Native Digital Funds

A Digital Issuance Working Group Paper

Dr Ian Hunt 2nd May 2023

Contents

The Structure of the Paper

This paper follows on from an initial set of papers on Digital Issuance, published on 19th July 2022, and launched at the Investment Association in London. Those papers set out a model of native digital assets based on forward flow commitments: it showed the radical potential of smart tokens to create a single, simple digital issuance model, and a single, simple operating model for financial assets, and the dramatic benefits that would follow.

This paper looks at the implementation of the smart token model for collective investments, and defines the key attributes of native digital funds: it considers the impact for the funds industry, for fund managers and for the investors in funds.

So that this paper is self-contained and can be read in isolation, the rationale and principles of the smart token model are explained very briefly in the first section of the paper. This material is a condensed version of the executive summary from the original papers, and can be omitted by anyone who has read those papers, or is otherwise familiar with the native digital assets / smart token model.

Foreword

FundAdminChain (FAC) is pleased to have been an inspiration for the production of this paper, to have played a role in its development, and to have contributed to its contents.

FAC has been focused on the application of distributed ledger technology and tokenisation into the investment funds market – in all its diversity.   This includes mainstream retail OEICs, as well as open and closed private funds. Central to our propositions, and to our business goals, is the improvement of operational efficiency in these markets. We are looking to drive financial inclusion, to unlock the potential of secondary markets, and to drive down the barriers to investment in these markets. All of these factors will strengthen flows and expand market reach.

This paper paints a vision in which growth is achieved, while costs and complexity reduce substantially. We applaud the focus on removing friction, disentangling complexity, compressing timeframes and enhancing trust. Reduced complexity means a reduced chance of error. Trust in the management of transactions will enable far greater standardisation and normalisation of assets than we see today, and will bring private funds and assets into the realm of organised markets.

FAC believes that distributed ledger applications should focus on the quality of experience of the end-customer, and on the value-add of the fund producer, as well as on efficiency gains in the servicing of funds. Every successful DL initiative will target all three benefits, and FAC's products will be crafted to achieve this, rather than creating tokens for tokens' sake. To exploit the power of distributed technology and decentralised business models, we need to treat them as part of a wider ecosystem, which includes conventional assets and conventional funds: ledgers should not be islands of digital assets. Integration is key, and the highly efficient DL backbone needs to be accessible to a wide set of off-ledger assets.

This paper sets out the extraordinary opportunities associated with stepping out of conventional processes and breaking down funds, assets and transactions to their basic form. It further highlights the power of tokens that are smart, and can self-execute, as vehicles for fund automation. Native digital funds are the target, and FundAdminChain supports the view that this model has immense value for all stakeholders in the funds markets. However, achieving the end-state will be a journey. We believe that tokenisation of conventional assets and funds, while delivering less benefit that native digital assets and funds, is a necessary step on that journey. We are fully committed to supporting and facilitating tokenisation as a result.

Based on these convictions, FAC has adopted a road-map and defined a SaaS product suite based on DLT, but focused on improving the current state journey and delivering near-term value-add. We aim to remove challenges and increase flow for investors, fund managers and fund service providers, and to support conventional funds throughout the process. We will offer a pathway from conventional to tokenised funds, and ultimately to native digital funds, that makes it as easy as possible for industry participants to travel the journey. FAC's starting point is the digital facilitation of onboarding: a major pain (in private markets in particular) for all participants. From here, we will move on to fund discovery, to tokenisation and to trading and secondary market functionality, with a focus on private funds.

At FAC, we will collaborate fully with the industry on the regulatory, technical and operating model changes required for mass adoption of DL technology and decentralized business models. The concepts set out in this paper set out a very exciting future state for the fund and fund administration industries. FAC looks forward to being part of this transition to a truly digital funds environment, for the benefit of investors and of all industry stakeholders.

Outline of the Smart Token Model

What the Native Digital Asset Model is For

In our conventional world of assets and transactions, each asset class has its own issuance model (how it is created, issued, and owned) and its own operating model (how it is managed, traded and settled). These tend to be very complex, and involve many entities, processes and controls. This combination of the multiple asset classes, operating models, entities, processes and controls drives a firestorm of regulation, which adds its own complexity to an already convoluted picture.

The native digital asset model eradicates this complexity, and the cost and risk that are its inevitable consequences, and replaces them with a single, simple digital issuance model, and a single, simple operating model, based on smart tokens. It enables us to issue and own all digital assets in the same form, and to manage, trade and settle transactions in those assets in the same way, whatever the asset is that we are seeking to issue and trade.

The model aims to provide a practical method of operation for a fully digital ecosystem. "Fully digital" in this context means that all value and all transactions exist only in digital form: there is no use of conventional issuance, registry, custody, banking or payment / delivery rails. Pools of value are in the form of tokens on a digital ledger, and all movements of value are flows of tokens between addresses on the digital ledger. The existence of a token at an address (or 'node' or 'wallet') on the ledger is proof of the ownership, of whatever that token represents, by the owner of the address.

