STANDARDS BOARD FOR ALTERNATIVE INVESTMENTS

Operational Due Diligence of Digital Assets

SBai Toolbox

Introduction

Digital assets were once the purview of retail investors, but more recently the asset class has gained attention from institutional investors and asset managers. There are dedicated digital asset funds specialising solely in these assets, however more traditional hedge fund managers are now allocating to this asset class. In a Q1 2021 survey, it was identified that there are more than 800 crypto currency or **blockchain** investment funds with just under half of these being hedge funds[1].

For a dedicated digital asset fund, it will be obvious that digital assets are included in the investment mandate, but this is not the only place they can appear in an allocator's portfolio. A 2021 study by PWC and others identified that one fifth of hedge funds are investing in digital assets with an average exposure of 3% of the portfolio. In addition, one quarter of hedge funds who have not yet invested confirmed that they are planning to invest[2].

Institutional allocators conduct operational due diligence (ODD) on the underlying managers and funds that they invest in, including on elements such as counterparties, valuation, and conflicts of interest. Digital assets operate using different infrastructure than more traditional asset classes, therefore any ODD must take account of certain risks that are more prominent within this asset class. The SBAI's Alternative Investment Standards help asset managers apply the required controls to satisfy an ODD process and specific standards are referenced throughout this memo.

This SBAI Toolbox memo looks at:

- Key areas of ODD for digital assets, including custody, trade processes, valuation and asset verification, conflicts of interest, and regulatory risk.
- Other ODD considerations including a brief look at digital assets and responsible investment.
- The appendices contain a list of ODD questions for investors to ask and a glossary of common digital asset terms[3].

Digital Assets can be a controversial topic and it is important to reaffirm that, at the SBAI, we do not endorse any alternative investment strategy including digital assets. Should allocators, after their own research and investment processes, choose to invest in specific strategies or asset classes, our aim is to ensure they can do this in an informed way whilst maintaining high standards within the alternative investment industry.

[1] https://cryptofundresearch.com/cryptocurrency-funds-overview-infographic/
[2] https://www.pwc.com/gx/en/financial-services/pdf/3rd-annual-pwc-elwood-aima-crypto-hedge-fund-report-(may-2021).pdf
[3] **Defined terms are highlighted in bold throughout the memo**

Investment Mandates

Most fund governing documents define the fund's investment universe quite broadly meaning digital assets may not be excluded from the investment universe of traditional hedge fund strategies. Allocators should explore this in initial and ongoing due diligence, particularly in macro or currency-based strategies.

It is important to discuss the scope of digital assets that may be considered, this could include liquid assets (and their derivatives) such as Bitcoin or Ethereum, **Initial Coin Offerings** (ICO), **Simple Agreement for Future Tokens (SAFT)**, or venture capital style equity positions in companies within the digital asset ecosystem. Asset managers of digital asset funds could also be involved in **Staking**, lending, and borrowing of digital assets.

Investors should consider any investment restrictions for this asset class. Given high levels of volatility, it is possible for small allocations to become much larger in a short space of time.

How the SBAI Alternative Investment Standards can help:

Standard 1.1 requires that asset managers have an appropriate level of disclosure and explanation of the fund's investment policy/strategy and associated risks included in the fund's offering documents. This should include:

- General details of the investments and instruments likely to be included in the fund's portfolio.

Custody

What does Custody of Digital Assets Mean?

Digital assets are digital bearer instruments that reside inside a digital **blockchain** database. Custodians store the **private key** (password) that controls the ability to transfer the asset to other people. Key custodial functions are the secure creation of the public-**private key** pairing and storing the **private key** in a secure way.

Custodians may be independent third parties (typically the case for more liquid digital assets such as Bitcoin) or the manager may opt to self-custody assets where infrastructure does not yet exist or is not yet mature enough for the specific asset class.

Third Party Custody:

Custodians of digital assets are not typically the recognised names used for more traditional asset classes requiting allocators to complete due diligence on the counterparties. Digital asset infrastructure may not yet be as mature as for traditional asset classes, but there is a minimum set of standards that should be expected. Allocators should understand the minimum standards they require in advance of conducting due diligence. As digital assets are bearer assets, security of the **Private Key** is an important area of focus alongside more traditional custodian due diligence[4].

