and its accuracy and implementation can have a major impact on customer experience. In the insurance industry, many insurance carriers have changed the amount of information that they request in order to provide a client with a quote. In the past getting an insurance quote in many markets involved completing a lengthy questionnaire primarily to feed their quoting engines; today through the use of more advanced data science, extensive data augmentation, and a decision by companies to be more customer-focused, these forms can be as short as just four questions long.

4. Using AI to design customer experience

AI may be used in innovation and product development for new products. Commonly, different designs may be tested against each other by using processes such as A/B testing. This is a randomized experiment wherein two or more versions of a design are shown to different segments of customers at the same time. Feedback data is collected either through observing results or collecting feedback from customers to determine which one leaves the maximum impact or drives business metrics the most. Using generative design algorithms that rely on machine learning techniques to factor in design constraints and provide an optimized product design. In 2018, General Motors adopted Autodesk generative design software to optimize for weight and other key product criteria for a seat-belt bracket.

The solution was recently tested with the prototyping of a seatbelt bracket part, which resulted in a single-piece design that is 40% lighter and 20% stronger than the original component design.

Common challenges

While the opportunities to apply this technology to improve customer experience are now clear, it is certainly not an easy journey in my experience. AI projects, in my experience, are riskier in themselves owing to the difficulties associated with data, the costs involved, and the inherent uncertainty. Being innovative with AI can therefore be doubly risky. Below I highlight some of the key challenges in my experience.

Innovating with AI

In recognizing that artificial cognition is only very loosely analogous to human cognition and often not at all analogous, it becomes apparent why it can be difficult to imagine what is possible when designing products with AI. We are dealing with a new kind of "animal". This is demonstrated in part by the breadth of examples of the application of AI in this space, where their applications range from recommendation engines to supply chain management and fraud detection models. Furthermore, the technology and its possibilities are evolving quickly – a great example is the abilities of Siri and how it has evolved. For these reasons, thinking creatively to come up with possibilities can be a challenge in itself. Even when considering an established product, the uncertainty arising from the idiosyncrasy of the problem and data adequacy means there is an element of uncertainty about what can be done.

Design thinking and other innovative techniques are the best tools to deal with these challenges in my experience, however, they need to be modified in order to be applied successfully, as AI has unique challenges as a technology. For example, even with perfect data, you may be unsure of the predictive power of the algorithm until you test it out, and small sample user testing can be difficult as the system adapts to each user and context. Getting the right team is also critical.

Skills and collaboration

Exploiting AI to its full potential in creating customer experiences that delight customers, create business value, and exploit the full potential of AI, requires multidisciplinary teams to collaborate. The most effective teams, in my experience, are those comprised of: data scientists and engineers – who can harness the power of data and technology reliably and effectively; product designers – who can empathize with customers' pain points and creatively design features/products and experiences which solve these; and business people – who can evaluate the financial viability of the project and how the proposed product or service will be operationalized by the business. Of course, many other skill sets are required as well.

Projects tend to have a higher failure rate, in my experience, when teams have solely one skillset, for example, a data science team given a mandate to "do something innovative". Many companies do not use such multidisciplinary innovation teams, and even when they have, these teams find it challenging to align their purpose and communicate effectively.

Privacy and other ethical concerns

Using intelligent systems for any application that affects people - like customer experience - raises important ethical questions that need careful consideration. Two of the biggest are dealing with data privacy and algorithmic bias (The Montreal Declaration provides a broad framework that goes beyond these for those interested).

Recent regulation has gone some way to address the privacy concern in some jurisdictions (e.g., the introduction of GDPR in Europe), forcing companies to compromise on the AI model and data being used. In the future federated learning (where algorithms may be trained in a distributed way, on-device) and homomorphic encryption (being able to use machine learning on encrypted data preserving privacy) will play a key role in providing privacy while still enabling AI.

Bias is much more difficult and tricky to deal with because unbiased data is nearly impossible to find, and even if it were possible, there is no unique technical definition for being unbiased/fair, meaning practitioners have to make trade-offs as they will not be able to get all the forms of fairness that they want. Companies, therefore, require an ethical framework to work within and ensure their algorithms live up to their values.

Governing and validating the use of artificial intelligence on an enterprise scale is challenging and not something that many organizations that have recently implemented AI have grappled with to date.

There are several challenges, the main ones being: identifying all uses of AI across the enterprise, dealing with volumes of data in validation teams, explaining models and results to stakeholders and customers, tracing data back to the source (especially to look through feature engineering), and validating hyper-parameters (which are often educated guesses).

Data challenges

Data is possibly the biggest challenge that most organizations face when trying to implement artificial intelligence. The quality and quantity of data can often prohibit applications of AI that would otherwise be possible. Even where data has been collected perfectly, it can be challenging when there is significant volume or where the data needs to be aggregated and reconciled across several systems.

A large volume of data in certain circumstances (e.g. sensor data perhaps from telematics devices installed in cars to monitor drivers of fleets or to price insurance can be a significant challenge to transmit, warehouse, and manipulate). Being good at sourcing data (both internally and externally), merging it usefully, and dealing with data that is less than ideal is table-stakes to work in innovative AI spaces. Newer technologies such as 'data fabrics' will play a bigger role in enabling this in the future.

Conclusion

In summary, firms should adopt a broad view recognizing that there are many facets to customer experience and many functions within a firm that affect it. In this context, AI has four major roles to play in improving how customers experience the products and services they use: measuring customer experience in real-time and providing deep comprehensive insights into customer experience, building smart, personalized, and contextually aware products and services, improving back-end operations which then impact customer experience, and providing designers and innovators with new tools for customer experience design.

The challenges here include innovating with AI as thinking of use cases can be unintuitive and challenging, getting multidisciplinary teams of data scientists, designers, and business managers to collaborate well, dealing with ethical issues such as bias and privacy, and, of course, dealing with poor and inadequate data. However, for those willing to take on these challenges, AI opens up new yet undiscovered possibilities for winning the hearts and minds of customers!

Kavi Pather
Partner and Africa Artificial Intelligence and Advanced Analytics Leader at EY

EY Partner, Kavi Pather is the Artificial Intelligence and Advanced Analytics Leader for the Africa region. Originally trained as an actuary (previously lead the EY actuarial practice) and having recently completed a Masters at Carnegie Mellon University in innovation and artificial intelligence, he helps clients remain competitive in a disruptive environment by combining a business mindset with data, technology, and human-centered design.

Mostafa AlShamy's Success Story

It is natural for the top management of every company to provide different types of resources like human, technical, financial, and information resources to increase the productivity and quality of their products and services. At the same time, risks are increasing in impact and diversity of sources, and this impacts organizations productivity negatively. Here comes my value as a governance, risk, and compliance (GRC) SME providing organizations with services that can increase the success rate and optimize their resources and risks.

> **I did not have a clear destination in mind at the beginning, but I had a passion. With a little bit of luck, I have found my destination which eventually became a great career.**

The beginning with unexpected pleasant changes

Most people would not believe that I majored in English literature at Cairo University more than two decades ago. In addition to my academic background in English literature, I was able to attend a thirteen-month study program hosted by the Egyptian MCIT, Canadian New Brunswick University, IBM, and Microsoft. This scholarship changed my perception, and I made my mind that information technology is the field which I wanted to master.

In 2003, I co-founded EGYBYTE and started a journey, which, until now I have not finished yet. I pursued my post-graduate studies in information systems (IS) followed by a master's degree in 2021 in the same field by developing an information technology service management (ITSM) implementation methodology based on information technology infrastructure library. Currently, I am about to finish my PhD in IS after developing a new enterprise governance of IT (EGIT) maturity model (MM) which will enable organizations of different sizes to measure their EGIT easily against multi-dimensions which are ITSM, information security management (ISM), business continuity management (BCM), and compliance.

Although my career path was not easy at all, it was full of adventures and achievements which made me ready to go further. I have been interested in gaining more and more knowledge from different sources from the beginning and my main sources of information are academia, market knowledge providers, and hands-on experience. This methodology is not easy because in academia they have scientific theories and methodologies of research while in market, attention is paid to new solutions and technical features. If we have the knowledge-gaining target on one hand, we still have the personal life and interests on the other.