The benefits of the native digital asset model are profound. It eliminates the boundaries between asset classes, and allows us to build whatever assets and transactions that we want, and that are useful to issuers and investors. It enables the issuer of capital to create exactly the funding that they want, and enables the asset owner to seek precise matches to their investment requirements. The model brings orders, executions, entitlements, corporate actions, income, securitisations, collateral and liabilities into the same simple operating model as trades. Asset servicing disappears as a result, and trading and settlement become simple and fully automated.

What Our Industry is For

If we strip away the blizzard of entities and activities engaged in what we currently do, and let the snow settle, then it becomes clear that the finance industry only manages two related things, and its purpose is to reengineer one into (and out of) the other. These are:

1. Current pots of value; and
2. Future flows of value.
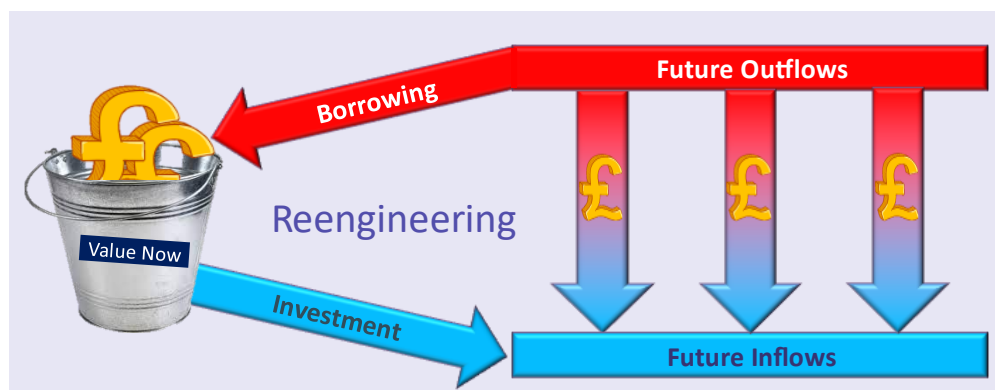
To deliver investment, we reengineer a current pot of value into a set of future inflows. To deliver borrowing, we do the converse, and reengineer future outflows into a current pot of value. That's all we really do. Everything else that exists or happens in finance is there to aid and abet delivery to these fundamental objectives.

The players who really matter in our industry are obvious once the purpose of the industry itself becomes clear: they are the investors (or 'asset owners' in the institutional world) and the borrowers (or 'capital issuers'). These are the players who make, or receive, the future flows, and who need, or defer, current value. Everyone else in the business is there only to serve the needs of these ultimate participants, and only deserves their place in the industry if they genuinely make it easier, cheaper or safer for investors and borrowers to achieve their goals.

Why the Model is Like it is

It is a common view in the media that 'digital assets' are the same thing as crypto. More clued-in observers are aware of tokenised versions of conventional assets, and they may call these 'digital assets' also. There is a problem with this view: a cryptocurrency is cash, not an asset as such, and tokenised conventional assets are conventional, not digital. There are hundreds of tokenisation projects. They may be worthwhile, but not one of them will transform the industry.

Tokenised conventional assets are just that: slightly sexier versions of conventional assets. The only digital thing about them is their title (i.e. their ownership), which exists on-ledger. Their regulations, controlling entities, operating models and terms and conditions are unchanged, and still exist wholly off-ledger. Registry, trading and fractionalisation are easier with tokenised assets, but not much else is. Native digital assets are not just sexier versions of conventional assets. They are wholly different, and do not conform to the straightjacket of current instrument classes.

In conventional finance, each asset type is wrapped up in law and regulation as if it were a coherent 'thing': it is valued, risk managed and traded as a single indivisible whole. It is a consequence of the smart token model that what we commonly call "assets" are not coherent, unitary things at all, but are really just collections of commitments to future flows of value. That value is often, but not always, represented in cash.

In a purely digital ecosystem, all pots of value are tokens, and all movements of value are flow of tokens on the digital ledger. So in this context, current value is represented by tokens (often cash tokens), and native digital assets can only be one thing: commitments to future flows of tokens. It is as simple as that. This maps the purpose of the industry very effectively: it is all about the management of current pots of value and future flows of value – in token form, because we are in a wholly digital context.

So digital asset tokens should represent commitments to future flows, not conventional assets.

Making Tokens Smart

In this context, the native digital asset tokens are like IOUs – they are representations of liabilities, held by the lender as a pledge until the borrower discharges its debt, then handed back to the borrower. The next big step is to make the tokens themselves control what goes on: they need to be smart, and potent. The difference with smart tokens is that it is the tokens themselves that make the repayment happen, not the parties to the debt.

Making tokens smart sounds complex, as if they will be like full business systems in their own right. However, because the only thing that happens on the digital ledger is the movement of

tokens between addresses, then the only thing that a smart token can do is to move tokens - itself or others – between addresses.   That means that smart tokens are relatively simple entities; they just need to know what they have to do, to know when they need to do it, to know the constraints that there doing it under; then they need the potency to do it. And the 'it' is just moving tokens on the digital ledger.

Once the tokens are smart and potent, then many of the processes that are carried out in the conventional world by regulated entities (order management, execution, entitlement calculation, corporate actions, income payments, securitisations, collateral transfers etc.), are carried out automatically by the tokens themselves. This may sound concerning – that tokens should be making transfers of value without human intervention – but the tokens are not making any of this up: they are just giving effect to what the parties to a transaction have already agreed will happen.

