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COURSE
82404A

# Blockchain Governance, the Metaverse, and Robotic Process Automation

Blockchain technology is evolving rapidly, and understanding its governance implications is increasingly relevant for finance and accounting professionals. This course digs into blockchain developments and oversight considerations, then explores the metaverse and its emerging business applications. It also introduces robotic process automation, a practical tool already being used to streamline accounting workflows. If you're curious about where technology is heading and what it means for your clients and practice, this course covers a lot of important ground.

CREDIT HOURS 2 | FIELD OF STUDY BUSINESS | EXAM QUESTIONS 10

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## LEARNING ASSIGNMENTS AND OBJECTIVES

## Assignment

- Study the full course materials included here.
- Complete the review questions after each chapter.
- Answer 10 final exam questions.
- Final exam is scored immediately, 70% or better passes.
- Certificate of completion is available in your account.
- Failed exams can be retaken free of charge.

## Course Objectives

- Recall the layers that make up a blockchain.
- Recall the phases of the metaverse.
- Recall the three primary components for most RPA automation.

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# Chapter 1: BLOCKCHAIN DEVELOPMENTS AND GOVERNANCE

*Chapter Objective*

**After completing this chapter, you should be able to:**

- Recall the layers that make up a blockchain.

Cointelegraph *published an article about the use of blockchain in the gaming industry in July 2020. An excerpt of the article follows.*[1]

**Blockchain technology has the potential to create a new era of gaming and drive true adoption in the industry.**

The first true blockchain gaming application was Cryptokitties. While the platform itself is a technology demonstrator for collectible items, it quickly rose to prominence as the application representing the majority of transactions made on the Ethereum platform. Since its inception, the number of apps leveraging blockchain technology in gaming has exploded, with categories ranging from adventure games and card games to action games, role-playing games, and casinos.

Blockchain use cases in gaming are mainly constrained by the transaction capacity of blockchain platforms in the case of Ethereum. Current blockchain applications in gaming, therefore, are experimental tickets, with collectible platforms and mobile games leading the pack.

Card games are among the first games to use blockchain technology in gameplay. The unique feature presented by collectible cards is that the cards themselves, as non-fungible tokens (NFTs), become tradeable items. Most of the time, the NFTs are traded on OpenSea. One of the most popular collectible card games using blockchain technology is Gods Unchained.

Real-time strategy, or RTS, and massively multiplayer online, or MMO, games are ideal genres for testing blockchain technology in gaming, as the gameplay allows for the creation of multiple asset types and smart contracts governing the rules of the games themselves. While successful titles in gaming are increasingly massively multiplayer, online, and feature group dynamics, the application of blockchain technology in gaming is probably going to gain significant traction in this segment.

Pixelmatic, a studio based in Shanghai and Vancouver that was founded by Samson Mow – current chief strategy officer of Blockstream and former director of production at Ubisoft – is working on a space-based MMO game with elements from the RTS genre and Eve Online and featuring a cryptocurrency for an in-game medium of exchange. While Eve Online features a marketplace for in-game goods, there's no news yet about the further development of crypto

assets concerning in- game items. This is still pretty encouraging, and the game is the first step toward wider acceptance of cryptocurrencies among industry players in mainstream gaming.

## BLOCKCHAIN LAYERS

Blockchain consists of three layers, the protocol, network, and data layers. Each layer has a different role but works together to make the blockchain function.[2]

1. **The protocol layer**. This layer consists of software rules about how the system will operate. This layer is the foundation of the blockchain; therefore, it includes the initial codebase and architecture that specifies the rules of engagement within the system.
2. **The network layer**. This layer consists of all the interconnected actors of the blockchain. The network layer carries out the rules implemented at the protocol layer, such as how participants access the system, how the data is shared, and how the ledger is updated.
3. **The data layer**. This layer is comprised of the information processed and stored in the distributed ledger. The data layer consists of two components, the operations and journal components. Operations determine how creating new records, modifying existing records, and executing code are governed in the blockchain. The journal component determines what data is in the blocks on the blockchain.

According to this conceptual framework, the three layers are interdependent. The protocol layer defines the set of rules that are implemented in the network layer. The network layer is interconnected servers that carry out the rules defined in the protocol layer. The protocol and the network layers enable the maintenance of the data layer.

