

Seven key emerging technologies to drive economic outcomes in 2022: Adaptation of law and policy and capital deployment will determine the winners

By Louis Lehot, Esq., Foley & Lardner LLP

NOVEMBER 1, 2021

As the end of the record year 2021 approaches, global venture investors are racing to deploy capital at an unprecedented pace. Global venture funding more than doubled in the third quarter of 2021 compared to the year-ago period, with seven key emerging technologies garnering the most strategic attention.

As we parse the data across geographies, we see the development of a decoupled and bipolar investing market divided between the United States and China, with Asia growing fastest.

The two superpowers of venture are competing in seven key emerging technology areas to drive more rapid economic growth and ultimately the security of their respective nations. America's ability to compete for the best entrepreneurs and engineers, the most capital, and the highest level of market access will determine whether America remains a leading superpower.

America's failure to compete in these key emerging technologies could cause it to be eclipsed by China. Both national security and economic returns hang in the balance.

While a great debate rages as to whether America is in decline, it continued to garner nearly 50% more investment from venture capital investors than all of Asia combined. But among the top ten global investors, three hail from China, and another from Japan (but whose largest asset continues to operate primarily in the People's Republic).

For 2022 and the remainder of this decade, whether it's competition for capital, market access, or talent, investors and governments alike will be focused on artificial intelligence and automation, quantum computing and the semiconductor industry, networking (whether in the cloud, on the edge or in the fog), >5G wireless bandwidth speeds, Blockchain and other distributed ledger technologies, and ultimately, biotechnologies like CRISPR, that will help us live longer and fight disease.

Today's legal systems, laws, and policies evolved out of centuries' old philosophies and cultures. While yesterday's answers to age-old questions may continue to be relevant, new approaches that modernize legal systems to stimulate the development of these technologies could be as important as the deployment of capital in determining the winners of the new technology race.

Artificial intelligence and automation

Artificial intelligence plays a significant part in almost every industrial sector and offers tremendous benefits to industries and individuals. Many companies have adopted automation to increase their efficiency and gain a competitive advantage.

AI-powered wearable devices help provide tailored treatments, and self-driving vehicles are another phenomenal achievement of AI.

The two superpowers of venture are competing in seven key emerging technology areas to drive more rapid economic growth and ultimately the security of their respective nations.

AI enables automation, and automation means productivity. Financial and strategic investors are hungry for more. In the future, we can see AI combined with other technologies and companies widely adopting AI¹ for their business operations.

Quantum computing and semiconductors

Quantum computers use quantum-mechanical phenomena to perform computation at much faster speeds than classical computers. Through the use of superposition and entanglement, quantum computers are the next generation of supercomputers.

Quantum computers can process equations that last generation supercomputers would take thousands of years to perform. The massive capabilities of quantum computers can also decrypt encrypted data easily. As practical quantum computers edge closer to reality, others are developing algorithms that are intractable even for quantum computers.

Our current legal system has not contemplated the world of probabilities that quantum computing will enable. Cybersecurity will be endangered, and unhackable quantum cryptography will need to be created in response. Safety systems to deter and prevent



cybercrime is urgent. The terabytes of personal information will need to be protected and collected at each point of transmission, wherever it is stored, analyzed, monetized, and used.

Competition will need to be preserved while rolled out, lest the first adopter squelches all others. Cloud compute power and orchestration platforms will need to evolve. Ultimately, we will have to decide what decisions are appropriately made by a quantum computer versus a human.

Meanwhile, the United States government will seek to protect its position in the design and fabrication of semiconductors. In contrast, China aims to decouple its dependence on U.S. semiconductor manufacturers with home-grown alternatives.

Networked compute power in the cloud, on edge and in the fog

Global business is now interlocked by overlapping computing networks that migrate from the edge of your device to the cloud and back again. Increasingly, data lives in some foggy place between the edge and the cloud, which can map the shortest distance between the two, optimizing both bandwidth and compute power.

Cloud services offer significant cost savings compared to local on-premises solutions. Maintaining a local or on-premises database requires sophisticated equipment, real estate, and experienced personnel to manage and maintain it.

With cloud service, the data becomes more flexible as it can be accessed from anywhere. Alternatively, some data is most productive when it lives on the edge of the device, where it is collected, analyzed, and monetized closest to its point of use.

The migration to automated cloud computing power and back to the closest edge of the network has only accelerated. Containers are increasingly deployed across the public, private, and hybrid cloud ecosystems to enable the transfer, storage, analysis, and response layers.

