

Presented by:  
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Managing Director

## A Fiduciary's Take: Cryptocurrencies And Blockchain

May 2019



### Agenda

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- 1 **Cryptocurrencies**
  - Defined and History
  - Mining
  - Coins versus Tokens
  - Initial Coin Offerings and Beyond
  - Trading
- 2 **Blockchain Technology**
  - What is it?
  - Current vs Future State
- 3 **Investment Considerations**
- 4 **Gifting**

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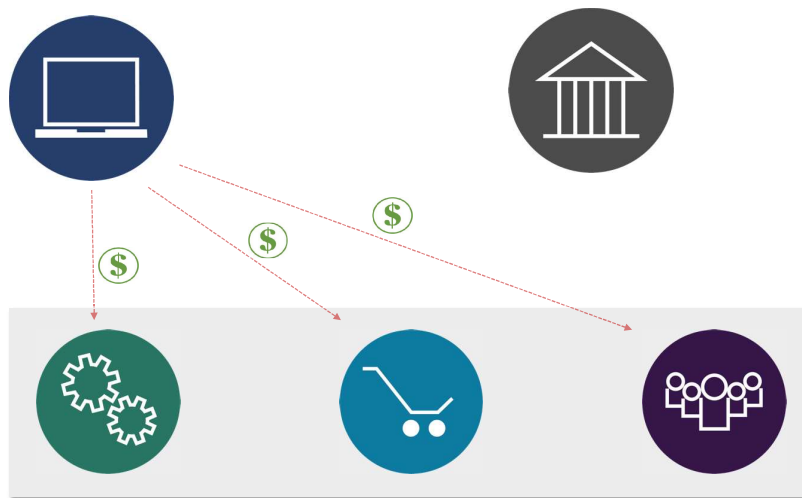
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### Cryptocurrencies

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## Current Electronic Transaction: What We Might Think Happens



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## Current Electronic Transaction: What Really Happens



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## Decentralized/Peer to Peer Exchange



6 Techquickie.com

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## Cryptocurrencies

### DEFINED

- **Bitcoin originated with the October 2008 white paper written under the pseudonym Satoshi Nakamoto (<https://bitcoin.org/bitcoin.pdf>)**
- **Nakamoto's motivation:**
  - An electronic payment system that could remain anonymous yet not involve credit
  - Thus, the concept of electronic cash or currency
  - Disadvantage of cash is that buyers and sellers need physical presence (or trust) to complete a transaction
- **Key at this stage: The notion of “cash” or “currency” strictly as a unit of exchange**
  - Not an asset class to be invested in

#### Bitcoin: A Peer-to-Peer Electronic Cash System

Satoshi Nakamoto  
satoshi@gmx.com  
www.bitcoin.org

**Abstract.** A purely peer-to-peer version of electronic cash would allow online payments to be sent directly from one party to another without going through a financial institution. Digital signatures provide part of the solution, but the main benefits are lost if a trusted third party is still required to prevent double-spending. We propose a solution to the double-spending problem using a peer-to-peer network. The network timestamps transactions by hashing them into an ongoing chain of hash-based proof-of-work, forming a record that cannot be changed without redoing

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## Cryptocurrencies

### A QUICK RECAP

- **1998 to 2009 — Pre-Bitcoin Years**
  - Attempts to create online currencies failed; B-Money and BitGold
- **2008 — Bitcoin White Paper**
- **2009 — The Launch of Bitcoin**
  - Software is available to the public
  - Mining begins — a process through which new coins are created and transactions recorded and verified in the Blockchain
- **2011 — New Coins Emerge**
  - Namecoin and Litecoin
- **2013 — Crash — Bitcoin drops 70%**
  - Shortly after crossing \$1,000, Bitcoin drops to \$300; takes about 2 years to cross \$1,000
- **2014 — Scams and Thefts**
  - Mt. Gox — hacked and goes offline; ~\$450mm at the time of the hacking; ~ > \$5.5 billion in 2018 terms 450mm at the time of the hacking;
- **2016 — Ethereum and ICO's**
  - Ethereum is a platform (Ether) to facilitate blockchain based smart contracts and apps
  - Issued under an Initial Coin Offering (ICO's)
- **Q4 2017 — Bitcoin price rises to \$19,000 (December)**
  - Price moves radically higher and gains meaningful media attention
  - Between 1,750 and 1,800 coins said to exist
- **2018 into 2019 — Crash, volatility, stability?**
  - Bitcoin declines steadily toward \$3,300 (December 2018)
  - Q1 2019 - Price rebounds to \$5,250