During the first ten years of my career, I have invested so much in technology by learning, implementing, delivering training, and introducing new technologies to the market. I was one of the best certified Microsoft trainers in the region who delivered training to the biggest local and multi-national organization in the MENA region for years. I was selected by Microsoft Egypt to deliver training for the new products to the technical consultants of Gold Partners and most important customers. After being awarded as a Microsoft Technical Reviewer for Microsoft Official Curriculum (MOC), I was selected to introduce new products of Microsoft to the market instead of marketing staff. After reaching that high point in my career and with the appearance of the management consultancy demand in the market, I decided that the time had come to move to management consultancy. This was a smart decision at the right time.

One of the issues I had at that time was to resolve one of the toughest dilemmas I had in my career which is how to combine academia with my everyday work. I had been trying to merge my master and later PhD studies with the services I delivered every day to my customers. I developed the methodologies I used at work based on scientific research.

During the last decade, I delivered assessment, training, consultancy, and audit services to different types of customers in the field of GRC and its pillars, be it ITSM, ISM, BCM, compliance, risk, audit, process engineering, and so on. I have gained recognition and appreciation from many entities, and I was awarded the PECB BCMS auditor of the year in 2019. Although most of my customers are in the MEA region, I have customers in Europe, North America, and Asia.

Currently, I am working on achieving two dreams which are completing, testing, and publishing my enterprise governance of IT (EGIT) maturity model (MM), which will be the first stage-based EGIT MM in the world as far as I know, and I will establish a new entity dedicated to automating the GRC for all organizations of different natures, sizes, and maturity levels. Of all my achievements, if you ask me what the most important one is, I will say my family, and then work.

GRC and more

At the early stages of my career, delivering management training like ITIL, PRINCE2, COBIT5, CPDE and others was enough for me. But later, the market demand for consultancy services increased as organizations started to estimate the ROI of investing in management systems (MS) in addition to other resources like human and technical. In the last five years the customers' maturity has increased greatly and they have started to target ISO standards certification for many reasons, and this was also followed by the appearance of many regulations like the GDPR in the EU, the Saudi National Cybersecurity Authority (NCA), the Saudi Central Bank (SAMA) (previously known as Saudi Arabian Monetary Authority), the Egyptian PII Law, the Emirati NCEMA, the Central Bank of Jordan (CBJ), among others.

I have developed a framework for GRC over the last fourteen years and I still use it with all my customers, and I

always received customers' appreciation. This framework covers four dimensions which are assessment, training, development, and auditing.

Assessment

In assessment, I try to define two states which are the current state (as-is) and the targeted state (to-be) to be able to guide the customer on the journey from the as-is to to-be. In many cases, I found customers who do not have a targeted state, but they just complain about existing issues while others do not complain but they know where they would like to be. Assessment is the stage at which I get the customers to commit and resolve the resistance to change.

At this stage, I assess the customer's organization from three different perspectives. The first one is assessing the needs of the stakeholders, as I believe that the one who can determine the value of a provided service is the customer and not the service provider. I have meetings with business stakeholders which can be representatives from all internal non-IT departments or external customers, too.

After delivering an awareness session about the project, its objectives, and the importance of their participation, I start a smart and short questionnaire that covers their perception of the IT department, the provided IT services, and their value to the organization.

The second perspective is assessing processes which can be done against different references like best practices frameworks or ISO standards. If a framework is selected by the customer, I will use the framework maturity model (MM) if there is one to measure the processes maturity levels. When an ISO standard is selected, all the requirements of this standard will be assessed using the conformity and non-conformity methodology. The last perspective is assessing the knowledge of respective staff against the selected reference by providing them with an anonymous questionnaire.

At the end of each assessment, there will be a detailed report covering the findings and recommendations of each perspective enabling the organization's top management to make the right decision for the next step which can be training for staff, starting the development or improvement of the management system they are interested in, or going for the certification audit directly. In some cases, my clients choose two or all the provided options for them while others prefer to do nothing.

Training

Training is one of the fastest rewarding pillars of my methodology, as I can see the achievement of my efforts in the eyes of the trainees. After many years of delivering assessment, consultancy and audit, I still like training as it allows me to transfer my knowledge and experience to many trainees who, in a lot of cases, represent many organizations at the same time without the burden of change resistance that I often encounter in the other three stages.

I see training as a mutual knowledge and experience transfer process because I learn a lot from the trainees' knowledge and experience. Many trainees call me after years of our first course and thank me for the influence I had in their lives and careers, which makes me so happy! Some of them become consultants and implement what they have learned in many organizations. I have delivered training to more than a thousand people in the last two decades.

Consultancy

One of my main goals is developing the management systems and processes needed to enable my clients to achieve their objectives. In each consultancy project, I have the feeling that the organization is my own and I make it my challenge to improve the organization and make a change continues even after I finish my assignment. I have participated in assessing and developing the management systems (MS) of many customers in various fields like telecommunication, petroleum, government, education, retail, banking, aviation, professional services, etc.

Each client has their own story, and you should be a good listener and observer to understand it and feel the feelings of all stakeholders which can be conflicting in some cases. Consultancy is all about changing people's thoughts and behavior in the work environment which they have developed for years, which is not an easy task at all. Therefore, there shall be a secret recipe for doing so and my ingredients are good understanding of the organization's context, and increasing their interest in making change based on their motives. Change resistance is the most common enemy in all projects.

Audit[1]

With the help of PECB and the introduction of their Certified Management System Auditor (CMSA), new opportunities and relationships were made easier. Many customers need certification for many reasons and ISO certification is the best solution for them. Although PECB MS is one of the newcomers as a certification body in comparison with other very old certification bodies, PECB MS is now considered a leader in the market with more than 500 certified auditors and more than 1000 certified organizations.

I have conducted certification audits for more than 30 organizations in less than four years with PECB MS and they are spread over four continents. I have audited SMS, ISMS, BCMS, and QMS management systems separately or integrated. In auditing, my first task is to convince the auditee that my role is a quality searcher and not as a police detector or investigator. This methodology helped a lot in breaking the ice and supporting the auditees in being open about their MS implementations and areas of improvement.

EGYBYTE and more

EGYBYTE has taken the biggest part of my heart and life. It is more than a company for me and almost all our customers have become friends as a result of our friendly way of doing business, which focuses the most on customers' objectives and satisfaction. Although I have co-founded two other companies which are dedicated to providing GRC services and automated solutions, EGYBYTE is still the source of my inspiration and motivation.

[1] PECB MS offers certification audits only for those clients who have not previously received assessment or consultancy services.

PECB or in other words actual "successful partnership"

PECB is one of the best knowledge and service providers in the market for many reasons. They really know what the market needs, how to develop great services, how to build and develop partners, and how to lead the market.

This is why now we have PECB, PECB MS, and PECB University to cover different needs for different professionals. Although I have dealt with many service providers and knowledge providers in the market, I consider PECB the best one and its employees my friends and colleagues due to their continual support and kindness.

Uncompleted journey

In my journey, I have dealt with many organizations ranging from startups, small, medium, and large corporates to central banks and the biggest national organizations in the MENA region. I still believe in new opportunities and regions with no limits.

> **I believe that new opportunities bring more knowledge and experience hidden in attractive adventures. Therefore, I am open for new opportunities, especially in new regions to discover more cultures.**

Enhance your career and become a PECB Certified Management System Auditor and contribute to delivering various high-quality audits.

Certified Management System Auditor Remote Training Event | EN | Central European Time

TRAINER
Anders Carlstedt

DATE AND TIME
September 13-15, 2021
09:00 AM - 05:00 PM CEST
Register here or contact ame@pecb.com

Certified Management System Auditor Remote Training Event | FR| Central European Time

TRAINER
Serge Barbeau

DATE AND TIME
September 20-22, 2021
09:00 AM - 05:00 PM CEST
Register here or contact ame@pecb.com

Certified Management System Auditor Remote Training Event | EN | Eastern Daylight Time

TRAINER
Marisol Valenzuela

DATE AND TIME
September 27-29, 2021
09:00 AM - 05:00 PM EST
Register here or contact noram@pecb.com

Digital Currencies: What the Future Holds for Businesses

BY ROLAND BARTALUS

Blockchain and digital currency are merged. Neither exists without the other. How do blockchain and digital currencies impact businesses and their transactions in a multi-chain world where we can see various fees and the internet being redesigned completely by multiple blockchains?