[4] See Report on Institutional Digital Asset Custody for more technical details on due diligence of a digital asset custodian: https://web.anchorage.com/anchorage-blocktower-whitepaper/

Minimum Standards	Custodian Security Protections
• Does the custodian meet the definition of a Qualified Custodian, for example by obtaining a state licence in the US? • Is the custodian insured – including for insider theft? Coverage may be immaterial to the value of the assets; however, investors may gain comfort from reputable insurers willing to underwrite the risk. • Can the custodian provide System and Organisational Controls (SOC) Reporting (preferably Type II) from a reputable auditor with no material exceptions?	Key aspects to discuss include: • Depth of experience of the security team at the custodian and documentation of processes – especially important for **private key** generation. • Back-up and redundancy plans – can the **private key** be recovered if there is a disaster event? • Management of the **private key.** For example, is it **sharded** and split across multiple independent parties for security? • Governance of access to the **private key**. Assessed similarly to standard cash control assessments i.e., multi-factor authentication processes are preferred over single user access. • Change management rights for any permissions and code changes.

Self-Custody:

Some digital assets may not be supported by competent third-party custodians, meaning the manager may hold the **private key** internally. How acceptable this is to an allocator will likely depend on the rationale for self-custody and the safeguards put in place. Where there are available institutional third-party custodians for the specific digital asset, serious questions should be asked about why an independent custodian is not being used.

At a high level, the ODD of a manager's custody arrangements should be the same as that for a third-party custodian. Some areas, however, will require increased scrutiny:

Regulatory Complexity May be increased for self-custody	**Independent Verification of Assets** Is there an alternative to the custodian?	**Security of the Private Key** Does the manager have the right security and asset class experience

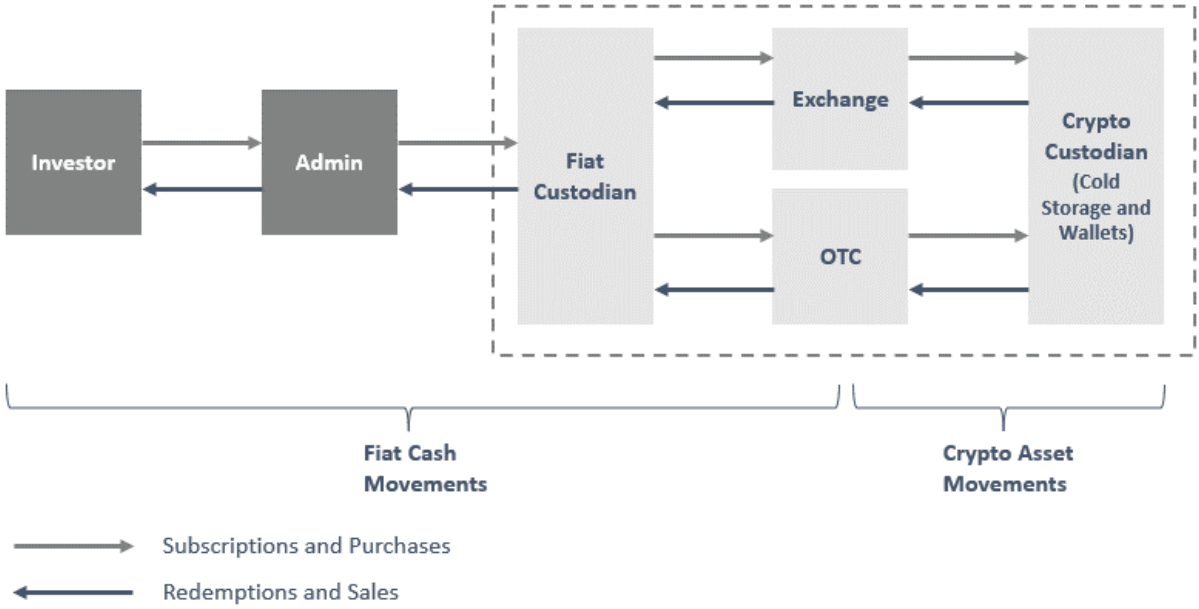
How the SBAI Alternative Investment Standards can help:

Standard 17a.4 requires that one or more third parties, independent of the manager, should be appointed to be responsible for the safe keeping of the property of the fund.

