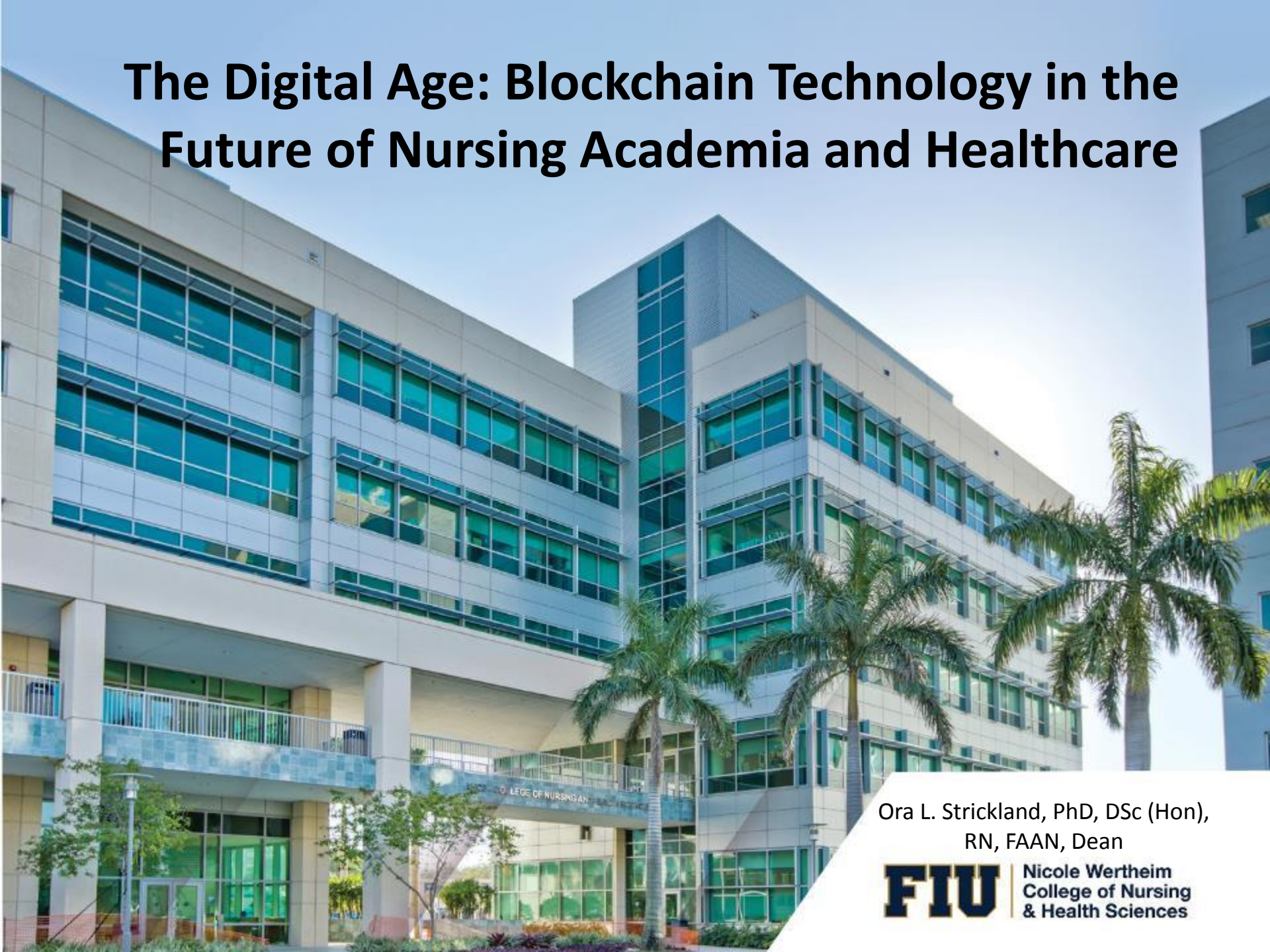
The Digital Age: Blockchain Technology in the Future of Nursing Academia and Healthcare



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The Future is Now!