Actually the most outstanding technological innovation of today, blockchain technology, has revolutionized business relationships.

While ordinary people may ask what blockchain is exactly, businesses may be curious about their options for using blockchain technology. Start-ups may decide from the beginning whether they want to do business on a blockchain basis in the future.

In general, blockchain is essential to businesses because it is:

- Open: Public blockchains feature transparent transactions and data records.
- Trustless: Blockchain records are censorship-resistant and immutable.
- Permissionless: Users can interact with each other without the need for centralized authorities or third-party intermediaries.

This article aims to provide you with an overview of how and on what platform companies can launch blockchain-based businesses focusing on one particular blockchain.

You can also find the latest trend of raising capital, and the impact digital currencies have on businesses regarding their finances, leading to the adoption boom of all blockchains and digital currencies. I will also explore a few of the security issues associated with it.

Deploying ventures

The greatest use case for digital currencies and blockchain itself at a skill is entrepreneurship. We are right now living in probably one of the best times to start building on blockchain technology. There are so many use cases that need to be met right now in the market, and the beautiful thing is that businesses finally have the tools to do it.

This article has been written on the day when the Ethereum London fork took place, which increases the scalability of Ethereum. Thus more and more apps can be developed on an Ethereum basis. Ethereum has already been having numerous similar challenges; for instance, Cardano has attracted significant attention recently, especially with high gas fees and network congestion on Ethereum, pushing applications to seek alternatives.

One such alternative for enterprises or low-budget businesses is the BSV blockchain, which is perhaps a better solution as development is cheaper while onboarding is relatively seamless.

The BSV blockchain is a platform created specifically for businesses. All digital transactions like payment transactions, value transfer, or asset registration take place on one blockchain. BSV believes their blockchain, where data and value interact seamlessly, requires a protocol designed with base layer stability that can enable massive scaling. More and more companies decide to leverage BSV blockchain tech to deploy their businesses.

They can use complex smart-contract applications as the BSV blockchain can be scaled unbounded, so no transactions are limited. Micropayments are also a feature, and the capabilities of smart contracts enable businesses to deliver value to customers in various industries like healthcare, supply-chain, big-data, gaming, and fin-tech.

The number of transactions on BSV is continuously counting, while its transaction fee remains at rock bottom.

The team behind BSV tries to do its best to develop and maintain a secure blockchain; however, the BSV network has suffered many attacks because of the code's vulnerabilities.

Enter innovations

The fundraising of digital currencies is associated with Initial Coin Offering (ICO) and, unfortunately, with the associated fraud. The most well-known risk was the so-called rug-pull when the issuer sold many worthless native tokens to investors and then ran off with the investor's money, leaving them holding a worthless token.

An innovative new blockchain-based method of raising capital precludes this. However, while the ICO boom could almost wholly be linked to the Ethereum blockchain, this new method uses the Kusama network of the Polkadot ecosystem.

The Polkadot ecosystem manages a multi-chain system, so capital raising can already take place on different blockchains. The ongoing multi-chain world encourages innovation. The central to this system is a relay chain, and multiple external parachains, e.g., Ethereum or any custom blockchains, can connect to this relay chain via a bridge.

Thus, there is no need to focus on security since the established connection to the Relay chain shares the security and scalability of the leading network.

Businesses can take part in an auction where they get a place to join the Relay chain. Once they get connected, they can crowdfund Kusama token (KSM) to raise money with their community.

Projects don't get access to the funds they raise from investors; they can't just spend the funds on anything they want. Funds are loaned to them for the specific purpose of the auction. If they win the auction, then they are connected to the relay chain. And that gives them the opportunity to build on the Kusama network.

This discourages fraudulent projects whose only goal is to cash out from investors.

Parachains are only given access to relay-chain for one year and may eventually renew it. During that year, they must lock up their KSM for the duration of the lease. That means the funds cannot be used in staking or trading.

The KSM is returned to its original owner at the end of the lease, so those who contributed KSM to a parachain will receive KSM back. They never actually spend their crypto.

This new form of fundraising is called PLO, Parachain Loan Offering. This can disrupt the crowdfunding market.

Follow all the incentives

By eliminating a trusted third party, firms can significantly reduce transaction costs, and now we are in a position when transaction fees could not be charged at all. Distributed ledger technology used by blockchains allows for instant transactions and control without the intervention of a central ledger or authority. It can process a sizeable number of transactions quickly, making it a prominent area of applications for instant money settlement and clearing.

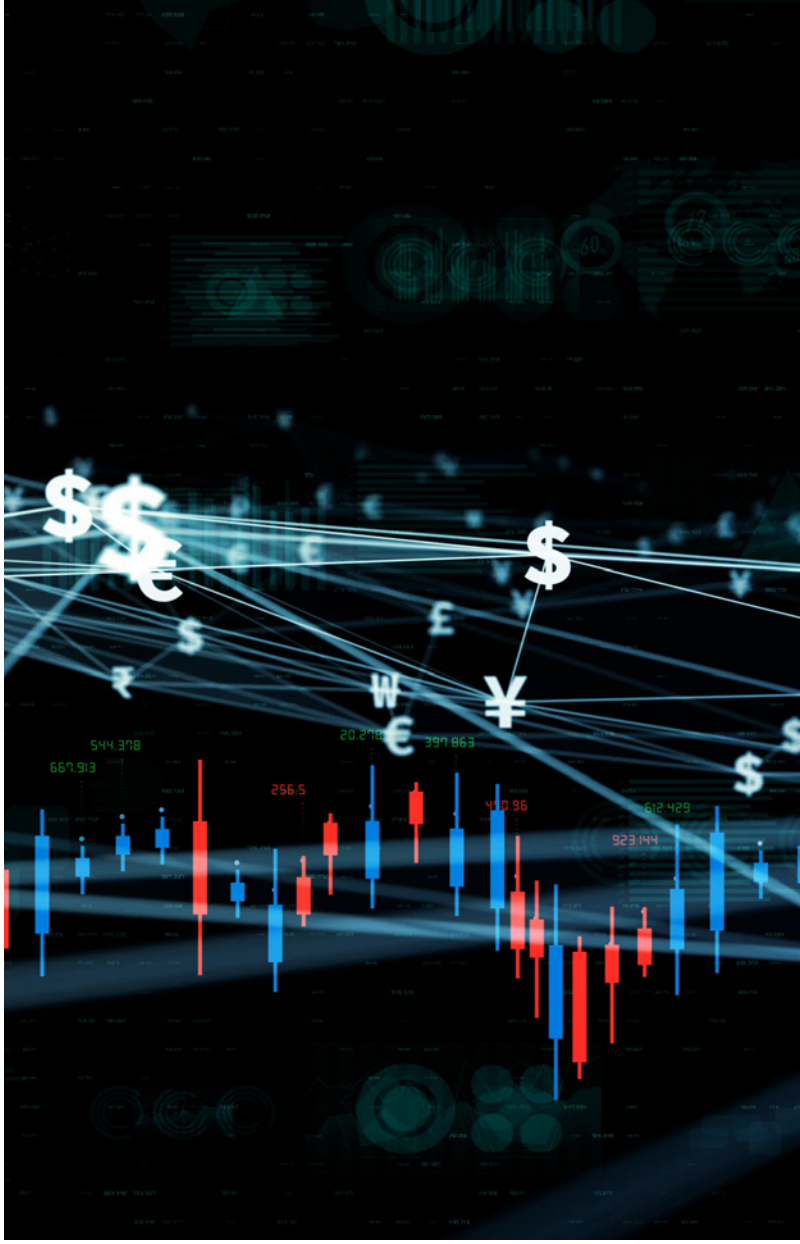
Blockchain is a decentralized database. This database is transparent, immutable, trustless, and very often can be public. Advantages include a highly secure network, transparency, privacy, no need for intermediaries, 24/7 availability, and accessibility for anyone with the internet.