Trade Process:

The system infrastructure supporting the digital asset ecosystem is in its infancy and there can be heavy reliance on manual processes.

Digital Asset Trade Flow Diagram



Trading of digital assets can be through "voice trading"[5], some exchanges offer electronic trading, but this is not yet standard across the industry. ODD analysts should ensure that controls expected when other asset managers trade via "voice" are in place.

Trade confirmations are typically emailed and should be provided simultaneously to the third-party administrator for reconciliation purposes.

Trade settlement is typically faster than most traditional asset classes, but delays may occur at the point of transferring fiat cash. For managers that hold assets in cold storage the retrieval process can be more cumbersome; however, this is typically achieved in hours rather than days.

Valuation and Asset Verification:

There will be many similarities between the valuation of digital assets and traditional asset classes, but there are also some key differences:

Valuation:

Valuation processes for digital assets vary depending on the specific asset class, but broadly:

Liquid Assets	Illiquid or Hard to Value Assets
Complexities come from round-the-clock trading, volatility of the asset, and reliability of data from exchanges.	Significant challenges in the absence of independent valuation agents. Risks can be mitigated through closed-ended funds and the use of side pockets

Markets for most liquid digital assets operate around the clock and as such valuation points could be set at any specified time and are not reliant on a market close time. The valuation point for the fund must be

[5] Trading completed on the phone or via other non-automated communication methods

clearly documented in the valuation policy and be consistently applied without exception. Managers may document this with a time stamp or audit trail within the fund accounting system.

Multiple exchange prices can be used to value liquid assets creating an average price. There have been instances of incorrect prices on exchanges so, given the volatility of the asset class, the process should be treated and evaluated in the same way as for broker quotes. Processes could include checks against the high and low prices in the market that day, monitoring of outliers, and comparisons or back-testing against traded prices.

Asset Verification

Independent parties such as auditors and fund administrators should be able to independently verify the digital assets in the portfolio.

When the asset is stored on a single **blockchain** address (i.e., not commingled with the custodian's other assets) there is a constant view of the existence of the asset and therefore traditional verification practices can be used. These addresses, or **wallets**, also contain a **hash** for each transaction in addition to the current **wallet** balance. Allocators should discuss who manages the list of **wallet** addresses to ensure all assets are verified.

For self-custody, there are more processes and procedures required to make sure that the **private key** is owned and exclusively controlled by the manager. Managers may, for example, demonstrate control over the **private key** by using it to send encrypted messages over the **blockchain** to an independent party.

How the SBAI Alternative Investment Standards can help:

Standard 7.1 requires that where a fund manager performs in-house valuations of hard to value assets, valuation procedures aimed at ensuring a consistent approach to determining fair value should be adopted and the procedures should be set out in a Valuation Policy. This should include amongst other things:

- If using broker quotes *(similar processes to this should be used when sourcing prices from multiple exchanges)*:
  - Making reasonable efforts to identify and draw upon multiple price sources (where available),
  - Specifying the acceptable tolerance ranges when multiple price sources are used and the approach to handling "outliers",
  - Ensuring consistency and avoiding cherry-picking of favourable pricing sources by using the same brokers at each valuation point, and
  - Where the fund manager arranges the provision of broker prices (as opposed to an independent third party) the manager should instruct the brokers to send the prices directly to the administrator.

Conflicts of Interest:

Digital assets are relatively new compared to traditional asset classes such as equities or bonds. Early asset managers in this space needed to diversify revenue sources until more institutional interest was attracted. In addition, the required infrastructure was either not available or not at the required standard and many market participants had to fund the creation of this infrastructure.

This means that in the digital asset ecosystem, there is a relatively high level of affiliated interests. Managers may have their own service provider functions (e.g., trading desks) or equity investments in

service providers. Service providers may also own exchanges or other related businesses. Affiliated businesses and conflicts of interest that may arise should be discussed as part of the ODD process.

Similar conflicts of interest in traditional asset classes are not uncommon. For example, in structured credit where there are affiliated loan originators and service providers[6]. So, a framework for assessing these conflicts already exists. Allocators should not hold digital asset fund managers to a lower standard because of the early-stage reasons detailed above. There should still be appropriate governance, mitigation, and disclosure of these conflicts.