The operating model has a tiny number of steps, entities and interactions: there six steps are:

1. The issuance of the smart token;
2. The transfer of the smart token to its recipient;
3. The earmarking of the committed tokens by the issuer, making them visible to the recipient;
4. The self-initiation of the smart token and the computation of its terms;
5. The transfer of the committed tokens from the issuer to the recipient; and`
6. The transfer of the smart token back to the issuer.
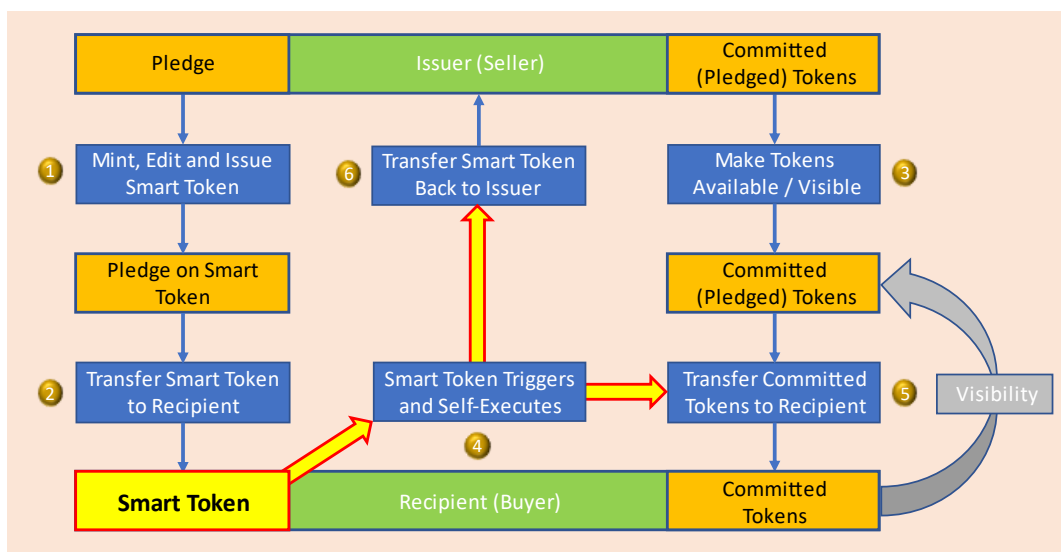
The Two Big Ideas

The two key steps that get us from conventional tokenisation to the native digital asset model are twofold:

1. First, we recognise that native digital assets are (and can only be) commitments to future flows of tokens, so we make digital asset tokens represent those commitments, not conventional assets.
2. Secondly, we make the tokens that constitute native digital assets smart, so that they can initiate and implement, as well as describe, the committed flows of tokens.

That's all. Once we take on board these two fundamental ideas, then the world of native digital assets and smart tokens opens up to us.

Funds in the Smart Token Model

Non-Digital Funds

Before looking at digital funds, we need to understand the form of current fund structures.

In a non-digital fund, whether the fund is principal-traded or market-traded, and irrespective of its being open-ended or closed-ended, the fund entity holds assets and cash within a segregated portfolio. It offers participation to investors in units in a trust, or in the shares of a fund company, such as an OEIC or ETF. In a trust, the holder has rights to the underlying assets, while in a fund company, the shareholders only have ownership of the company shares, but not of the underlying assets.
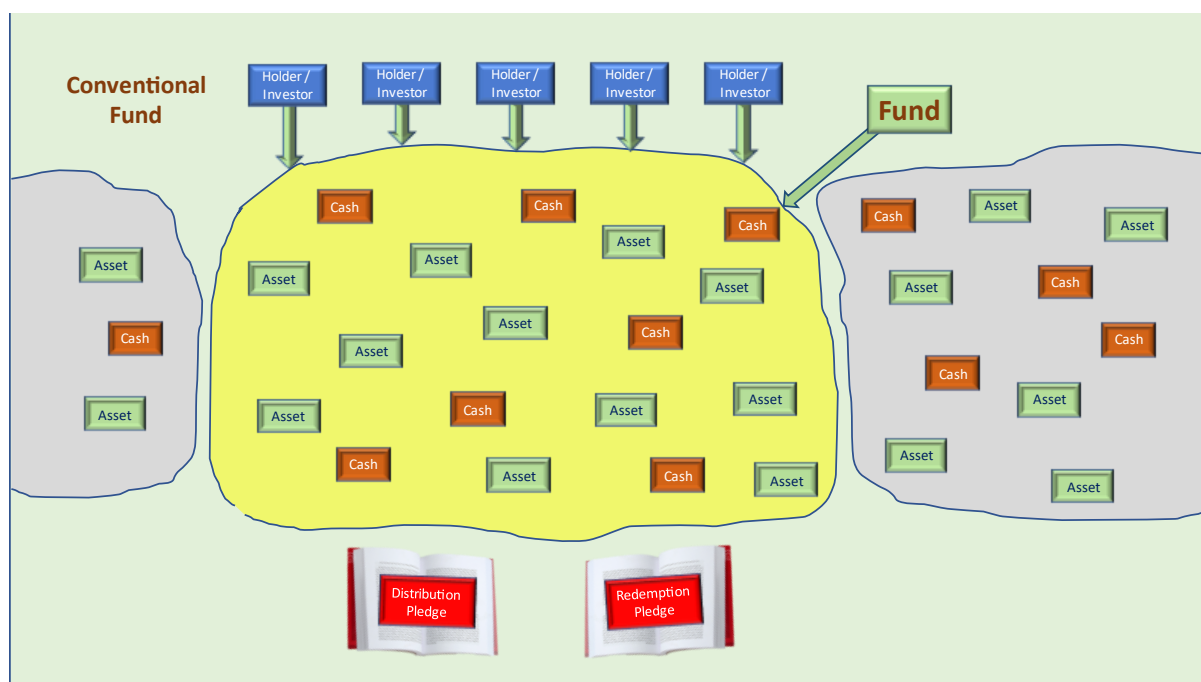
If the fund is principal-traded, like an OEIC or a unit trust, then all trading is between investors and the fund entity, and the fund is the only source of units / shares for new investors. In a market-traded fund, like an Investment Trust or an ETF, trading is between the investors via an organised market.