## TYPES OF BLOCKCHAINS

Even though blockchain was first introduced as an underlying technology for cryptocurrency, many organizations are developing blockchain technology to facilitate many other transactions. One development we see is in the type of blockchains. There are public/permissionless, private/ permissioned, and hybrid blockchains.

### Permissionless versus Permissioned

A permissionless blockchain is a blockchain in which anyone can participate in the network to validate transactions, add blocks to the blockchain, and maintain a copy of the distributed ledger. A permissionless blockchain is also known as a public blockchain. For example, the Bitcoin blockchain is a permissionless blockchain.

In a permissioned blockchain, only authorized nodes can validate transactions, add blocks, and maintain a copy of the distributed ledger. Permissioned blockchains are also known as private

blockchains. Table 8.1 summarizes the differences and similarities between permissionless and permissioned blockchains.

**TABLE 8.1 PERMISSIONLESS VERSUS PERMISSIONED BLOCKCHAINS**

| Permissionless | Permissioned |
|---|---|
| A node does not require permission to join the network | A node requires permission to join the network |
| Is open to everyone | Is open only to selected organizations or individuals |
| The consensus algorithm brings trust to all | Nodes are known to each other, therefore do not need a trust mechanism |
| Offers high security because all nodes mine the transactions | Offers less security. It can be easily manipulated because only any one node will be responsible for adding transactions to the blockchain |
| Slow transaction speed because all nodes have to agree. | Fast transaction speed because only one node will be adding transactions to the blockchain |
| Harder to scale | Scalable network |
| Not energy-efficient | Energy-efficient |
| Truly decentralized | Not truly decentralized |
| Transparent network | Less transparent network |
| Immutable | Partially immutable |
| Governance structure imposed by the consensus algorithm | Governance structure imposed by the participants |
| Public transactions | Private transactions |
| Nodes are not authenticated | Has an established authentication process for the nodes |

### Hybrid Blockchains

Hybrid blockchains generally combine the features of permissionless and permissioned blockchains. A hybrid blockchain will allow controlled access while enabling freedom to decide which processes are kept private and which are kept public. Compared to a permissionless blockchain, a hybrid blockchain will offer more trust because you may have some control over who

participates in the network. On the other hand, a hybrid blockchain will allow known nodes in the network; however, it requires a more stringent consensus algorithm, making it more secure than a permissioned blockchain. Hybrid blockchains are customizable, allowing blockchain members to decide who can participate and which transactions are made public.

### Consortium Blockchain

Consortium blockchains or federated blockchains are a newer development. These blockchains fundamentally differ from hybrid blockchains. Consortium blockchains are networks in which a preselected set of nodes or stakeholders closely controls the consensus process. These blockchains are similar to private ones but are used by multiple organizations. Therefore, the network will be decentralized. Unlike a permissionless blockchain, a consortium will have preselected nodes that validate the transactions. Unlike a permissioned blockchain, even though it may be preselected, one node cannot add validated transactions and blocks to the blockchain without other validating nodes signing off on the block. Currently, we see three types of consortia blockchains: technology-focused, business-focused, or dual-focused (both technology and business). Technology-focused blockchain consortia provide help to develop the technology and gain global recognition. Business-focused consortia focus on solving a specific business issue such as banking, energy, or supply chain.

## SMART CONTRACTS

Simply stated, a smart contract is a computer program executed on a peer-to-peer network. When two parties to a contract agree, the terms of the agreement are written as a computer program. Once this program is executed, the subsequent steps can be automated, reducing any human contact. The peer-to-peer network will validate and verify the trigger events and subsequent transaction details, reducing the need for employees to match documents and verify events, such as the shipment of goods.

For example, let's say company A agreed to buy 100 widgets from company B. The two companies would negotiate and specify the terms of the sale and monitor each other based on the terms of the sales contract. A smart contract can be written based on the agreed-upon terms. Let's assume that according to the terms, company A must make an advance payment by the 15th of the month. On the 15th, the smart contract would inform company A that the payment was due, make the payment, and send it to an escrow account without the internal approval of company A.

### Advantages of Smart Contracts

Smart contracts can simplify many types of transactions between business partners while adding an element of trust. There are several other advantages of smart contracts, as listed below.

- **Automation.** The contract terms are written as code/computer protocol and committed to the blockchain. The contract terms are executed automatically based on trigger events such as a date or receipt of goods.