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## Cryptocurrencies

### DEFINED

Primary risk with the launch of a digital currency and electronic payment system is the ability (and temptation) to duplicate files

THINK MUSIC



Classic resolution is having a central authority keep track of ownership

THINK DTC

- Risks with a central authority:
  - Prone to hacks
  - Laborious checks and balances process by participants
- Steering away from the construct of a central entity responsible for books and records, opens up the potential for a “distributed ledger”, whereby all participants keep track of validated and live records of transactions and ownership

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## Cryptocurrencies

### MINING

- In order to have a successful distributed (decentralized) ledger transactions must be validated by all participants
- Participants connect to the ledger using computers running Bitcoin software
  - Each of these contact points is referred to as a "node"
  - Each active Bitcoin node helps the network by sharing and spreading validated transaction data
- Mining is the process of adding transaction records (in "blocks") to the public ledger of past transactions
  - "Mining" nodes solve complex, iterative, mathematical problems (almost like a puzzle) which, once correctly solved is added to the existing chain
  - Validated blocks are permanent and immutable



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## Cryptocurrencies

### MINING

- Despite the simplistic sounding name, mining performs a number of key tasks.
  - Each of these transaction blocks must be validated by other participants
  - Each block's header contains hash (SHA-256) which is essentially an iterative puzzle that requires a complex solution requiring software and computing power
- The reward for successful mining is the receipt of a number of Bitcoins.
  - Important to consider this when one remembers that there is no monetary authority governing supply of Bitcoin.
- Why doesn't everyone just mine?
  - The process is resource intensive (hardware, processing, energy, time)

<https://www.wsj.com/articles/rural-washington-is-a-hot-spot-for-bitcoin-miners-1518354001>

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## Cryptocurrencies

### COINS VERSUS TOKENS

#### Coins

- Since its 2008/2009 inception, many changes have been applied to the Bitcoin protocol. All elements can be amended, including the money supply. If the change of the protocol is not unanimously supported a "fork" is created, thereby creating a new cryptocurrency.

#### Tokens

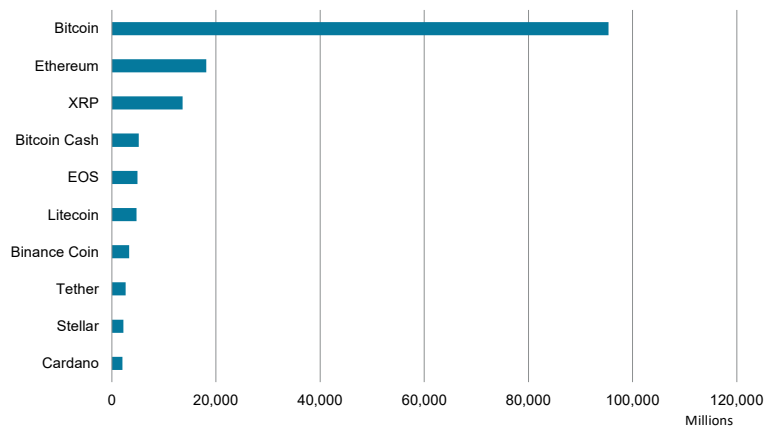
- Similar to Coins, tokens are tradeable units, but the value is derived from a company's equity or access to a service. The two common types are equity and utility tokens.
- **Equity Tokens** represent ownership of an asset, such as debt or company stock. By employing blockchain technology and smart contracts, a firm attempts to issue shares via an ICO.
- **Utility Tokens**, or user tokens, provide users with future access to a product or service. Through utility token ICOs, companies attempt to raise capital funding development of (blockchain) projects. Users/investors purchase a claim to the future service.