For principal-traded, open-ended funds, there are generally two contractual pledges. The fund entity commits to redeem units / shares in the fund on demand at the then prevailing price. Depending on the definition of each share class, there may also be a commitment to distribute income generated from the fund assets. These are essentially 'paper' contractual commitments in the fund agreement, not anything resembling a digital asset. In a market-traded fund, there may be no commitment to redemption by the fund (except for in-specie redemption for large holders of ETFs).

The fund entity is rewarded for running the fund through explicit fees charged to the investors in a single-priced fund, or through margin in a fund priced on a bid / offer basis.

Digital Funds

The two groups of funds that may be described as 'digital':

1. Tokenised funds; and
2. Native digital funds.

Tokenised funds are conventional fund structures with conventional underlying assets, whose title is tokenised onto a digital ledger. So the only thing that is really digital about them is their ownership. The digital title replaces share-holding or unit-holding for the investors as proof of ownership, and is represented by tokens. The investors in a tokenised fund hold the tokens representing their holding at their address on the ledger. The tokens are 'passive', and have no role other than to act as markers of ownership.

In a native digital fund, all value is represented by tokens on-ledger, and native digital funds hold only tokens as underlying assets. Investor ownership is represented by smart tokens, committing and implementing future flows from the fund to the investors. By definition, the value flows committed by the smart tokens are themselves flows of tokens.

There is a clear migration path from tokenised funds into native digital funds, as tokenised funds can start to hold tokens among their conventional assets:

1. Tokenised funds holding conventional assets, evolving into:
2. Tokenised funds with some token holdings, ending up as:
3. Tokenised funds, holding only tokens, transforming into:
4. Native digital funds, holding only tokens.

Tokenised funds offer some significant operational benefits, rationalise the role of the transfer agent, reduce operating costs, and simplify cash management. However, significantly greater benefits in cost reduction and operational simplification will accrue from native digital funds. Inter alia, native digital funds offer the potential for:

- The delivery of an unlimited range of investment products and outcomes from the same pool of assets;
- The replacement of shares and units as title with tokens pledging the relevant outcomes;
- The elimination of share classes;
- The facility for distribution to follow the same operating model as issuance;
- The facility for a primary and secondary market in all fund tokens, eliminating the distinction between principal-traded and market-traded funds;
- The elimination of the hard distinction between open-ended and closed-ended funds.

The potential of native digital funds to achieve profound reductions in cost and complexity, as well as to deliver far greater product flexibility, makes them very attractive from a client and z distribution perspective.

Tokenised Funds

In a tokenised fund, only the title is digital – everything else is conventional. The tokens are collateralised by reference to the fund as an off-ledger asset. Distributions and redemptions are made in the normal way, albeit they involve the creation and redemption of tokens.

Where a fund is constituted conventionally, as a company or a trust, then its substantial existence is off-ledger: our only option is to tokenise its ownership in the form of title tokens. In these cases, the

title is to a fraction of the underlying assets in a trust, or to a fraction of company itself in a fund company. We may be able to add some rules, terms and conditions to the token to facilitate its processing, but we cannot do much more than that.

By tokenising the ownership of the fund, and representing it as title tokens, we gain the benefits described earlier: Transfer Agency becomes much simpler, the fund register becomes self-maintaining, messaging and reconciliations diminish, and the fund activity becomes instantly visible to any participant through the distributed ledger, so long as they have the right permissions. So long as the cash used for settlements is also in token form, then settlements can be on an atomic basis, so perfect DVP is possible wholly on-ledger; cash management is much simplified too,

To gain the full benefit of digitisation, however, and to exploit the power of the smart token model, the fund itself needs to become a native digital entity.

Native Digital Funds

A digital fund is not a single, unitary entity, representing the whole fund: it is a cluster of tokens, representing the constituent assets and liabilities of the fund. The constituents may themselves be native digital assets and native digital cash, or they may be tokens representing off-ledger assets and cash, or both. They may include stablecoins, crypto, CBDC, asset title tokens or other smart tokens. The only purpose of off-ledger assets in a native digital fund is to collateralise the title tokens held by the fund: cash collateralising cash tokens, and conventional assets collateralising asset tokens.