Welcome to the future.

The Digital Age has brought us

BLOCKCHAIN TECNOLOGY!

Focus of Today's Presentation

We will:

Explore together the new reality of the next phase of the currently evolving Digital Age – Blockchain Technology.

Discuss the basics of blockchain technology, how it works, some of its current uses, its advantages, and disadvantages.

Explore how blockchain technology can enhance academia and healthcare; and, what might be required for us to fully participate in and take advantage of this technology.

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What is Blockchain Technology?

What is Blockchain Technology?

A shared, immutable ledger – a digital technology that will forever change the world!

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What is Blockchain Technology?

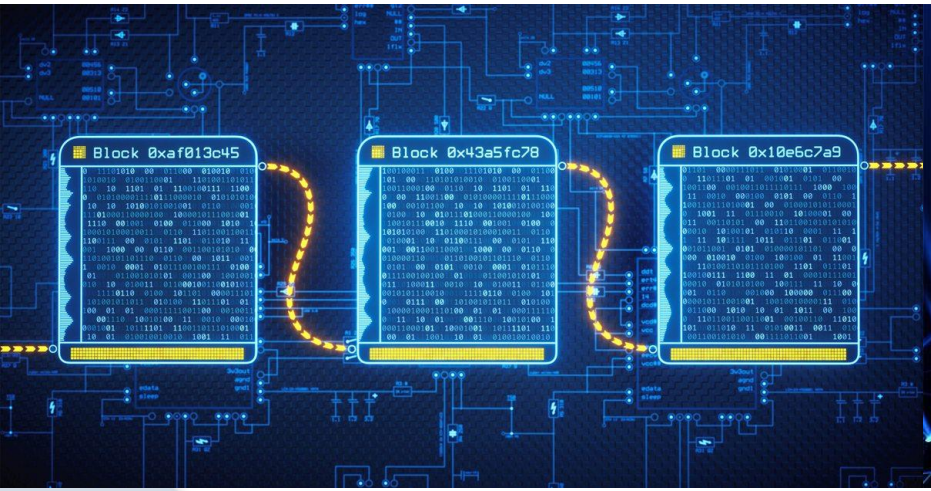
A means for recording and storing a shared or distributed ledger and its transactions, and tracking the movement of any asset on the ledger in a matter of seconds or minutes over a digital network.

Networks can be “unpermissioned” (open to anyone) or “permissioned” (restricted).

Assets can be tangible, intangible, or digital; e.g., a house, car, land, cash, patents, copyrights or intellectual property.

A blockchain is a digital operating system that provides for many applications that can run on that operating system. (Similar to internet operating systems, e.g. Microsoft Windows or MacOS.)

What is Blockchain Technology?



- Each block, once verified, is imprinted instantly upon a ledger made up of thousands and thousands of nodes. Each node stores a duplicate accurate accounting of value, information and/or data of the entire blockchain. Nodes can be setup on the blockchain in multiple or many locations.

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What is a Blockchain?

A shared, immutable ledger of information, data, and value. Each block validated is forever imprinted throughout a **decentralized network** that makes up the blockchain.

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How Blockchain Works

- A blockchain stores data in blocks linked together to form a chain.
- As the number of digital transactions grows, the blockchain also grows.
- The time and sequence of transactions are recorded and confirmed in blocks, which are logged into the blockchain within a discrete network.
- This network is governed by rules agreed on by the network participants (Gupta, 2018).

What is Blockchain Technology?

Centralized vs **Decentralized**

What is the difference between a centralized and decentralized network?

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What is Blockchain Technology

- Centralized Network - A type of **network** where all users connect to a central server, which is the acting agent for all communications. This server would store both the communications and the user account information. Most public instant messaging platforms use a **centralized network**. Also called **centralized** server-structure.

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What is Blockchain Technology

Examples of centralized networks

Examples of centralized networks using servers to store information and data in a centralized location:

-Facebook (Information)
-Bank of America, WellsFargo, Chase..etc. (Value)
-Amazon (Information, Data)
-Netflix (Data)

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What is Blockchain Technology

- Decentralized Network - **Decentralized computing** is the allocation of resources, both hardware and software, to each individual workstation, or office location in many places together validating a ledger of value, information or data.