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## Top 10 Cryptocurrencies by Market Capitalization

Market Cap (\$ million)

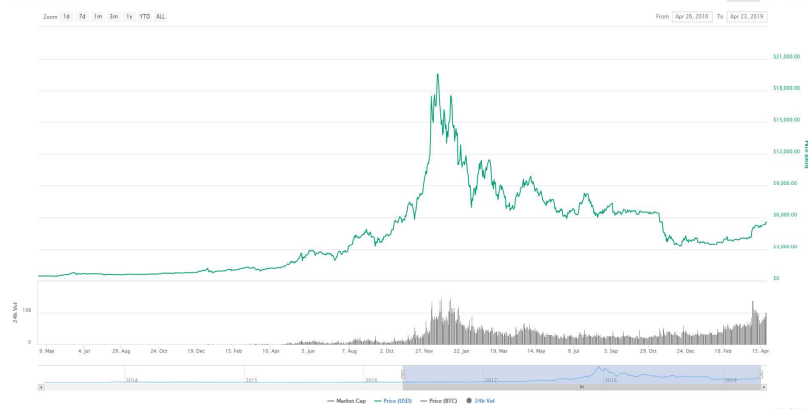


Data as of 3/23/19  
13 Source: Coinmarketcap.com

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## Bitcoin Price – Last three years

Bitcoin Chart



Data as of 3/23/19  
14 Source: Coinmarketcap.com

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## Cryptocurrencies

### ICOs

#### INITIAL COIN OFFERINGS (ICOs)

- An ICO is a fundraising method for new cryptocurrency ventures.
- While there may very well be a business plan, online presence and stated fundraising goals (including which currencies are accepted) ICOs are unregulated so attempt to bypass the regulatory framework involved in the traditional VC capital-raising process.
- ICOs can be thought of as the cryptocurrency response to IPOs and have similarities to **crowdfunding** but are more accurately referred to as “crowd sales” as early backers seek a profit.
- Ethereum and its smart contract platform is an example of a successful ICO which launched in 2014.



## Cryptocurrencies

### SECURITY TOKENS (STOs) – “Equity tokens + ICOs 2.0?”

- Initially, ICOs appeared to revolutionize public funding and crowd sales.
  - Crowd sales lead to reduction regulatory red-tape.
  - But, developers (and scammers) flock to the market raising millions for just a (often flimsy) white paper, hype and a promise of riches
  - By 2018, Ponzi schemes, pump and dump, washed transactions
- STOs, like ICOs, are fundraising tools, but they have certain regulations which hold the token issuers accountable for their actions.
- Security Token is intended to be an Investment Contract
  - Represents legal ownership of a digital asset.
  - Ownership verified within the blockchain
- Security Tokens represent a more mature market.
  - Willing to embrace SEC and other Federal regulations including:
    - Regulation D, Regulation A+, Regulation S

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## Cryptocurrencies

### TRADING, HYPE AND BEHAVIORAL FINANCE

#### Lack of intrinsic value, media attention and stunning price action all helpful enablers

- From the outset but particularly in 2018, the market became ripe for speculation
- “Just liquid enough”
- Technical (buyers vs. sellers) rather than fundamentally driven
- Typical speculative/behavioral patterns, both cognitive and emotional:
  - Herding
  - Confirmation
  - Positive frame
  - Overconfidence
  - Recency and ultimately...
  - Loss aversion

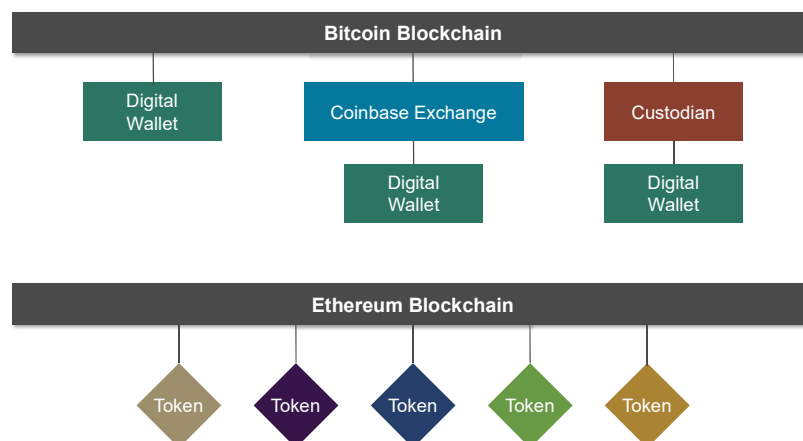


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## Interaction of Different Blockchains and Storage