Key benefits include increased trust in the system thanks to traceability of goods and services, substantial transparency, and cost reduction by replacing manual and paper-based administration.

Low transaction costs mainly reflect in international transfers. Still, the speed of transactions and the almost immediate timing of their settlement are critical. Traditional payment systems usually have several clearing sessions per day and do not function during holidays and weekends.

Moreover, the use of digital currencies enables the involved parties to avoid costly conversions of currencies.

Financial transactions in digital currencies can also provide different levels of anonymity to their users, depending on the digital currency that is used. In contrast to knowing that the Bitcoin network is fully transparent and traceable, by using networks such as Monero, transactions and participants can remain completely hidden, and all this contributes to a higher level of personal data protection.



An additional advantage is that due to the nature of the blockchain, the transactions do not require unique identification. Thus the theft of personal data is impossible.

Blockchain can also record and transfer everything of value, so businesses can potentially put all their activities to the blockchain. Digital currencies can contribute to greater financial inclusion, which is perhaps the most significant benefit of all.

While digital currencies bring us so many advantages, disadvantages can also arise. These are price fluctuation, potential theft of funds. Currently, the consumption of a massive amount of electricity is also a hot topic. However, it must be mentioned that the traditional banking system uses a lot more energy than all of the entire digital currency and blockchain space.

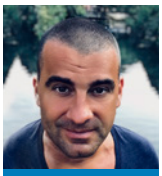
Another must for businesses and companies is the incorporation of Decentralized Finance (Defi) in their

operations. Defi provides financial freedom and credibility to users that the current financial system lack. Defi is gaining traction in investing, trading, borrowing, and lending. Businesses can take massive advantage of integrating Defi results into their balance sheet.

We are still at the beginning

The knowledge of the complexities of the blockchain industry will allow companies to start their own business or raise capital using this technology to make their business more profitable, so we can say that there are no limits to using digital currencies and real applications. Its rise has only just begun. There will be many ways for businesses to be incentivized to use digital currencies, which we have to really rely on. The adoption curve of blockchain and digital currencies has already taken off and is increasing insanely as institutional and retail investor capital flows into the system in a big way.

Digital currency could become the new conventional financial system in the future.



Roland Bartalus
Blockchain and Digital Currency Consultant

Roland Bartalus has a background in project management and has been in the crypto space since 2013, with vast experience as a crypto consultant. His university degree is a Master of Science in Blockchain and Digital Currencies.

He is passionate about cryptocurrency, technology, innovation, libertarianism, anarcho-capitalism, as well as being outdoors and enjoying life with his family. He loves to learn the best privacy practices.

SEA, SUN, AND DIGITAL NOMADS IN MAURITIUS

Photo by Kurt François from Explora

World-famous for its turquoise blue waters, immaculate beaches, lush green landscapes, and tropical breeze – Mauritius is a destination that no more needs presenting. Situated off the East Coast of Madagascar, the Star and Key of the Indian Ocean is a volcanically-erupted island with a history of human colonization starting roughly around the 16th century. The island's population is a melting pot of cultures forging from Africa, Asia, and Europe and is mainly bilingual in English and French.

After gaining its independence in 1968, Mauritius set out to become one of the most prosperous countries in the region, with an economic transformation that expanded the mono-crop-based economy, opening the door for the manufacturing sector, tourism industry, the Financial Services sector as well as the tech hub.

Remote work and the pandemic

COVID-19 has brought in its wake a series of disruptions that changed people's lives around the world. With the strict application of sanitary practices came new ways of working that are likely to affect us in the long term. Over and above these challenges, this new paradigm has opened avenues that go way beyond office premises. The pandemic has proved that given good connectivity, all work can be done anywhere virtually and without necessarily affecting productivity and reliability.

While travel restrictions are slowly lifting around the world, Mauritius has been proactively working on packages to attract travelers and professionals who wish to take advantage of its idyllic setting while enjoying all the logistic advantages of the workplace. One key initiative is the Premium Visa, which aims to encourage foreign nationals to come to Mauritius for a stay either as a tourist, a retiree, or a professional who would like to go with their family and work remotely from the island. The visa allows a non-citizen to stay in Mauritius for one year with a renewal option Learn more on www.edbmauritius.org/premium-visa.

What's in for travelers and digital nomads in Mauritius? The list is long! Mauritius offers an array of advantages that are unparalleled in the region, namely: overall safety (Mauritius is considered as one of Africa's safest countries), a modern tech hub and high internet connectivity, high standard of living with all necessary facilities, and beyond along with an excellent healthcare system. Fellow digital nomads will most certainly benefit from the numerous co-working spaces available around the island, which will provide them with all the necessary infrastructures and amenities to work smoothly while experiencing the country's natural beauty and a balanced lifestyle.

Whether relaxing on the many sandy beaches, going for a hike at the Historic Le Morne Brabant (and the numerous hiking spots inside the island), discovering the multicultural cuisine of the island, or the many shopping destinations that spread around the island, digital nomads have almost endless choices! For interesting activities, check out here.

Cybersecurity risks and solutions

However attractive and undemanding it may seem, remote work does come with its load of risks. With an increasing number in remote work, cybercriminals have been offered an even broader playground for the rampage, exploiting tens of millions of home-based workers who unknowingly provide new access points to malware, viruses, ransom wares, and phishing attacks. The targets for attackers have never been broader.

It is a common misconception that cyber security is all about information technology (IT). IT plays a crucial role in cyber security, but that alone is not enough to protect individuals and companies from modern cyber threats, especially with an increasing number of people working remotely due to the COVID-19 pandemic.

While making the most of the advantages of remote work, digital nomads should ensure that all aspects of cybersecurity are respected. These three pillars are People, Process, and Technology.

People: Everyone using IT needs to be aware of their role in preventing and reducing cyber threats, whether it is how to spot phishing emails, handle sensitive data, use Bring Your Own Devices (BYOD), or work from home securely.

Following a cyber security awareness program can help reduce the risk of cyber threats aimed at exploiting people. With people usually being the weakest link, cyber security is a business issue, and everyone has a role to play.

Process: In a remote work context, employees need to be reminded about an organization's work from home (WFH)

Photo by Kurt François from Explora

security policy while ensuring that they are following it to the letter.

Technology: When securing your remote workforce, one of the best practices is to use a virtual private network (VPN). A VPN encrypts data in transfer, allowing personal and confidential data to tunnel from one device to the next, away from prying eyes.

BDO IT Consulting–PECB partnership

BDO IT Consulting has been among the first to bring PECB training to Mauritius and is an honorable representative in the region. The partnership between BDO IT Consulting and PECB will allow our prospects and clients to explore a great variety of courses at different levels. It will also help in promoting the remote or distant learning culture in Mauritius. PECB is a certification body and a learning service which offers a wide range of certifications with new learning methods for people who wish to excel in their respective areas of expertise. People can learn at their own pace and safely in their comfort zone, especially during this time of global pandemic situation.

The partnership between the two parties will bring a broad opportunity of upskilling and reskilling in completely different means, which will be the new normal very soon. This is a perfect mean to learn and at the same time enjoy the beautiful scenery and recreational activities anywhere, anytime.

Krishna Radhakeesoon
Partner, BDO IT Consulting Ltd

Krishna has over two decades of experience working with banking, insurance, leasing, hospitality, retail, real estate, and healthcare clients in Mauritius, the United Kingdom, Kenya, Rwanda, Seychelles, Madagascar, Comoros, and Burundi. He leads a team of specialists delivering various assignments. These include cybersecurity strategy, cybersecurity awareness training, vulnerability assessments, and penetration testing, IT security assessment, ISO 27001 implementation, ISO 22301 implementation, IT general control reviews, application control reviews, IT risk assessments, IT project assurance, IT policies and procedures development, business continuity planning, system change, data migration reviews, and Big Data analysis.