How the SBAI Alternative Investment Standards can help:

Standard 17j.1 requires that a fund manager should ensure that it has internal arrangements to manage and mitigate conflicts of interest, and this should include documented compliance policies and procedures. Conflicts of interest should be recorded and reported to senior management on a periodic basis or, in the case of conflicts requiring the approval of senior management, escalated as soon as reasonably practical. Where applicable, conflicts of interest should be reporting to the fund governing body.

Regulatory Risk

The regulatory framework for the digital asset ecosystem is currently undefined and unclear, which adds heightened regulatory risk to the space. Regulators continue to express interest in a more regulated environment and each jurisdiction is following its own approach. The focus of regulation so far has been on **ICO**s, exchange activities, and AML and KYC[7].

For example, in the US the lack of clarity as to whether a digital asset is considered a security or not gives rise to regulatory risk. If underlying assets are classed as a security this can lead to actions by the US SEC[8] for unregistered security offerings as seen in the action filed against Ripple in December 2020[9]. This can mean that exchanges delist the asset resulting in reduced liquidity and an inability to trade. Allocators should use these case studies to understand manager's reactions and knowledge on this topic (particularly for less liquid or newer digital assets).

How the SBAI Alternative Investment Standards can help:

Standard 17g.1 requires that a fund manager should ensure that it understands laws and regulations relevant to the securities in which it trades.

AML and KYC:

The use of digital assets for money laundering or terrorist financing has been a concern for regulators and some institutional investors. A digital asset benchmarking study by the University of Cambridge suggests that there has been some improvement, reporting that in 2020 approximately 13% of digital asset only companies did not complete any KYC checks - down from 48% in 2018[10]. Therefore, AML and

[6] Covered in more detail in the SBAI Toolbox Memo on Conflicts of Interest in Alternative Credit: https://www.sbai.org/toolbox/alternative-credit/
[7] Anti-Money Laundering and Know Your Customer checks
[8] US Securities Exchange Commission
[9] https://www.sec.gov/news/press-release/2020-338
[10] https://www.jbs.cam.ac.uk/faculty-research/centres/alternative-finance/publications/3rd-global-cryptoasset-benchmarking-study/

KYC checks by the manager and service providers continue to be an important consideration during ODD. Two main areas should be considered:

Fund Subscriptions	Exchanges
The risk is standard if the fund only accepts subscriptions in fiat currencies, but could be enhanced if the manager accepts subscriptions using crypto assets. Where a manager is not limiting subscriptions to fiat currencies, the manager or administrator should have a process in place to complete AML checks.	Allocators should understand the due diligence the manager completes on the exchange and whether this covers AML. Asking for a list of exchanges and cross-referencing this against lists of reputable exchanges (such as those compiled by New York Department of Financial Services (NYDFS) or Digital Asset Research) can help provide comfort also. https://www.dfs.ny.gov/ https://www.digitalassetresearch.com/

How the SBAI Alternative Investment Standards can help:

Standard 17c.1 requires that a fund manager should be confident that it understands the applicable laws and regulations in the market in which it deals and has effective systems and controls in place to enable it to identify, assess, monitor, and manage the risk that the fund manager might be used to further financial crimes.