### PREVIEW OF: CURRENCIES VS. TOKENS



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## Cryptocurrencies

### OTHER TOPICS

#### Custody

#### Asset Class, Commodity or Currency?

- Recall that the genesis for Bitcoin was to serve as a unit or means of exchange
- The run-up in value in 2017 caused people to view it as more of an asset
- <https://www.wsj.com/articles/bitcoin-isnt-a-currency-its-a-commodity-price-it-that-way-1515041387>
- Finite number of coins to be created (21 million) has drawn comparisons to gold

#### Regulation

- Is it fundamentally possible to regulate a decentralized platform?
- Commodity Futures Trading Commission (CFTC) has ruled Bitcoin is a commodity and the regulation of commodity futures tied directly to bitcoin is under its authority.
- The SEC has not approved any exchange-traded products with direct ownership of cryptocurrencies. It has focused attention on initial coin offerings (ICOs) as they relates to investor-protection laws.
- The IRS says bitcoin must be treated as property for tax purposes. Capital gains or losses shall be recorded in the same manner as the disposition of any property.
- US Treasury Department has formed working groups reviewing cryptocurrency practices as they relate to money laundering and terrorism financing risks.

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## Cryptocurrencies

### OTHER TOPICS

#### How Do Exchanges Get Hacked?

- Despite the upcoming conversation about decentralized exchanges, many (popular) wallet and exchanges remain centralized and are vulnerable to computer hacks.
- On a more idiosyncratic basis, phishing and other email / phone hacks also yield bitcoin IDs and passwords

#### Forks

- Since its 2008/2009 inception, many changes have been applied to the Bitcoin protocol. All elements can be amended, including the money supply. If the change of the protocol is not unanimously supported a "fork" is created, thereby creating a new cryptocurrency.

#### Actual Mined Blocks and Block Details

- <https://www.blockchain.com/en/btc/blocks>
- <https://www.blockchain.com/en/btc/block-height/532668>

#### Buying, owning, advising for clients

#### Gifting

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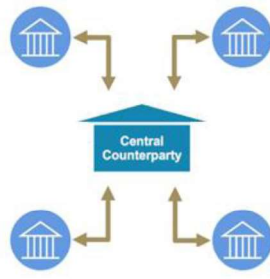
## Blockchain Technology

## Blockchain

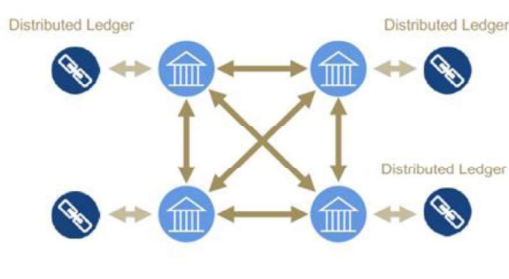
### WHAT IS IT?

*A synchronized accounting system that uses cryptography and timestamps on blocks of data to ensure accurate and secure recordkeeping.*

### CURRENT MODEL



### BLOCKCHAIN MODEL



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## Blockchain

### WHAT IS IT?

<b>Decentralized</b>	Managed by using a peer-to-peer network of collaboration.
<b>Distributed</b>	A "distributed" ledger that requires cooperation by all participants.
<b>Encrypted</b>	Cryptography is applied to data in order to make personal information viewable only to those who need it.
<b>Immutable</b>	Records cannot be altered without changing every preceding "block", thus leading to error.
<b>Transparent</b>	All transactions are recorded on a public record, allowing for accountability and trust.