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The newest version of the ISO/IEC 27002 standard is on its way!

The ISO/IEC 27002 training course provides the necessary guidelines needed to initiate, implement, maintain, and improve information security within the organization.

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- → Enhance organizational reputation

Contact one of our **authorized Resellers** to schedule your seat for the updated PECB ISO/IEC 27002 training course!

Best Reads for Understanding Blockchain and AI

Blockchain and Artificial Intelligence have had a bigger impact on business than anticipated, as they are helping businesses get creative and design different types of models and installations that can make our lives easier. Many people who are familiar with blockchain will probably associate it with cryptocurrency, and now the concept of a “digital wallet” doesn’t strike anyone as odd.

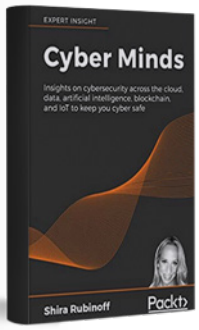
Having entered the revolutionary era of these two growing technologies, we are left asking ourselves, what is their correlation?

As is known to the public, artificial intelligence (AI) is the utilization of advanced computer systems to perform tasks which would normally require the capacities of a human being, and it can be as simple as serving you your personalized cup of coffee, or as complex as data analysis. To understand the connection between AI and blockchain better, as well as their influence in life, you can take a look at our compilation of books that explore more of blockchain and AI.

Blockchain Bubble or Revolution: The Future of Bitcoin, Blockchains, and Cryptocurrencies by Neel Mehta, Aditya Agashe, Parth Detroja

In this book, bestselling authors and renowned Silicon Valley leaders, Neel Mehta, Aditya Agashe, Parth Detroja, offer their views on blockchain and cryptocurrencies, by exploring their constituting concepts and explaining how blockchain works from a technical point of view. Giving you a rigorous analysis of crypto concepts and talking about the role of blockchain in big companies like Microsoft and Facebook, this book provides an insightful commentary and makes bold predictions on the future of blockchain technology.

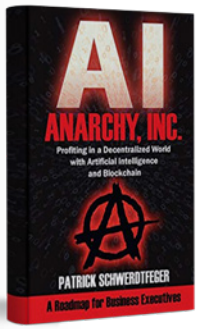
Read the book for information on the complex nature of blockchain as well as exclusive interviews with many industry tech leaders.



Cyber Minds: Insights on Cybersecurity across the Cloud, Data, Artificial Intelligence, Blockchain, and IoT to Keep you Cyber Safe by Shira Rubinoff

How do we protect sensitive information against cyber-attacks? One of the key features of this book is its exploration of the latest progress in cybersecurity, as well as its thorough examination of cyber threats of business, government, and military. The book also provides an engaging journey of discovery, from people who are very skilled at their respective fields, explaining challenges we encounter, as well as what we are doing to manage them.

If you are in charge of cybersecurity within an organization or simply interested in learning more about the field, this book is a must-read for you, as it talks about topics like cyber hygiene, data breaches, blockchain, the world's biggest data breaches, cyberwars, and more.



Anarchy, Inc.: Profiting in a Decentralized World with Artificial Intelligence and Blockchain by Patrick Schwerdtfeger

Does digitalization make data more vulnerable to cyberattacks (and consequently a threat) or more readily available to people (an opportunity)? Patrick Schwerdtfeger, an expert in blockchain and AI, stresses the need to understand digitalization in order to prosper in a decentralized world, while focusing on the trend of accelerated disruption.

The book covers AI and machine learning, Big Data analytics and algorithms, disruptive innovation and technology trends, income inequality and wealth distribution, and more!

Secure and Smart Internet of Things (IoT): Using Blockchain and Artificial Intelligence (AI) by By Ahmed Banafa

With roughly 60% of the world's population being internet users, one cannot avoid topics like IoT, AI, blockchain technology, digital transformation, smart devices, etc., which are exactly what this book discusses. Moreover, discussing fog computing, network security, zero-trust model, data analytics, DDoS and IoT, etc., Ahmed Banafa uses comprehensible language to write about challenging scientific and technical concepts, so even novices can easily fathom.

IoT has the capacity to transform the way we live, and this highly educational book explores in particular, the advantages and disadvantages of sensor networks and device comprising.

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GDPR AND ARTIFICIAL INTELLIGENCE:

Challenges and Obstacles Only or Opportunities as Well?

BY MASSIMO MARINO

EU's regulation on data protection and privacy, known as General Data Protection Regulation (GDPR), has an undeniable impact on global technology development and innovation.

Organizations around the world are still digesting all implications of GDPR and, admittedly, are not yet adequately prepared to shift their approach from facing and addressing the Regulation as a bunch of perceived obstacles and problems to rather embracing the vision, accept the challenge, and aim for the many opportunities instead.

The GDPR came into effect in May of 2018 and is the result of the standardization of multiple data privacy regulations and laws across the EU, bringing order and clarity especially for organizations with international operations. While GDPR protects EU residents, it is global in scope in that it affects organizations worldwide which target the European market or provide services managing personally identifiable information of EU residents.

The Regulation empowers individuals (data subjects in the GDPR) and gives them a high degree of control over what, how, and for how long businesses (controllers and processors) can operate with their personal data. Controllers and Processors, under the GDPR, have a series of strict obligations to abide by and technology leaders like Google, Facebook, and Amazon have already felt the brunt of the Regulation and have had to adapt, amend, and update their policies and practices to comply with the GDPR.

To aim at a compliance with the Regulation, organizations must conduct exhaustive internal assessment of their internal processes, governance, and their data architecture and technology platforms, and manage substantial changes covering both the personal and technical aspect of their processes. Seeking external expertise is always wise at any level.

At a minimum, organizations must demonstrate full awareness of all aspects of the data lifecycle and prove they can guarantee at all moments data confidentiality, integrity, and availability. An additional obligation for an organization is establishing mechanisms to detect violations and thus continuously improve processes, security measures, and controls to minimize further occurrences of a concretized and assessed security risk.

Another important GDPR provision is the obligation for organizations to ensure that any processing is supported by organizational and technical measures to ensure data quality and relevance which, implicitly, has the side effect to increase efficiency and efficacy of the same process.

Without getting into any more details of the GDPR, the brief scenario described above already suggests that technology innovations, especially in the realm of Artificial Intelligence (AI), are heavily impacted by the GDPR.

AI is a broad branch of computer science which aims at building "smart" machines and applications which would be capable of performing at a level which can be compared to how a human would react in similar situations.

Artificial Intelligence comes in multiple flavors and is not limited to "self-aware" computers.

AI is already present in our lives with a wide range of applications like Siri and Alexa, self-driving cars, conversational bots, marketing recommendations from websites to even less obvious examples like spam filters and information packet analyzers. Other uses of AI include the crucial support for doctors, radiologists, oncologists performing diagnoses, and researchers in general when analyzing and interpreting medical data with finding patterns and correlations more accurately.

When talking about AI, it is thus not possible to overlook the GDPR because access to data is the key ingredient for any AI application, and what happens to personal data is, after all, the focus of the GDPR.

The European Commission has expressed its views on AI with the release of the communication on "Artificial Intelligence for Europe." The document describes AI as referring to "systems that display intelligent behavior by analyzing their environment and taking actions – with some degree of autonomy – to achieve specific goals."

The message delivered by the EU document is clear: "The EU can lead the way in developing and using AI for good and for all" profiting from the opportunities arising from a "Digital Single Market" and the adoption of standardized data protection rules guaranteeing and allowing the free flow of data in the EU all while ensuring cybersecurity throughout the whole process. The Commission is already working to make data sharing in the EU easier and create the legal basis and the conditions to "open up more data – the raw material for AI – for re-use."

Given the AI reliance on access to data, one must reflect on the legal and ethical framework coming from the GDPR to achieve trust and ensure accountability in the adoption of AI in various domains. Impacting AI applications, the GDPR has specific provisions related to automated decisions and profiling (Article 22) and the rights of the individuals whose data are then treated (Article 15).