What is Blockchain Technology
Examples of Decentralized networks

µTorrent®

FrostWire

Smart BitTorrent client with built-in search

- Examples of Decentralized Networks (Peer-to-Peer)
  -Utorrent (Information, Data)
  -Limewire/Frostwire (Data)
  -Bitcoin (Value)

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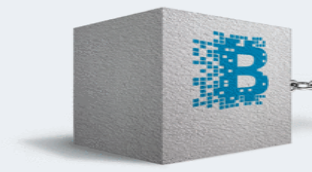
Why is a Blockchain Immutable?

- Each block contains a digital fingerprint or unique identifier or *hash*.
- The previous block hash links blocks together and prevents any block from being altered or the insertion of another block between two existing blocks. This renders the blockchain tamper evident.
- The blockchain contains verified proof of transactions, and it removes the possibility of tampering by a malicious actor (Gupta, 2018).



Advantages of Blockchain Applications

Efficient: Transaction information is recorded once and is immediately available to all parties through a distributed network with each participant acting as a publisher and subscriber. (Peer-to-peer replication)

Cost-effective: Eliminates the need for intermediaries. (Cuts out third parties)

Reliable: Information is immutable after transacted and recorded on the digital ledger of the blockchain network. (Data unchangeable, fixed, permanent)

Secure and safe: Since the underlying transferred ledger can't be changed; a change can only be made via another transaction, and both transactions would be visible.

Finality: Ownership and completion of a transaction is documented on a single, shared ledger.

Disadvantages of Blockchain

- Lack of public understanding of the broad spectrum of use cases for blockchains.
- Volatility in value.
- Limited ability of the public to understand, value, access and manage blockchains.
- Virtual blockchains and cryptocurrencies pose risks as potential vehicles for money laundering, tax evasion, and fraud.
- Development of effective regulatory responses to virtual blockchains and cryptocurrencies are at an early stage as they operate on a global scale.

Types of Blockchain Technology

Cryptocurrency

- Digital Currency
- Virtual Currency
- Characterized by peer-to-peer exchange

Blockchain Businesses and Markets

- Provide services based on blockchain or distributed ledger technologies for tracking information for commerce or governmental activities.
- A private, permissioned network where identities are often known and without the need for cryptocurrencies.

Cryptocurrency

- Digital currency that have no central monetary authority.
- They are **shared ledgers** that can be used to record any transaction and track the movement of any asset(information, value, data) internationally. The effectiveness and efficiency of this ledger is the basis of a crypotocurrency's value.
- They are "mined" on running computers by people and businesses around the world who use special software in a peer-to-peer computer network.
- Current Major Cryptocurrencies