Cloud orchestration platforms like Kubernetes and Docker have emerged as ubiquitous technologies to build, deploy and manage containerized applications using automation, and investors have noticed.

Cloud orchestration platforms like Kubernetes and Docker will see more interest from investors since containers and virtualization technologies make a company's applications and other assets more portable to other cloud services, not locking them into one provider and allowing an enterprise to choose between hybrid and hybrid public cloud options.

Legal systems need to evolve to account for the location of the servers, how and where the clusters of containers travel, and how to protect the data. Jingoistic legislators in each of Europe, the United States, and China are competing to be the most stringent in safeguarding personal information. Inevitably, they will need to best balance the monetization of data that lives or travels through their clouds and networks against the right to personal privacy.

5G

5G, the next generation of cellular bandwidth connectivity, has already started in some parts of the world, providing greater connectivity speeds. One of the most vital characteristics of 5G is Massive Input Massive Output (MIMO). 5G can transmit and receive data from a wide variety of sources, and with 5G, transmission and reception of data can happen on the same wavelength at the same time.

China, the United States, and Europe have engaged in a high stakes battle for hegemony in the 5G market, with China coming strong out of the gate.

Cloud orchestration platforms like Kubernetes and Docker have emerged as ubiquitous technologies to build, deploy and manage containerized applications using automation, and investors have noticed.

While the war for dominance in 5G deployment rages on, the future of the next generation of bandwidth hangs in the balance.

Meanwhile, legal questions abound regarding who gets access, when and where, who pays for it, where the data goes, who protects the privacy of transmitted data, and ultimately, the balance between liberty and authoritarianism.

Blockchain

Blockchain is a specific kind of database, with the difference between a typical database and blockchain being how the data will be stored. In a standard database, the data is categorized into well-defined rows and columns and stored. While in a blockchain, the data are stored in blocks, and each block is connected to its predecessor and successor, forming a chain-like pattern. Hence the name "blockchain."

The data in the blockchain are encrypted. They are stored in a hash format, with all of the blocks in the blockchain networks interconnected. It's virtually impossible to decrypt the data in a blockchain network without the right keys, making blockchain effective against cyberattacks and data leakages.

Lately, huge financial corporations and multi-national corporations have started adopting blockchain technology. In the upcoming years, the genuinely decentralized characteristics of blockchain will create an abundance of opportunities across multiple industries, such as the healthcare industry, which is often subjected to cyberattacks as it contains much sensitive information.

Adopting blockchain technology to store records could prevent any cyberattacks in the healthcare industry. The total revenue spent

globally on blockchain solutions is expected to be 6.6 billion by 2024.²

Biotechnology and genetic engineering

CRISPR, Clustered Regulatory Interspaced Short Palindromic Repeats technology, is a significant breakthrough in genetic engineering, allowing for altered DNA sequences and modifying gene function. This technology will bring about significant advancements in medical sciences and could potentially cure diseases with its capabilities to change the DNA structure.

Through the end of the third quarter of 2021, funding for healthcare ventures globally had exceeded every prior whole year by more than 25%, with America way ahead of the pack. Despite the projected growth and abundant investment capital, there are dangers that legal and ethical concerns related to genetic research could restrain the growth of gene-editing technologies. There's the possibility of off-target effects and other ethical problems that could cause government regulators to put a hold on development.

Regulations must keep pace with the change that CRISPR-Cas9 brings worldwide to research labs. Developing international guidelines could be a step towards establishing cohesive national

frameworks. Ethical questions relating to biotechnology will arise with each innovation.

Tensions between the best interests of an individual patient and society at large will only get more pronounced. The response to the pandemic and vaccination mandates is only but one example.

Conclusion

The technology field never stops developing, and these technologies will play an increasingly important role in our lives. In all of these key emerging technology areas, America and China compete to demonstrate that their system drives a better way of living, working, and relating to one another.

At issue in the new technology race is whether a democratic system where individual liberties and private property are paramount can prevail over a centrally governed command system where the interests of society prevail over the individual.

Notes

¹ <https://bit.ly/2ZHpFq1>

² <https://bit.ly/3vViSoD>

About the author



Louis Lehot is a lawyer specializing in emerging growth companies, venture capital, and mergers and acquisitions at **Foley & Lardner LLP** in California's Silicon Valley. He provides entrepreneurs, innovative companies and investors with practical and commercial legal strategies and solutions at all stages of growth, from the garage to global. He can be reached at llehot@foley.com.

This article was first published on Westlaw Today on November 1, 2021.