The European Data Protection Board (EUDPB) has issued guidelines which help in interpreting these provisions, but we expect additional situations and legal cases to come and provide legally binding interpretations of the various rules and how they do apply.

This is not the only place where the two acronyms clash and need to find a common ground of intent and approach. For an ethical use of AI to be attained, other provisions from the GDPR need to be considered such as, for instance, the principles of fair and transparent processing.

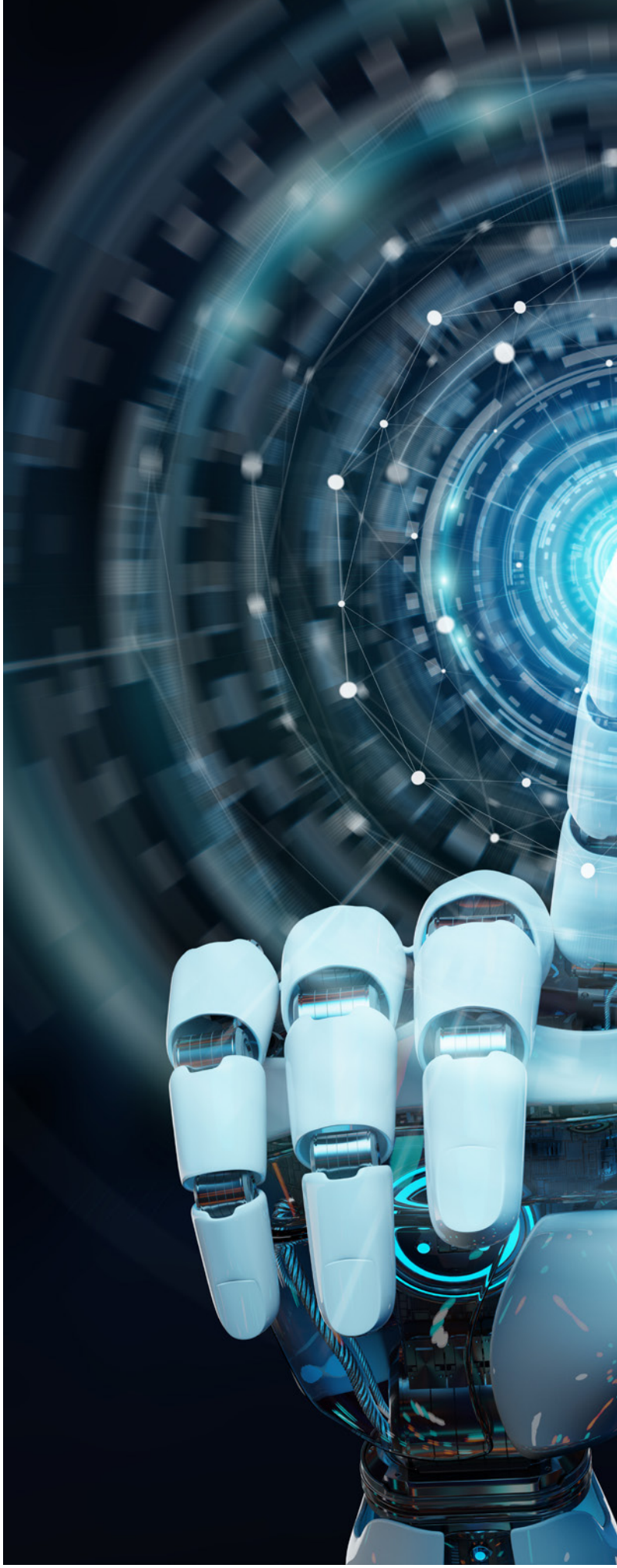
A fair and transparent processing, without incurring into intellectual property violations, would demand organizations to provide information on the data which are used by the AI in input and information on how the output produced by the various algorithms determines the AI decisions and actions. Moreover, AI applications shall be made in a way which do not hinder the honoring of the GDPR rights of individuals with respect to their data.

It is worth noting that the AI community must consider also other EU laws which regulate specific issues at the core of AI development and use, but the GDPR is not a prescriptive set of rules, so the onus is on the organizations to document and demonstrate compliance with the GDPR provisions when processing personal data in an AI context.

As with all other data processing in other domains, GDPR in some cases restricts what can be done with personal data, or at least adds complexity to a proper and legally defensible data treatment but the challenge comes with a great value: increased trust which can accelerate the acceptance of AI solutions by consumers as the EU continues to progress toward a principled, ethical, and regulated data market.

Trust goes hand in hand with cybersecurity and whether an organization implements adequate organizational and technical security measures to protect personal data and privacy against the loss of confidentiality, data integrity, and data availability. Users' trust is one of the most important issues in modern business and making progress around data privacy and security could lead to a definitive competitive advantage for businesses and further adoption of AI solutions.

Further adoption and increased consumers' trust could well balance the additional development costs which the regulation is likely to trigger thus the risk of limiting the application scope and features should be minimal. The Regulation also requires organizations processing



personal data to ensure their accuracy and relevance. The compliance efforts will bring in more value through improving algorithms and methods while profiting from well-regulated access to massive amounts of high-quality data as required.

GDPR and AI will walk along together; the requirements and obligations from one will need to be modulated by the needs and goals of the other. The European Union is aware of the opportunities which arise from both and understands well that GDPR and AI are companions in a very long journey. The relationship is bound to mature and to give birth to a more precise, secure, and ethical environment.

AI will continue to define the world of tomorrow and is already changing the world of today. Growth in computing power and data availability will create opportunities which will be limited only by our imagination.

However, at the same time, this growth demands a coordinated approach and, according to the EU Commission, it should be developed in an appropriate framework which promotes innovation and respects the Union's values and fundamental rights as well as ethical principles such as accountability and transparency in a global space.

in

Massimo Marino
Co-Founder & Senior Partner
of KAX Consulting Sàrl

Dr. Massimo Marino is an accomplished physicist/computer scientist with an extensive experience in scientific research, business strategy, information security, and compliance/GDPR.

In the numerous companies he has worked for, he has been instrumental in elevating IT governance, as well as implementing the GDPR compliance program and other similar regulations which resulted in improved operational outcomes.

He has worked in both the USA and the EU for world-renowned institutions and companies such as: CERN, LBNL, Apple, World Economic Forum, Novartis, etc.

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PECB advises you to avoid traveling nowadays due to the ongoing COVID-19 outbreak. However, make sure you add this incredible destination on your travel bucket list.

FYI: This is a suggested itinerary for five days, so not everything may be your cup of tea. Feel free to pick from the days (and activities), but keep in mind that New York City is BIG, so you change up this itinerary, you might have a lengthy train or taxi ride between places.

I'm so proud to be a native New Yorker and I love to help first timers plan their first trip to New York City. I've made a five day itinerary for NYC with advice on what to see and eat mostly in Manhattan for all budgets.

This is a local guide, so although I cover the famous sites, I encourage you to see the smaller neighborhoods/places that make New York special. The Big Apple has so much to offer year-round, so most of these tips can be also used over the holidays.

How long to spend in NYC? 5 days in NYC is actually the perfect amount if it's your first visit. You can spend 3 days in New York City, but it's cutting it close–and you'll need to come back again. If you have only one day in New York City, you can still see Manhattan!

Before you visit New York City: Download Google Maps & the FREE map at the bottom with all mentioned places as well as Yelp for food. Google has recently really improved their offers for food recommendations.

How to get to NYC from its airports

If you're on the East Coast, you can take Megabus directly to Manhattan. Otherwise, you will fly into JFK, LaGuardia, or Newark. JFK is easily accessible via the Airtrain & A train and/or LIRR. You can also book your own shuttle in between Downtown Manhattan and JFK/any other airport if you don't want to worry about it. Uber is now also an option.

LaGuardia requires a bus and a train, but it's a quick hop to Manhattan. Newark International Airport is in New Jersey, so plan on 30+ minutes on NJ transit. This is separate from New York's subway system. You can click here for tips on how to use the NYC subway.