Bitcoin

Ethereum

Litecoin

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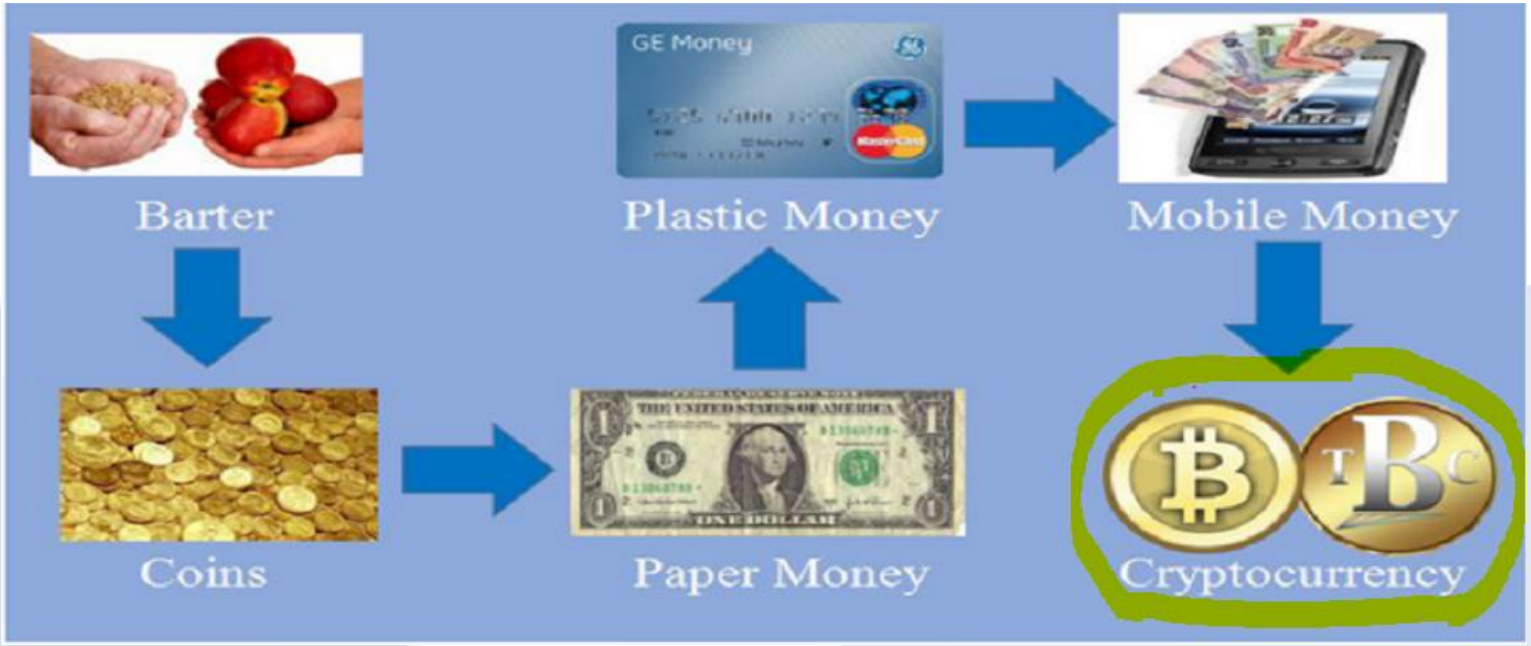
The Evolution of Currency

- Currency and Monetary Exchange Over the Ages



- Types of currency
  - Fiat Currency – National metal and paper currency
  - Alt Currency – Various cryptocurrencies

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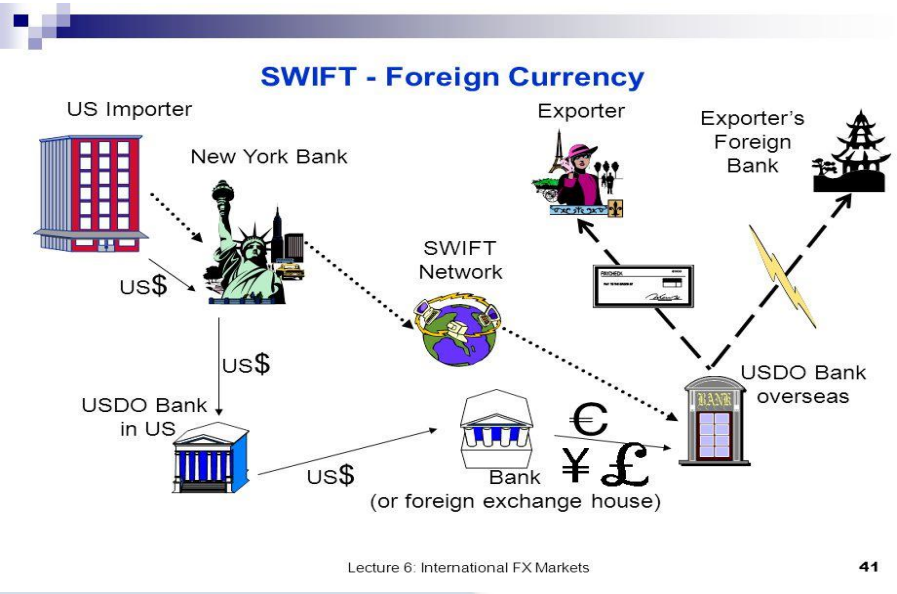
The Current System



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Cryptocurrency: Is It the Next Logical Step in the Evolution of Money?