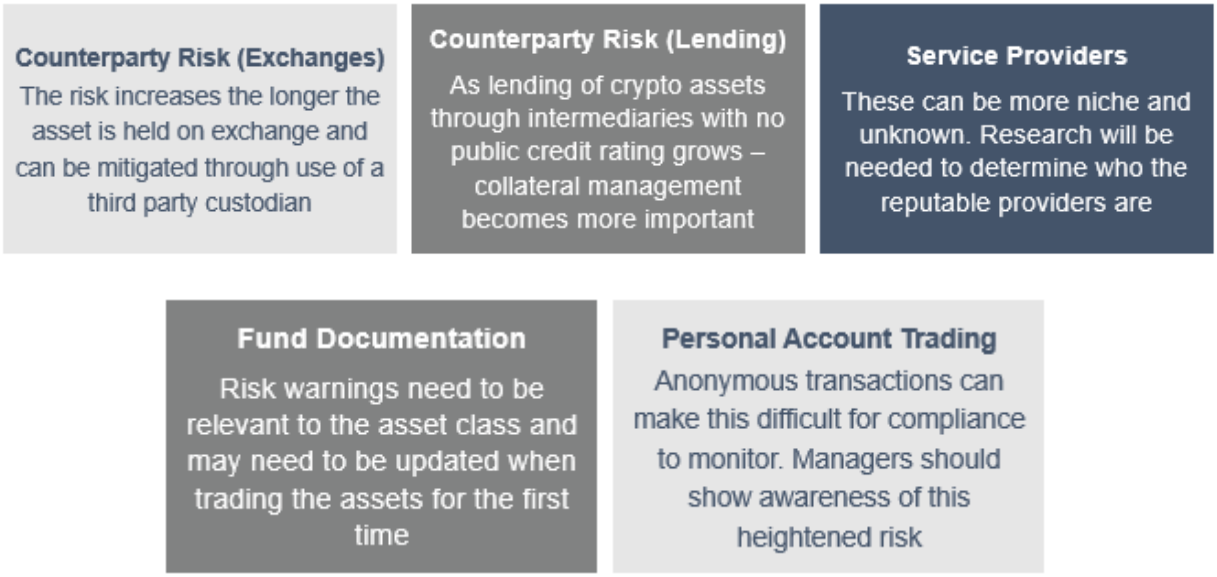
Standard 21.7 requires that regular reports on compliance with laws and regulations (in particular those relating to AML) applicable to activities which are performed by the administrator on behalf of the fund should be obtained by the fund governing body from the fund administrator.

Other Operational Due Diligence Considerations

The focus areas above are considerations above and beyond traditional ODD. Allocators will still need to cover standard areas, several of which were highlighted in a recent SEC Risk Alert[11]

Fees	Segregation and Experience	Reconciliations
With typically smaller AUM service provider fees can have a significant bps impact	The risk is similar to other emerging managers but compounded by an emerging asset class	Blockchain and Wallet reconcilations should be completed. Fund accounting systems may not cope with the number of decimal places for holdings

[11] https://www.sec.gov/files/digital-assets-risk-alert.pdf



How the SBAI Alternative Investment Standards can help:

Standard 14.1 requires that a fund manager has a process for setting up trading relationships on behalf of the fund, including the assessment of credit worthiness and the setting of risk limits.

Standard 14.2 requires that the creditworthiness of a fund's counterparties are monitored periodically and risk limits adjusted where required.

Standard 17h.1 requires that a fund manager should adopt a personal account dealing policy for its staff, ensure awareness of this, test compliance from time to time, and make a summary of the policy available to investors upon request.

Digital Assets and Responsible Investment

Headlines have highlighted the potential environmental impact of this asset class which should be considered alongside any Responsible Investment objectives of the allocator.

Mining is integral to currencies that use **Proof of Work** to validate transactions. For example, Bitcoin miners solve complex mathematical challenges to verify a transaction. This process is designed to increase in complexity over time which requires more computer processing power and therefore more energy. Whilst the use of renewable energy is becoming more common, a digital asset benchmarking study by the University of Cambridge shows that only approximately 39% of **proof of work mining** is powered by renewable energy[12].

There are alternative mechanisms that use less energy, for example **Proof of Stake**. Here miners are required to have an investment in the designated digital currency and the ability to mine is typically proportionate to their **stake**. The incentive here is to increase investment rather than processing power. There are also initiatives such as the Crypto Climate Accord[13], where supporters sign up to help accelerate the development of "greener" proof systems.

[12] https://www.jbs.cam.ac.uk/faculty-research/centres/alternative-finance/publications/3rd-global-cryptoasset-benchmarking-study/
[13] https://cryptoclimate.org/

Appendix A: Questions for Investors to Ask

Investment Mandate

- Does the investment mandate exclude digital assets as part of the investment universe?
    - *This might be explicitly excluded, or the investment mandate is defined well enough that digital assets could not be part of the investment universe.*
- Does the asset manager currently invest in digital assets, or has it done so historically?
- Does the asset manager intend to explore adding digital assets to the portfolio at any point?
- How does (or would) the manager invest in digital assets (e.g., derivatives, liquid assets, **ICO**s, **SAFT**s, or VC style investment?
- Should the asset manager decide to allocate to digital assets, does it intend to give advanced notice to its investors?
- How will any digital assets be reported to investors e.g., how will they appear in risk reports, monthly newsletters, etc.? The Open Protocol Risk Reporting framework was updated in 2021 to include digital asset exposure data.
- Is there a restriction on the amount of exposure to digital assets in the portfolio – if yes, what is the restriction and how long is the cure period for any breaches given the volatility of the asset class?