Where to stay in New York City & How much spending money you'll need

New York is expensive. If you're not on a tight budget, you're best off staying off in Midtown or the Village if you can afford it since both locations make sightseeing easiest. Click for my insider guide to affordable hotels in New York City.

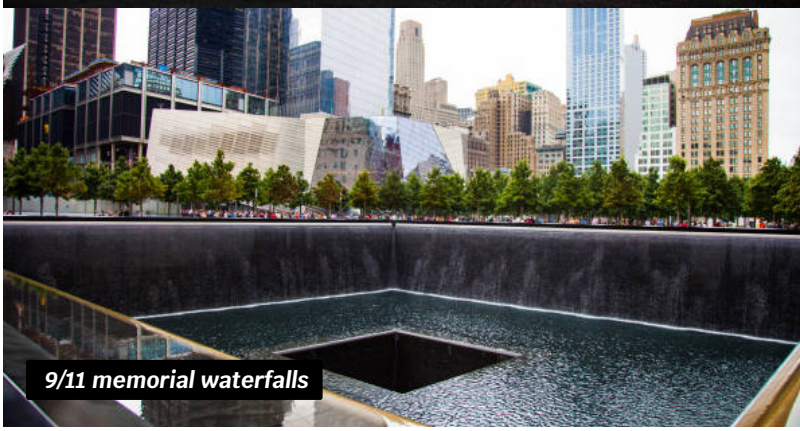
However, for those seeking an alternative experience and/or lower price tag with a short train ride to the sites, stay in Astoria or Long Island City in Queens. In Brooklyn, look in Williamsburg, Dumbo, or Clinton Hill.

You might also find some affordable picks along the Lower East Side. You might also want to look into the Pod hotel chain for affordable rooms in central locations. Click for my picks for affordable hotels in New York City.

For budgeting tips, read my master NYC on a budget post where all of the activities are FREE. Plan on spending at minimum $50+ per person on food, $20 per person on activities minimum, $100+ on the hotel (for one room), and extra if you plan on going out (cocktails are usually $10-15). Be sure to master happy hour as it will save you a lot of money. Please be sure to account for tips at restaurants as tipping is standard in New York City.

I did not include this on the list: I highly recommend stopping to see a Broadway show, if that's your thing. Book your tickets early and try first through the theatre itself to get the best prices in advance. In place of going out, see a show. Budget about $70-$300+ per ticket depending on the show and your sets. A friend of mine was able to get tickets to a major Broadway show for just $70 per seat. Off-Broadway is a great option for those on a tighter budget.

Broadway theatres


9/11 memorial waterfalls

What to see in NYC in 5 days!

Day 1: The Must-sees with a Twist

This day is all about experiencing New York City at its best: pizza, history, and iconic views.

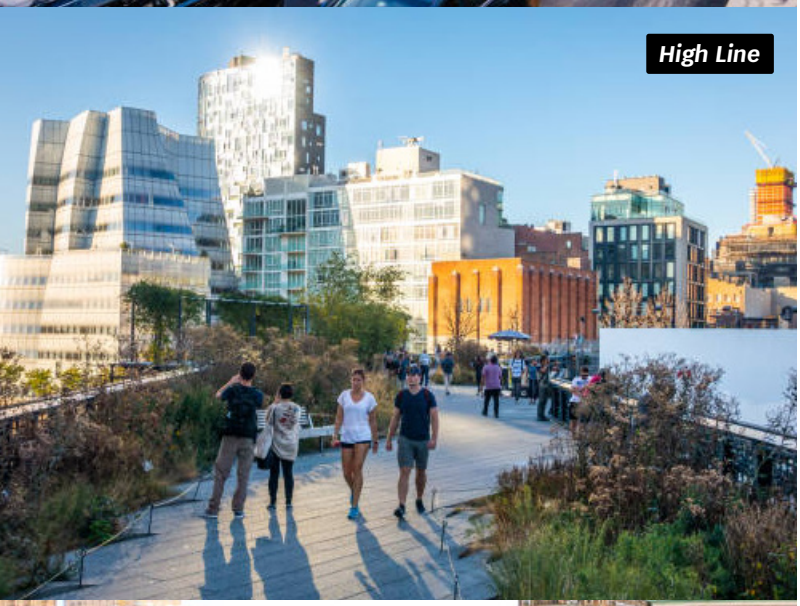
Visit the 9/11 Memorial ($2 Reservation Fee; otherwise free to visit). Note: Please be respectful of those who passed away here and don't remove the flowers or take smiling selfies. Walk a few streets over to see the Woolworth Building, one of New York's prettiest early skyscrapers dating back to the 1910s.

Walk up towards Chinatown. Be sure to bring cash and trust me when I tell you that the bags offered to you on the street are not real Chanel bags. You can click for this insider's guide to Chinatown written by a friend who is from Chinatown. Annie includes a bit of history as well as her favorite restaurants in Chinatown. I personally love to always stop off for bubble tea!

After you eat, consider visiting the Tenement Museum to learn about New York's immigrant past–and what living in Chinatown was like barely 100 years ago. You need to reserve ahead for tickets. Click to read more about the Lower East Side.

> **Walk across the Brooklyn Bridge. No matter how many times I walk across the Brooklyn Bridge, I never ceased to be amazed by its impressive building.**


Brooklyn Bridge


High Line


Washington Square Park

Stop in for a coffee at Brooklyn Roasting Company for some Brooklyn vibes and a good cup of coffee before walking to the Brooklyn Promenade for a panoramic view of Manhattan. Click for a complete guide to downtown Brooklyn!

Have Juliana's Pizza for dinner. Grimaldi's is not as good as it once was. This famous pizzeria has delicious, affordable thin crust pizza cooked to perfection. Its location under the Bridge makes it even better around sunset.

Get drinks in trendy Williamsburg at Union Pool or Night of Joy to enjoy the view of Manhattan from the roof, especially in summer. Not into the hipster scene? Head back to Manhattan via the Brooklyn Bridge to enjoy the view of the lit-up skyline before walking down to Battery Park to catch the free Staten Island ferry for amazing views of the Statue of Liberty. You can click for my favorite free viewpoints in New York City here!

Day 2: The Intellectual / The Partier

This day involves walking through some historic neighborhoods before taking in some culture via films and books. For those into partying, you'll still want to walk the High Line, experience Greenwich Village as well as explore Chelsea, which has some of New York's best nightlife.

Walk the Highline for an amazing view of Manhattan's skyline from above in a modern green space that used to be train tracks. The Highline is a public park that spans quite a few blocks, so give yourself at least an hour if you come here to enjoy the views!

Stop in Chelsea for a delicious brunch in any of the stalls before walking around chic Chelsea. This area, which used to be the meatpacking district, has great boutique shopping and antique shopping. Click for your Chelsea brunch guide!

Walk down Greenwich Avenue or West 4th Avenue for scenic houses and interesting shops in Greenwich Village. Pass the Stonewall, the birthplace of the gay rights movement. There are many great cafes and coffee shops in this area.

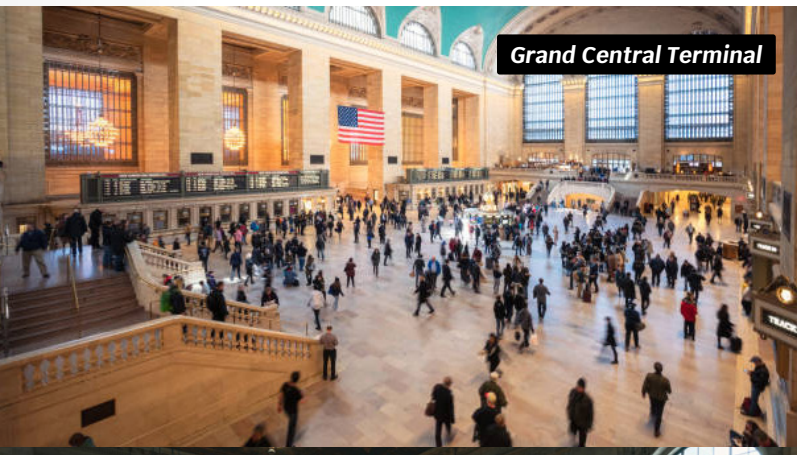
Walk towards the iconic Washington Square Park (next to New York University). People watch & play a chess game before walking up to Union Square, which has a great weekend farmer's market in addition to normal shopping. Stop in the Strand, one of New York's best independent bookstores. For dinner, you have so many great options from Japanese to vegan to pizza. Enjoy!