Limitations of cash and fiat currency transactions:

- Useful in local transactions in small amounts.
- Prolonged time between transactions and settlement.
- Need for third-party validation of available funds except for cash transactions. (Inefficient and costly).
- Vetting credit card transactions are costly, time-consuming and include intermediary fees.
- Half of the world's population have no access to bank accounts.
- A central finance system, e.g. banks, add cost and risk of fraud, cyberattacks, and mistakes.

Cryptocurrency: Is It the Next Logical Step in the Evolution of Money?

Disadvantages of Cryptocurrency

- Lack of public understanding of the broad spectrum of use cases for cryptocurrencies.
- Volatility in value.
- Limited ability of the public to understand, value, access and manage cryptocurrencies.
- Cryptocurrencies pose risks as potential vehicles for money laundering, tax evasion, and fraud.
- Effective global regulatory responses to virtual and cryptocurrencies are at an early stage.

Types of Blockchain Technology

Blockchain Businesses:

- Business networks that use blockchain technology.
- Peer-to-peer replication: Each participant (called a node) on the network share a ledger that is updated in seconds each time a transaction is made.
- The blockchain business is economical and efficient since it eliminates duplication of effort and reduces the need for “middle men” or intermediaries.
- Transactions are verifiable, secure, and authenticated.
- Smart contracts are used to set rules that govern a business transaction. It is stored on the blockchain and automatically executed with each transaction.

Key Business Benefits

- Time savings and cost savings.
- Enhanced privacy of transactions.
- Tighter Security: A “permissioned” network protects network participants against tampering, fraud, and cybercrime. By using IDs and permissions, users can indicate which transaction details they want other network participants to view.
- Enhanced trust across the business network: Transactions are more auditable. Digitalization streamlines transfer ownership, enhances privacy, and provides cryptographic proof of a set of transactions since they are tamper proof.

The Future of Blockchain Technology in Nursing Academia and Healthcare

Healthcare and academia need more efficient, secure and cost-effective systems for managing:

- Medical and student records
- Preauthorizing payments
- Transfer of payments
- Settling insurance claims
- Recording and transmitting:
  - Patient data
  - Student data
  - Research data

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Potential Use Cases for Blockchain in Academia and Healthcare

- Faster and more accurate huge data entry and verification.
- Publication and copyright verification, storage and tracking.
- Redefinition and transparency of data sharing between academic and healthcare institutions related to research, and student and patient records.

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Potential Use Cases for Blockchain in Academia and Healthcare

- Ensuring privacy of sensitive student and patient data and information.
- Verification of insurance and claimant information reducing fraud.
- Using blockchain technology for cross border research, patient care, and education.
- Recording origin, processing, shipping and tracking of patient supplies across borders.

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Determining How Blockchain Fits in Your Work (Gupta, 2018, p. 41-40)

- Does my business network need to manage contractual relationships?
- Do we need to track transactions that involve more than two parties?
- Is the current system overly complex or costly, due to the need for intermediaries or a central point of control?
- Can the network benefit from increased trust, transparency, and accountability in recordkeeping?

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Determining How Blockchain Fits in Your Work (Gupta, 2018, p. 41-40)

- Is the current system prone to errors due to manual processes or duplication of effort?
- Is the current transaction system vulnerable to fraud, cyberattack, and human error?

A “yes” answer to any of these questions means blockchain can likely benefit your work.

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Key Questions for Nursing and Academia to Consider

- Are we ready to become active participants in blockchain technology?
- Is the nursing profession adequately prepared to help transform our ecosystems utilizing blockchain technology?
- With what other disciplines should we collaborate to ensure our active participation in blockchain development?
- How should we adapt our curricula to ensure that nurses and educators actively and meaningfully engage with blockchain technology?

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Final Word

"The blockchain technology, still in its early years, has thrown down the gauntlet in front of the current systems, challenging them to overhaul."

Prableen Bajnai, 2016

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