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## Blockchain

### CURRENT VS. FUTURE STATE

Activity	Current Model	Future (Blockchain) Model
<b>Transaction Settlement</b>	Lengthy process	Instantaneous
<b>Need For Documentation</b>	Many documents to be managed & reconciled	One distributed ledger
<b>Central Counterparties</b>	Required as intermediaries	Disintermediation; control with buyers & sellers
<b>Cost</b>	High transactional costs & processes	Low cost & high efficiency; fewer players
<b>Fraud</b>	Lack of transparency in markets	Transparency through open records
<b>Checks &amp; Balances</b>	Manual confirmation & reconciliation	Smart contracts provide automatic accountability

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## Blockchain and Crypto Custody

### RECENT DEVELOPMENTS

- There is increasing demand in the market for a traditional, established custodian to provide custody of cryptocurrencies
- The existing framework (DTF, Fed) is not a model that works
  - In a decentralized eco-system, how does a traditional custodian add value?
- Traditional institutions slowly wading into the space
  - Asset class is just riskier and more complicated
    - Technology
    - Risk/compliance (including KYC/AML)
    - Legal/regulatory
- Hot (online) versus cold (offline) storage
  - Cold appears to be one path non-traditional custodians are pursuing
- “ABC”: **A**lways Be Cautious
  - Am I dealing with a custodian or merely an exchange?
  - If cryptos trade on the Blockchain, how is everyone getting hacked?

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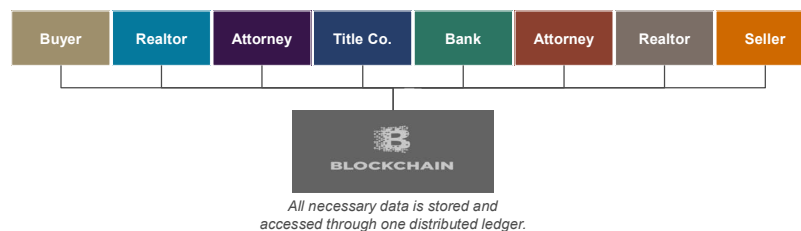
## Blockchain

### CASE STUDY: BUYING A HOUSE

- Inefficient property search process due to fragmented listings data.
- Time-consuming, paper-driven, predominantly offline due-diligence process.
- High title insurance and related costs due to chain of title & lien recording issues and fraud risk.

## CURRENT VS. FUTURE MODEL

*Individual databases need to be aggregated and reconciled.*

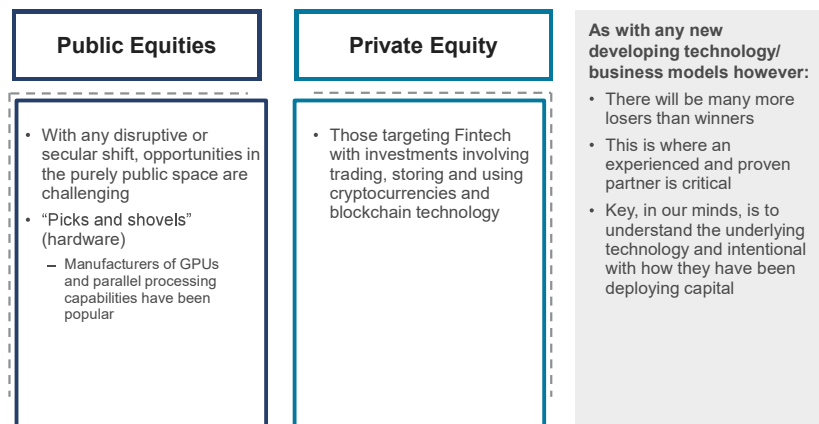


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## Looking Forward

### WHAT ARE THE INVESTMENT OPPORTUNITIES?



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## Blockchain

### DISRUPTIVE OR FOUNDATIONAL?

<b>Disruptive</b>	Technology attacks traditional business models often with a lower cost.	<b>Foundational</b>	Attempts to create an entirely new economic or social systems.
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Regardless, the structural shift presented by Blockchain Technologies shift will take considerable time and resources.