Like the tokens in tokenised funds, the smart tokens representing investment in a native digital fund are held at the addresses of the investors. However, they are active, self-executing tokens, and themselves control the delivery of committed flows from the fund to the investors. So delivery of investment outcomes from the fund to the investors is self-actuating.

In the picture below, green tokens represent inbound pledges, and red tokens represent outbound pledges. The outbound pledges will be held on the recipients' nodes, rather than the fund manager's node, but will be visible to the fund manager.
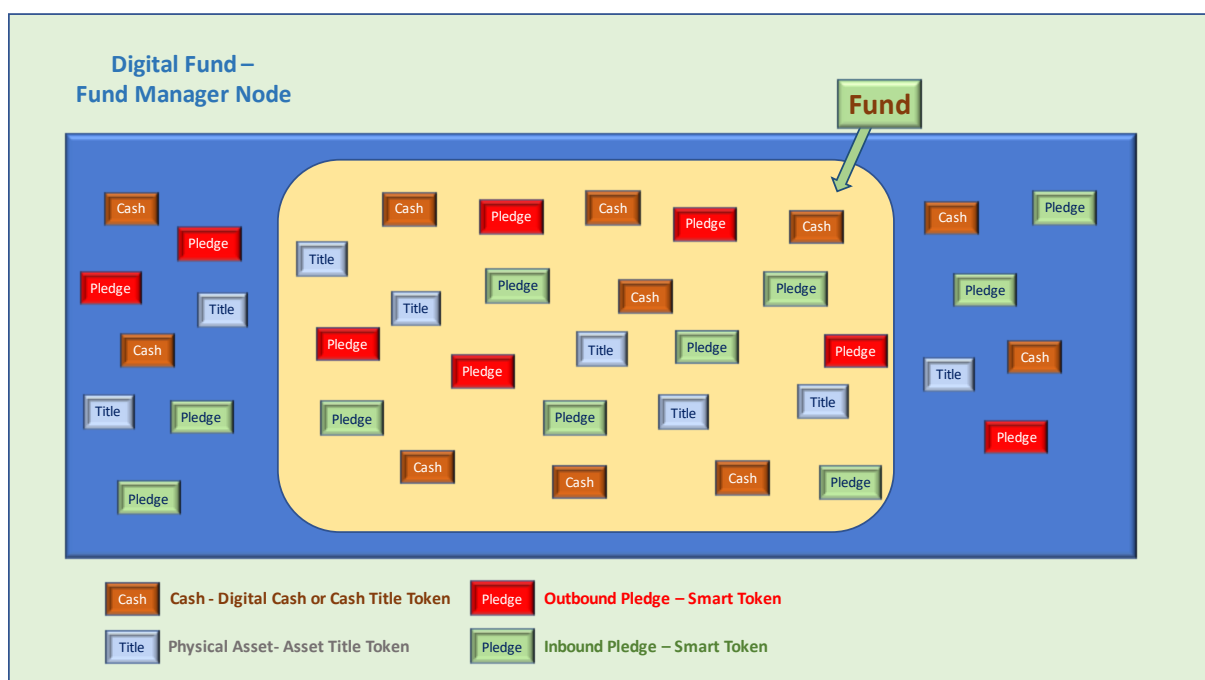
The cluster bears the name of the fund as a label, and is elastic, in the sense that it flexes as its constituents change. Those constituents will change as the fund receives new tokens and pledges, issues new pledges, trades pledges, trades asset title tokens, and delivers or receives cash tokens.

In a native digital fund within the smart token model, there are no units, shares or other off-ledger representations of title. The investors do not need any direct claim over the underlying assets (or liabilities) of the fund, nor any ownership of the fund as an entity, unless the law separately dictates that they must. They will simply hold pledges from the fund, which, depending on their treatment in any jurisdiction, may carry legal obligation.