Custody

- Does the manager use third-party custodians for all assets? If no, which assets are self-custodied and what is the rationale for this?
- What authorisations and licences does the custodian have?
- Does the custodian have insurance? If yes, what does this insurance cover, up to what value is covered, and which firm is providing the insurance?
- Does the custodian have an external auditor produce a Type II SOC Report on its controls? If yes, will investors be provided with a copy and have there been any material exceptions? If no, what is the reason and does the custodian intend to have one produced?
- Who is on the team that oversees security of the **private keys** and what is their relevant experience?
- Does the custodian provide documentation on the security procedures in place to investors?
- What are the security processes in place for both key generation and key storage? How does the custodian protect against collusion and coercion?
- Has there ever been a breach in these security controls?
- What back-up and redundancy plans are in place at the custodian and how would a **private key** be recovered if there was a disaster event?
- Has there previously been an event that required the recovers of a **private key** and was the recovery successful?
- What is the process for accessing a **private key** and does it require multi-factor authentication?
- Does accessing the key require personnel from both the custodian and the asset manager?
- What are the change management controls to change permissions or code and how are these enforced?
- Does the custodian provide proof-of-existence audits on demand?
- How does the custodian prove exclusive control of **private keys** to auditors?
- Are **wallets** segregated or commingled at the custodian?

Self-Custody Additional Questions

- Does self-custody of the assets require additional regulatory requirements and if so, who is responsible for the oversight of this?
- Are self-custodied assets belonging to any one fund commingled with assets belonging to other funds and/or the GP and its affiliates at any stage?
- Which service providers are performing independent verification of the assets in the portfolio and at what frequency is this completed?
- Can assets be moved with no independent authorisation or is another service provider involved in transaction authorisation?
- What is the background of the team responsible for designing the self-custody solution, does this background qualify them for the task?

Valuation and Asset Verification

- Are the digital assets in the portfolio considered liquid or hard to value?
- For liquid assets:
    - Does the valuation policy clearly state the time of the valuation point?
    - Has the manager ever deviated from this time, and if yes why?
    - Can the manager evidence adherence to this valuation point via automated timestamps or an alternative method?
    - Does the manager use multiple exchange prices to create an average price?
    - If yes, what is the verification process for these prices including testing against high and low prices for the day, monitoring of exceptions, and back-testing against traded prices?
- For Hard to Value assets:
    - Does the fund liquidity align with the frequency of reliable valuations?
    - How is the manager valuing these assets?
- Is the fund administrator and auditor able to independently verify the assets in the portfolio? (Investors should also raise this same question to these parties independently).
- What is the process used to verify the assets?
- Who manages the complete list of **wallet** addresses to ensure third parties have the complete list?

Conflicts of Interest

- Does the asset manager, custodian, third party administrator, or any other service provider to the fund own equity or debt in any affiliated businesses such as exchanges, custodians, or trading desks?
- If yes, what are the processes in place for mitigating any conflicts of interest? For example, does the manager prohibit the fund trading with an affiliated trading desk?
- Are the conflicts of interest clearly disclosed to investors?
- Will the manager provide access to the firm's balance sheet to verify other interests?

Regulatory Risk

- What is the manager's understanding of the current and forward-looking regulatory environment in the jurisdictions that it operates in?
- Does the manager trade any assets that have the potential to be classified as a security by the US SEC?
- What does the manager see as the main regulatory risk to the portfolio?

AML and KYC

- Does the asset manager limit subscriptions in the fund to fiat currencies?
  - If no, what processes are in place for AML and KYC checks on the non-fiat currencies?
- Does the asset manager conduct due diligence on the exchanges used?
- Does this due diligence cover AML and KYC checks?
- Will the manager provide a complete list of exchanges used by the fund?

Digital Assets and Responsible Investment

Questions for Investors to Ask:

- Do the digital assets in the portfolio rely on **Proof of Work** for **mining** or **Proof of Stake**?
- Is the manager aligned with any initiatives to reduce energy consumption in the **mining** of digital assets?