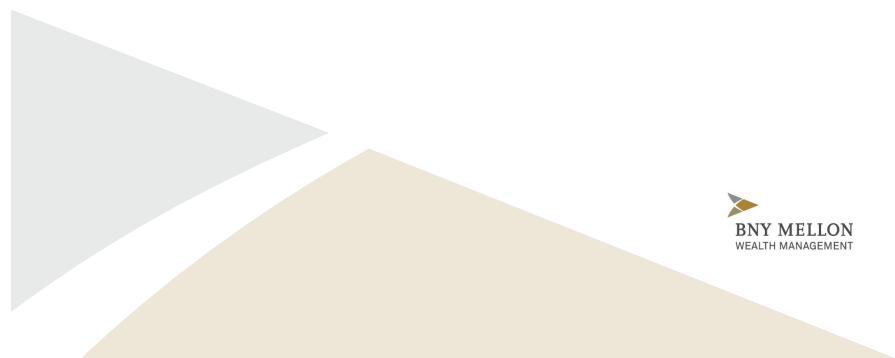
### STATE OF THE BLOCKCHAIN

- Through a number of consortiums industry leaders are now engaged in a broad range of "Proof of Concept" activities.
- Applications are beginning to be utilized in industries such as finance, real estate, automotive industry, shipping, manufacturing, and global supply chains.
- BNY Mellon has established a blockchain-based platform for U.S. Treasury Bond settlement, which has been up and running internally since 2016.

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## Investment Considerations



## Looking Forward

### WHAT WILL OUR CLIENTS AND I SEE



### Cryptocurrencies

- **Estimate is between 1,500 - 1,800\* presently existing, expect many to have short lives**
  - Some estimates already put "dead" and scam cryptocurrencies at > 1,500
  - 2018 was a big year of reckoning
- **As market matures, winners, losers and acceptance rates should all become clearer**
- **At this point, BNY Mellon Wealth Management Investment Strategy Committee takes no view**
  - The firm does not trade or custody cryptocurrencies



### Blockchain

- **Change will be more gradual** but in many ways this is the really exciting news
- **BNY Mellon**
  - Treasury and Information Services Technology teams
- **Industries with**
  - Identifiable intermediaries
  - High administrative (transaction) costs
  - Inefficient tracking or logistics

## Cryptocurrencies

### PRUDENT INVESTOR RULE

The prudent investment rule — a trustee who invests and manages a trust assets owes a duty to the beneficiaries of the trust to comply with the prudent investor rule. A trustee is not liable to a beneficiary to the extent that the trustee acted in reasonable reliance of the provisions of the trust.

#### Standard of Care



#### Portfolio Strategy



#### Risk and Return Objectives



#### CONSIDERATIONS

- Reasonable Care
- Skill
- Caution

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## Cryptocurrencies

### CFA STANDARD V: INVESTMENT ANALYSIS, RECOMMENDATIONS AND ACTIONS

#### MEMBERS MUST:

1. Exercise diligence, independence, and thoroughness in analyzing investments, making recommendations, and taking investment action
2. Have a reasonable and adequate basis, supported by research and investigation, for any investment analysis, recommendation, or action

#### GUIDANCE

- Defining Diligence and Reasonable Basis
- Using Secondary or Third-Party Research
- Using Quantitatively Oriented Research
- Developing Quantitatively Oriented Techniques
- Selecting External Advisers and Subadvisors
- Group Research and Decision Making

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## Gifting

## Cryptocurrencies

IS THERE ANY VALUE HERE?

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### THE INTERNET:

1. Can be a helpful starting spot but (amazingly) you cannot believe everything on the internet

### PARTNERING / GUIDANCE

1. Partnering with someone trained in valuations and possibly seasoned in the space in order to determine imbedded value, liquidity, history.
2. Where / how is it custodied?

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## Working with Donors

WHAT ARE SOME OF THE ISSUES?