Investors in the fund will receive commitments from the fund in the form of pledges: the pledges to investors will represent a major part of the liabilities of the fund. As pledges, they are by definition commitments to future token flows, but in this case, the pledges are minted by the fund itself as an issuer, and commit the fund to deliver the future flows. The investors are the recipients of the fund pledges, and will hold them at their addresses as IOUs.
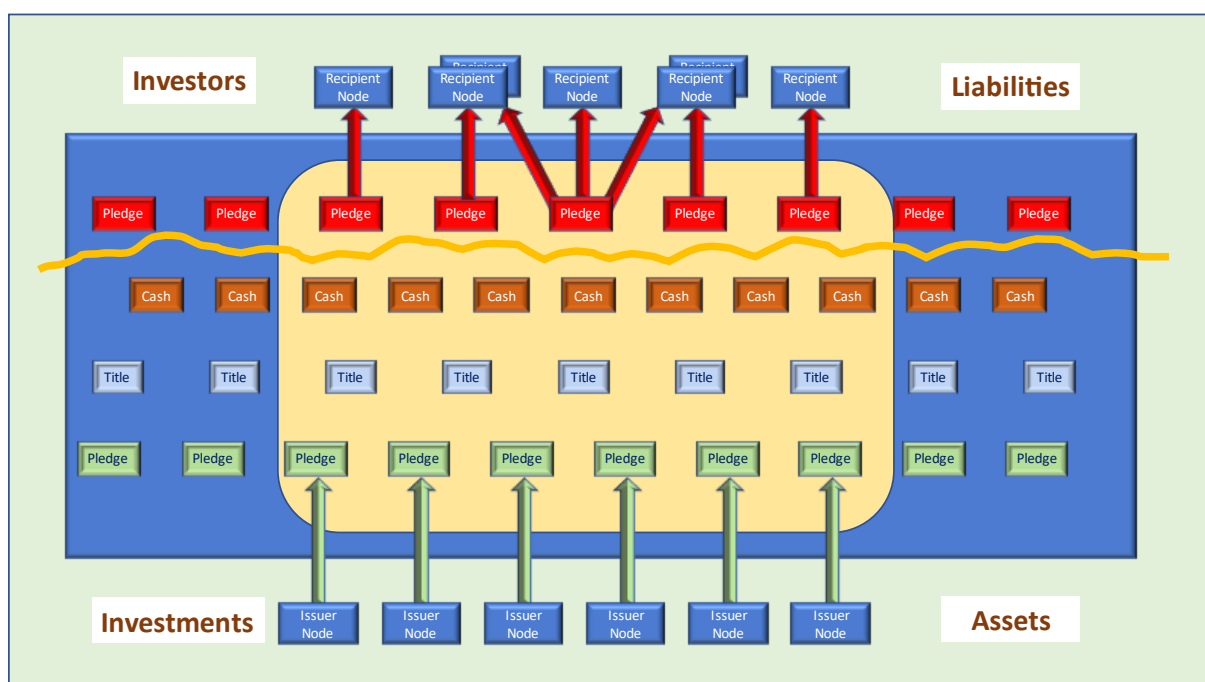
The management fee of a fund is also a pledge: it is an outbound pledge from the fund cluster to the fund manager, which will self-execute to pay cash tokens on an agreed frequency, and calculated in accordance with its terms. An alternative mechanism, which is entirely practical, but would result in a larger population of smart tokens, would be for the investors to pledge periodic payments to the fund. Either works.

All orders, transactions and settlements in tokens held by the fund, or issued by the fund, will follow the standard native digital asset operating model: so no fund-specific capability is required there. However, the fund does require an elastic wrapper, which persists as an entity while it changes through the inbound and outbound trading of the fund[1].

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[1] In most contexts in the native digital asset model, wrappers are transient, and their constituents are fixed. They are a convenience for trading a cluster, and generally deployed because the cluster represents a familiar asset: they have no relevance once a trade is complete. In a fund context, the wrapper persists for the life of

Investment Products of a Native Digital Fund

In a conventional fund, the range of products delivered to the investor is usually very limited. Essentially, the client is offered the price / performance of the fund assets, less the costs of running the fund; this will be delivered at the point in time that the investor chooses to redeem. The client may also be offered the income generated from the fund assets, if the fund or fund class is distributing. That is generally that.

With a native digital fund, there is no such limitation on the investment outcomes offered to investors: multiple, diverse products can be delivered from the same fund, at the discretion of the fund manager. The pledges are the investment products of the fund, and can be designed to meet the outcome objectives of the investors. Products could, for example, pledge a repeated flow, a one-off payment at a specific time, an index-relative flow, a flow with a guaranteed floor, an event-triggered flow, etc.

It is up to the fund manager to decide what pledges they want to make to investors in their funds, and, therefore, the definition of products is optimally flexible. So long as the tokens and inbound pledges in the fund cluster can support the delivery of the outbound pledges, then the fund has complete flexibility over the pledges that it offers, and to whom it offers them. The management value-add, as well as the sourcing of high-quality assets and inbound pledges, is the discipline of asset / liability management: it is up to the fund manager to appraise the expected value, risk and timing of inbound flows, and to match them to the outbound pledges that they wish to make.

As the manager can decide what pledges they wish to make to the investors in the fund, it follows that managers can decide to take capital risk if they wish to structure products that require this. Absolute return and guaranteed return products are also wholly practical, so long as the manager is capitalised to deliver them, and to meet their obligations under adverse conditions.

Private asset funds can represent their capital call commitments as inbound pledges from the investors to the fund. These can self-execute when each capital call is made, and transfer cash tokens of the agreed kind from the investor to the fund. In essence, the contracts between the general partner and the limited partners are encapsulated in the triggers and terms of the smart tokens.

The pledges that the fund makes to investors can, as a base case, reflect the two basic products of a conventional open-ended fund: a distribution pledge and a redemption pledge. So a native digital fund can mimic the behaviour of an OEIC, for example. But it doesn't have to.

A distribution pledge may be expected to commit the fund to transfer to the investors the flows received from digital assets and tokenised assets held by the fund. However, the distinction between what is a capital flow and what is an income flow is not straightforward. The idea of capital is tied to the idea of a unitary, persistent asset, which does not exist in the native digital asset model. In the model, therefore, there is no such clear distinction: committed flows are there because their

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the fund. The only alternative to this is for each fund to have its own individual node: that is unlikely to be operationally convenient, or cost-effective.

issuer has chosen to pledge them to their recipients, almost certainly in exchange for some flows of cash tokens in the other direction. They are neither income nor capital: they are just flows.