- **No need to integrate**. If trading partners are to automate the entire supply chain processes, companies have to integrate their systems with the systems of all their trading partners. Integration is not feasible because of incompatibilities, cost, confidentiality, and time. Blockchain offers a common platform for smart contracts. Therefore, trading partners can maintain their systems and integrate data with blockchain.
- **Public availability**. The terms and events related to the contract are available to all parties.
- **Autonomy**. Since the contract terms are executed automatically and are publicly available, there is less room for manipulation by the other party.
- **Trust**. Since all terms and documents are encrypted on the shared ledger, documents cannot get lost or delayed. Therefore, there is a minimal need for trust. The automation of the terms eliminates the need for trust between two parties. For example, in a sales transaction, the two parties do not need to worry about receiving goods or cash, as the payment is triggered with the delivery of goods.
- **Backup**. The shared distributed ledger provides a layer of backup for the contracts.
- **Safety**. Encryption keeps the contract documents safe.
- **Speed**. Automated software code eliminates the need for human intervention to reconcile and verify whether particular events have occurred. All the verification is done using the peer-to-peer network.
- **Savings**. Savings can come from eliminating intermediaries such as banks and notary services.
- **Accuracy**. Well-written code can avoid errors that stem from manual data entry.

Smart contracts are not without any problems. The smart contract is only as good as the computer code written. If the programmer makes an error in the computer code, this error will trigger actions that will cost the parties involved money, time, and reputation. When developing smart contracts, key considerations should be given to all blockchain layers (network, protocol, and data) layers.

## OTHER DEVELOPMENTS

### Oracles

An oracle, based on Greek mythology, is someone who can communicate directly with God. Blockchain oracles are systems or devices that enable the blockchain to communicate with external systems. To execute a smart contract, it needs to receive inputs from external systems, such as the date products are shipped. The shipping date may trigger a smart contract to execute to send payment to another organization. Using the earlier widget example, assume payment will be made once the goods are shipped. An external system generates the shipping date, and the oracle sends the date to the blockchain. Blockchain oracles, therefore, are devices or software that will capture data from external systems and feed them into blockchain smart contracts and vice versa.

Oracles enable blockchain to access data from various legacy systems, advanced computations, and the real world creating a unique ecosystem where on-chain code is connected to off-chain infrastructure. Oracles are categorized by the type of communication they have with other systems:

- **Input oracles.** Capture data from the real world and deliver data to smart contracts.
- **Output oracles**. Capture data from smart contracts and send commands to off-chain systems.
- **Cross-chain oracles**. Enable communication between different types of blockchains.
- **Compute-enabled oracles**. Provide secure off-chain computation that is impractical to do on-chain due to technical, legal, or financial constraints for data gathered from oracles.

Since most oracles are specialized devices, they are managed by third-party vendors. One of the biggest challenges of using oracles is ensuring the trustworthiness and reliability of various oracles that communicate with the blockchain. This problem of ensuring the trustworthiness and reliability of data is called "the oracle problem."[3] Blockchain, based on a decentralized network, attempts to solve the problems of trustworthiness and reliability. However, when data is captured by a single device/system, we are unable to completely trust the source of that data. One way to solve the oracle problem is to create a decentralized network of oracles.

For example, let's say that we need to monitor the temperature and input the current temperature into a smart contract. If the thermometer is located near a window, the average temperature may not be accurate; therefore, we may not be able to trust the input from the oracle. However, if we monitor the temperature in different areas of a room and use the average, we can receive a more reliable view of the temperature. Compute-enabled oracles address the oracle problem by collecting data from various systems/devices and using complex algorithms to come to a consensus about the accuracy of the data.

**Exchanges**

A cryptocurrency exchange is an intermediary that enables the buying and selling of cryptocurrencies. Some exchanges offer a variety of products and services, while others mainly offer the trading of digital assets. Crypto exchanges can be categorized into brokers and crypto exchanges. Traditional brokers can act as an intermediary between cryptocurrency markets and investors. A crypto exchange facilitates the buying and selling of digital assets based on market prices. These exchanges may only deal with cryptocurrencies or facilitate converting government-backed currency to cryptocurrencies.

A crypto exchange can be centralized or decentralized. A centralized crypto exchange is overseen by a third party called an operator. The operator ensures that trading runs smoothly. An advantage of a centralized exchange is that these exchanges enable smooth linking of your bank account or debit card to buy cryptocurrencies. However, these exchanges charge a fee for easy access. A