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### CLIENT SPECIFIC ISSUES

- |   |   |
|---|---|
| <div style="background-color: #8B6914; color: white; padding: 10px; text-align: center; font-size: 2em; margin-bottom: 10px;">1</div> <p><b>Lack of planning</b><br/>Wills not mentioning cryptocurrencies or digital assets</p>  | <div style="background-color: #8B6914; color: white; padding: 10px; text-align: center; font-size: 2em; margin-bottom: 10px;">4</div> <p><b>Security/Privacy concerns</b></p> |
| <div style="background-color: #8B6914; color: white; padding: 10px; text-align: center; font-size: 2em; margin-bottom: 10px;">2</div> <p><b>Lack of knowledge</b></p> <ul style="list-style-type: none"> <li>• Lack of access to accounts</li> <li>• Loss of money</li> </ul> | <div style="background-color: #8B6914; color: white; padding: 10px; text-align: center; font-size: 2em; margin-bottom: 10px;">5</div> <p><b>Loss of money</b></p>             |
| <div style="background-color: #8B6914; color: white; padding: 10px; text-align: center; font-size: 2em; margin-bottom: 10px;">3</div> <p><b>Passwords</b></p>   |   |

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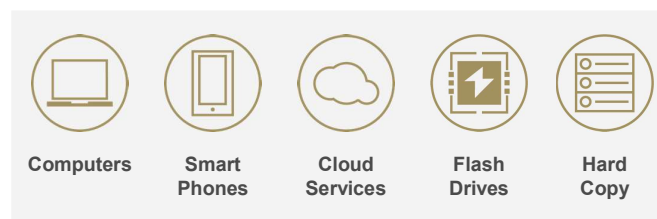
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## Cryptocurrencies

STORAGE – *Questions to ask*

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**Where is the information housed for  
cryptocurrencies and digital assets?**



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## Cryptocurrencies

### PLANNING CONSIDERATIONS

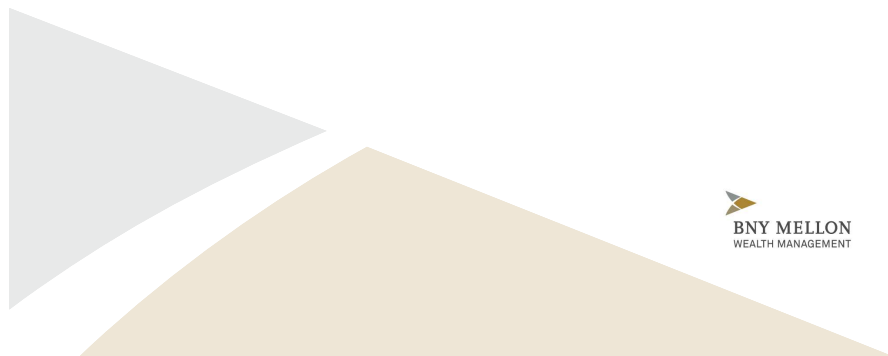
#### Steps that individuals should consider taking:

1. Make a list of all digital accounts and assets with sign-in info
  - Include website address, username, password, and security questions
  - Make sure list is with trustworthy person or in secure location
2. Consider online "after-life" websites that securely save passwords and account instructions for designated agent
  - Be aware that these services are new and untested
3. Investigate whether accounts allow you to include designated agent in account preferences
  - Similar to Facebook's "Legacy Contacts" and Google's "Inactive Account Manager"
4. Include explicit written permission in trust and other estate documents granting authorization to trustee or other delegates to access and control digital assets
  - Make sure information is not in Will or other documents that will be publicly available
5. Periodic review of estate plan and coordination with changing laws

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## Appendix



## Disclosures

### IMPORTANT INFORMATION ON BNY MELLON

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Rankings include assets managed by BNY Mellon's investment boutiques and BNY Mellon Wealth Management. Each ranking may not include the same mix of firms.

\*BNY Mellon has entered into a definitive agreement to sell Centersquare Investment Management to its management team and the private equity firm Lovell Minnick Partners. The transaction is expected to be completed by year-end 2017.

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## Disclosures

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Some of the factors that could impact these forecasts include, but are not limited to:

- General economic conditions
- Financial market performance
- Interest rate levels
- Changes to current laws or regulations, and
- Future geopolitical conditions

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