The fund may receive cash income from off-ledger assets, but these do not necessarily translate into flows out to investors that could be described as income. An issuer could, in an extension of the model, define a flow itself as 'income' or 'capital', but this would really be an arbitrary label. So there can be a 'distribution pledge', but it will be more a matter of pledging some regular flows to the investors (because they want them), than it will be pledging what is strictly a flow of income.

A redemption pledge is really just a pledge to deliver a flow that is calculated against a rate tied to the performance of the fund itself. 'Performance' in this context means the relative value of an index, where the index is based on the balance of assets over liabilities in the fund. The index will need to be objective, and the source of the index will be referenced in the pledge, so that both the fund and the investor know how the redemption will be calculated[2].

Buying into and Trading a Native Digital Fund

When an investor wishes to buy into a digital fund, they would use exactly the same network facilities as any other active ledger participant:

- The investor may search for nodes offering fund pledges that match their objectives; and / or
- The investor may advertise their interest in receiving particular fund pledges by holding Indications of Interest on their node; and / or
- The investor may search smart market nodes which hold fund pledges of behalf of fund providers.

In this model, the smart market nodes are the equivalent of platforms / distributors in the conventional fund market.

Funds may find investors through multiple means also:

- The fund provider may find and match to the investor's IoIs through network search facilities; and / or
- The fund provider may advertise their interest in making particular fund pledges by holding IoIs on their node; and / or
- The fund provider may send their IoIs to a smart market / distributor / platform.

Once a match is achieved between the fund and an investor, then the IoIs of the two parties are converted into an order and the transaction progresses according to the standard smart token operating model.

A fund pledge is a digital asset - i.e. a smart token, like any other, and can therefore be fractionalised and on-traded by the investor without limitation. This makes no difference to the liability for the tokens committed in the pledge, which remains the obligation of the fund as the principal and issuer. If the fund offers a redemption pledge, then it is, in effect, holding itself out as principal in

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[2] The index value at any point will be a calculation of: cash tokens (digital and tokenised) in base currency + tokenised assets at current liquidity-adjusted valuation + risk-adjusted inbound forward flows - risk-adjusted outbound forward flows. To maintain the integrity of the index, investor flows into and out of the fund, together with returns attributable to them, will be adjusted out as is usual for index maintenance.

this respect also, but this makes no difference to the opportunity for the investor to sell on the token in the secondary market. Funds can therefore be both principal-traded and market-traded, and there is both a primary and a secondary market in digital fund investments.

Open / Closed-Ended, Principal / Market-Traded? As You Like

The pledges that the fund offers to investors can be offered to eligible investors without limit, or they can be offered as a fixed supply that cannot be exceeded. The fund can offer multiple pledges to the same investors, or to different groups of investors, and so can offer products which are open-ended, and products which are closed-ended, simultaneously from the same fund entity. A native digital fund is therefore neither open-ended nor closed-ended in its entirety, but each of its pledges will be one or the other at any point in time.

A native digital fund can grow on an open-ended basis if the manager continues indefinitely to disclose public Indications of Interest in the issuance of further pledges. The fund can shrink without limit, again in an open-ended fashion, if the manager continues indefinitely to hold public Indications of Interest offering to buy outbound pledges for cash tokens.

When a fund is launched, then the fund manager will offer outbound pledges, probably in exchange for cash tokens, in Indications of Interest held on the fund node and visible to investors. It is up to the manager how the issue is, or is not capped.

Beyond launch, if the fund wishes to offer a principal trading facility to investors, then it may continue to hold Indications of Interest within the fund cluster, offering outbound pledges to new investors, and cash tokens to existing investors in exchange for the surrender of their outbound pledges. The extent of those pledges is at the discretion of the fund manager, so a fund does not need to be principal-traded on an all or nothing basis: it may offer a partial facility.

The investors are free to fractionalise and trade the smart tokens with other investors, whether they are redemption pledges, income pledges, or whatever. So every digital fund is tradeable in the secondary market. If there is a smart market set up on the network that hosts the fund node, then this can act as an exchange for smart tokens issued by funds, just as it can be an exchange for any other token. So every digital fund can be exchange-traded too.

The summary of this is that every digital fund can be a hybrid principal-traded and market-traded vehicle, and every fund can deliver open-and closed-ended products.

ETFs operate an in-specie subscription and redemption process, which enables them to be open-ended without cash transactions in the underlying assets. As we have seen, digital funds can be open-ended and market-traded, like ETFs. The ETF process could be replicated in a digital fund, but this complexity is unnecessary, and is not justifiable other than for pure tax-efficiency purposes.

Fund Classes? No Need for Them

As a result of the flexibility for the manager to construct arbitrary pledges in a digital fund, there is no need for fund classes, as we conventionally understand them. The terms of each different pledge (or cluster of pledges) offered and issued to investors is the nearest equivalent of different classes of fund. The underlying assets are the same for all outbound pledges; however, the manager is entirely free to define different individual or clustered pledges, and to market them to different categories of investor.

This freedom could include the marketing of a cluster including income pledges, as an equivalent of income classes in a conventional fund structure. Clusters without the income pledges (i.e. "accumulation clusters") could commit a higher absolute or relative return to their recipients if the fund manager can support this from the assets and liabilities of the fund, or from their own balance sheet.