Note: It shouldn't take long to walk (maybe 1 hour from Chelsea market down to the Union Square), so you should have plenty of time left for museum-going or must-sees (e.g. Top of the Rock) if you set out early. Personally, I'd skip the Top of the Rock if you go to a rooftop bar.

At night, head back to the Village to visit one of New York's many (pricey) speakeasy bars, including Employees Only or Please Don't Tell. Reserve ahead and dress well as you might not get in otherwise. Chelsea/the Meatpacking District is one of the main areas for going out in New York (if that's your thing). The Standard is famous for its rooftop bar although it's difficult to get into.

If chic cocktail bars aren't your thing, New York has a lot to offer in terms of alternative culture. Check out the IFC movie theatre for rare indie movies or Comedy Cellar for late-night laughs (beware of the drink minimum).

Need a late-night snack? Veselka has delicious 24-hour Ukrainian borscht and perogies. (Yes, that restaurant out of Nick and Nora's Infinite Playlist.)



Grand Central Terminal

New York Public Library

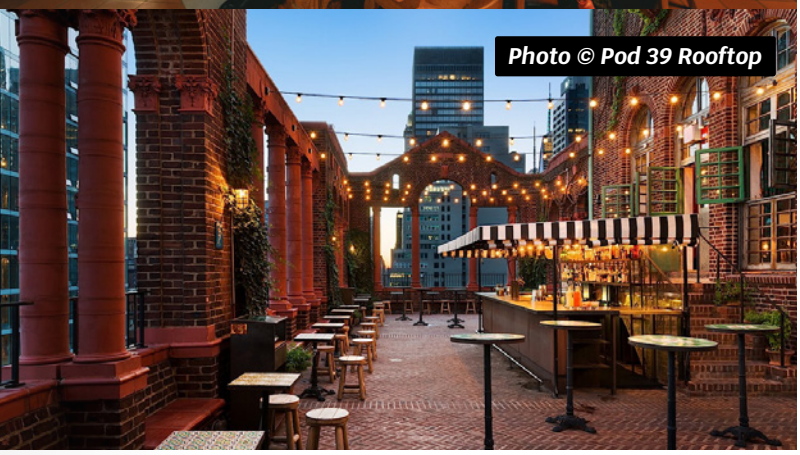


Photo © Pod 39 Rooftop

Day 3: Iconic New York

Start your day off in the beautiful Grand Central Terminal. This historic train station is one of the most famous filming locations in New York City. I love people watching here although try to stay out of the way. For something off the beaten path, find the whispering gallery where your voice echoes!

Head to the New York Public Library and pass the landmarks (the Chrysler & Empire State Building) to take in the architecture. My favorite is the Chrysler building, which was known as the ugliest building in New York when it was built.

For lunch, eat at Shake Shack with the rest of Manhattan in Bryant Park. (Dress warmly in winter since there's no seating!). In Bryant Park, you can watch people ice skate in winter while you eat! Nearby, I have a soft spot for browsing the giant Macy's in Herald Square.

If you're an art lover, visit the Museum of Modern Art. MoMa is a world-class museum for a reason and I strongly recommend checking the recent exhibitions to see what is on.

If not, enjoy shopping along Fifth Avenue. The Christmas windows here during November and December are spectacular and free. My personal favorite is Bloomingdale's!

Dinner doesn't need to be expensive to be good. Go to Halal Guys for cheap/delicious take-out chicken and rice, Pio Pio for fantastic Peruvian food, or Empanada Mama for empanadas. After dinner, watch the sunset and take in the incredible skyline (with a cocktail in hand) at the Pod 39 Rooftop.

Enjoy the bright lights of Times Square at night. (Trust me, it's like daytime.) If you're on a budget, I like to head to Hell's Kitchen for more budget drinks and late-night snacks.

Day 4: The Perfect Classic NYC Itinerary

Pick up a bagel with lox from Zabar's or get a boozy brunch at Calle Ocho. To be honest, anywhere with a good bagel and a coffee should work as long as it's not Dunkin Donuts.

Head to the American Museum of Natural History if you're with kids OR the Met for a few hours! In the Met, I love the Egyptian temple, Musical Instruments, Armor, and pre-20th century art. Don't miss the rooftop garden for amazing views. Bring your own yogurt for a Gossip Girl photo. (XOXO)

In good weather, you could spend the whole day in Central park lounging, but the Met is one of my favorite museums in the world with a world-class collection. The Met doesn't have suggested admission anymore, but it's still a great museum. The American Museum of National History is also a fantastic museum and better suited to families as well as science lovers. Click for a guide to the Upper East Side!

Head to Central Park. I recommend finding the Belvedere Castle, the Bethesda Terrace, Sheep Meadow for lazy picnics, and the Boathouse. If you're a runner, I strongly recommend trying to run the Reservoir one morning.

In summer, check the Summerstage program ahead for free music shows! This yearly music festival in New York brings in well-known as well as upcoming artists for free shows in Central Park. It's great to make a day out of it.

For a nicer modern meal, visit the Thalia or the Russian Tea Room. For a casual, very New York meal, try a (famous) NYC hot dog? Don't buy it from a cart; Only buy from Gray's Papaya with a smoothie like a local. Have the real New York famous cheesecake at Junior's for dessert.

Day 5: The Culture Lover (Queens)

Queens is where I grew up. (Yes, not everyone lives in Manhattan.) It was named Lonely Planet's #1 destination in the world in 2015 due to its amazing food and culture. Really.

> **Take the train to Astoria to visit the Museum of Moving Image in the morning. For anyone who is a movie buff or has kids, this museum will be heavenly. They have old prop sets from classics, such as Seinfeld, interactive exhibitions, and a lot of movie props (even from Star Wars).**

Central Park

Astoria itself is a neighborhood in Queens that has historically been Greek and you can still find great Greek food here. That said, it's rapidly changing as more millennials move in.

Lunch: visit nearby Jackson Heights for the best Latin American food in NYC or Indian food. (Yelp!) Jackson Heights is a diverse neighborhood with incredible food from so many countries. (I highly recommend checking out the Queens Night Market if you're lucky enough to be in town later that evening!)

The rest of the Day gives you lots of options. Stop off at Flushing Meadow Park (especially in summer!) to see the iconic Unisphere and check out the NYC Panorama, which is a miniature version of New York City in the modern Queens Museum of Art.

Into art/sculptures? Visit the Noguchi museum for beautiful Japanese sculptures and a zen garden, PS1 for avantgarde exhibits, or the free Socrates Sculpture Park for free sculptures.

Into beer? Head to the Bohemian Beer Garden to relax or one of the many microbreweries popping up all around NYC (Singlecut Beersmiths / Rockaway Brewing company).

> **For shopping, catch the LIC flea market on the weekend. Don't miss the gorgeous retro-chic Sweetleaf coffee shop if you're in the area, which turns into a bar a night.**

For dinner, head to Flushing (Stop on 7 Subway: Main St). Decide what kind of Asian food you're seeking and check on yelp. (It's going to be a hard decision.) After dinner, stop for bubble tea or Chinese pastries.

You can even do private room karaoke if you look for KTV signs. You can click to read more about Flushing, including my favorite picks for dinner.

Last Thoughts: Plan Ahead.

New York is so large. I sometimes joke that you need about two weeks to just cover the major sights, which is true since I didn't even include Coney Island (Brooklyn). I didn't even cover every borough here!

However, five full days in New York City is a perfect start to feel at home in New York. At a minimum, you should have the hang of the subway by the time that you're done.

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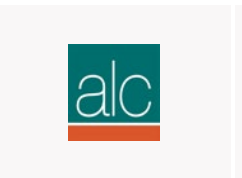

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