Appendix B: Glossary of Common Digital Asset Terms

The below table contains definitions for some of the common terms that may appear when discussing digital assets. Note that some of these terms did not appear in this memo but are listed below for information purposes.

Term	Definition
Airdrop	The distribution of new digital assets to the public for either holding another **token** or having an active **wallet** address on a particular **blockchain**.
Altcoin	A generic term for digital currencies that are not Bitcoin and are considered an alternative.
Blockchain	Decentralised[14] ledger technology that offers a permanent, immutable record of transactions divided between different **nodes**. Essentially, a network of information, like an online ledger, stored in no single place and used to detail anything from digital currency transactions to recording who owns specific properties.
Coin	The term can be used to describe a crypto-currency asset that is not a **token**. It describes a crypto currency that is independent of any other **blockchain** or platform.
Cryptocurrency	A digital currency that is secured by cryptography and used as a medium of exchange within a peer-to-peer economic system.

[14] To note there are also permissioned blockchain networks that are "less decentralised"

Decentralised Finance ("DeFi")	An ecosystem comprised of non-centralised financial applications developed using **blockchain** technology. Uses computer codes known as **smart contracts** to conduct and settle transactions in real time.
Encryption	Conversion of information or data into a secure code to prevent unauthorised access to the information or data.
Fork	A change in a **blockchain's** protocol that the software uses to decide whether a transaction is valid or not. This causes a split in the **blockchain** network that results in the creation of a new asset.
Hash	Taking a transaction as input and generating an output of fixed length to identify the transaction
Initial Coin Offering (ICO)	A fund-raising method in which new projects sell their cryptocurrencies to investors
Mining	The verification of transactions within a **blockchain** network where transactions are added as entries into the **blockchain** ledger. The method of verification depends on whether **proof of work** or **proof of stake** is used.
Node	A participant on a **blockchain** network that communicates with other participants to ensure the security and integrity of the system.
Non-fungible token	A type of cryptographic **token** that represents a unique digital or real-world asset that isn't interchangeable.
Off-chain	Transactions that occur off a given **blockchain** network, that may be later reported or batched together before being submitted to the main chain.
Private Key	A lengthy sequence that allows users to sign transactions and to generate receiving addresses. Can be thought of as a password.
Proof of Stake	This is a consensus mechanism where miners are required to have an investment in the designated crypto currency and the ability to validate new transactions ("mine") is typically proportionate to their **stake**
Proof of Work	A mechanism to validate transactions. For example, Bitcoin miners must solve complex mathematical challenges to verify a transaction.
Sharding	The breaking of the **private key** into several individual fragments
Simple Agreement for Future Tokens (SAFT)	A form of fund-raising directed to accredited investors which promises **tokens** when the project or company becomes operational.
Smart Contract	An automated contract that triggers certain actions when predetermined conditions are met. It works following an "If… Then…" methodology so that certain conditions must be met before other actions can be taken.
Stable Coin	A digital asset that uses a device to stabilise its value, for example, by maintaining a reserve of underlying currencies or commodities.
Staking	A process that involves buying and setting aside a certain amount of **tokens** to become an active validating **node** for the network.
Token	Digital assets issued on a **blockchain** which can hold value or be redeemed for assets. These are not the same as coins.
Wallet	A secure digital wallet that allows users to store digital assets electronically.

Appendix C: Contributors

The SBAI would like to thank the following for their contribution towards this Toolbox memo

(Alphabetically by Firm)

Steven D'Mello
Partner, Operational Due Diligence, *Albourne Partners*

Seerat Maini
Associate, Operational Due Diligence, *CPP Investments*

Garima Grover
Associate, *Galaxy Digital*

Karl Ngok
Vice President, Client Services, *Galaxy Digital*

Steve Kurz
Head of Asset Management, *Galaxy Digital*

Andrew Chen
Absolute Return Strategies, *Lockheed Martin Investment Management*

Matt Lundy
ORAM Head of Operations, *One River Asset Management*

Wei Xie
Director, Co-Head of Multi-Strategy Investments, Capital Markets Group, *OPTrust*

Matt Perona
Chief Operating Officer and Chief Financial Officer, *Polychain Capital LLC*