Intermediaries and Service Providers? Still Some Needed

The native digital fund model removes the need for multiple intermediaries: there is no requirement for Custodians[3], Depositaries, Transfer Agents, ACDs / Mancos, Fund Administrators or Fund Accountants. However, there are still some requirements for trusted third parties (in addition to the manager / operator of the fund), to deliver objectivity and consolidation to investors.

The relationship between the assets and liabilities in the fund cluster is key to the delivery of its commitments to its investors. So a strong asset / liability matching capability is a key competence required of the fund manager: the investors need to have confidence in this. Similarly, and especially if the fund makes redemption pledges to its investors, liquidity is a key consideration: management of the liquidity of the title tokens and inbound pledges in the fund cluster is also a strong requirement of the manager and a key concern to the investors.

In conventional principal-traded funds, like OEICs, with regular trading and a redemption commitment, the promise of liquidity is usually only deliverable in reality if the redemptions are undemanding. In some cases, where the underlying assets are illiquid or hard to value, the promise is effectively worthless: well-publicised failures bear testament to this. In the context of native digital funds, the tokens committed must be deliverable for all pledges made by the fund to its investors: the pledges are therefore more honest and robust than we are used to from conventional funds. Asset / liability and liquidity management are central to the manager's ability to deliver.

If a fund manager wishes to make, or inadvertently makes pledges that may not be deliverable from the assets and liabilities that the fund holds as tokens, then they can do so, but delivery still has to take place. This has the implication that the manager must have access to alternative sources of the committed tokens: this is the equivalent of stock borrowing in conventional investment, and signals the requirement for service providers to deliver a liquidity service to the network. Ultimately, the manager is at liberty to put their own balance sheet at risk, but this will result, self-evidently, in a material capital requirement.

So the confidence of the investors in the manager's ability to deliver, over the life of the fund, to the pledges made to investors will be underpinned by liquidity analysis, by asset / liability matching and by the availability of alternative liquidity. All in turn depend on robust valuation of the pledged future flows represented by smart tokens, and of the off-ledger assets underlying title tokens. To protect the investors, it may be necessary to deploy an independent assurance function. This would monitor the valuation of the tokens in the cluster, the asset / liability match of those tokens, their liquidity, and the robustness of alternative liquidity sources. This will provide confidence to investors that the fund is, and will remain, able to meet its commitments over time, and is a level of assurance far higher than investors enjoy today from conventional funds.

The redemption pledge calculation is dependent on an index of performance, based on the valuation and asset / liability mix of the fund. The construction of this index may be delivered by the same

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[3] Except for assets collateralising title tokens held by the fund.

third party that delivers the ALM, liquidity and valuation assurance to investors; alternatively, it may be provided by a specialist index-provider, based on data from the assurer.

Distribution and Platforms – Part of the Same Picture

The manager of a native digital fund can interact directly with investors, or can access the end-investor through distributors and platforms, just as they do with conventional funds.

The investor with a spread of investments will want to see a consolidated view of all their investments, whether they are digital or not. There will therefore still be demand for a platform of some kind to bring together investments from multiple books of record. If the investor has only digital assets, then all of their investments will be represented in the form of tokens, and these tokens can be held in a digital wallet / address on-ledger. If they have a mix of digital and non-digital investments, then a conventional platform will be required to present a consolidated view, and the ledgers on which their digital investments are held will need to make that data available externally.

In addition to its function as a consolidator of investments, a platform for native digital funds is a venue where multiple funds advertise their pledges, and where investors access funds from multiple providers: it is a smart market that brings together funds and investors, by matching the appetite of the investors to the pledges offered by the fund provider. The platform can act just as a shop window for the funds, and leave the fund to issue pledges directly to the investor once the match has been found, and the transaction facilitated. Alternatively, the platform can intermediate as the recipient of the pledge from the fund, and issue its own pledge to the investor.

Distributors can deliver an investment platform by hosting a smart market, and by providing the searching / matching facility that finds suitable investments for their clients. Beyond the platform capability, the distributor could add more value by creating their own products and wrappers out of the native digital assets issued to them by the funds. The distributor could manage their client investments through a conventional register, or, more efficiently, could issue their own pledges to the investors as smart tokens. In the latter case, the clients would have their own addresses on-ledger, potentially hosted by the distributor.

Where the platform or distributor issues their own pledges to their clients, then the issuance model at the retail level is the same as the issuance model of the funds, which is the same as the issuance model of the underlying assets of the funds. The same technology and operating model can therefore support transactions at every level of investment and wealth management.

Dilution, Equalisation and Liquidity

A native digital fund sells pledges to its holders, and these are commercially-priced on the basis of the asset / liability mix of the fund, and the perceived value of the pledge that the fund wishes to offer. It is entirely up to the fund to determine the commercial price of any pledge (including a redemption pledge), to manage its asset / liability mix, and to maintain adequate liquidity to meet its pledged obligations. There are no NAV-driven prices which the fund has to offer to subscribers or redeemers, so there is no notion of a dilution adjustment to those prices, nor is there any notion of a dilution levy.

The concept of equalisation depends on a clear distinction between what are income flows (in cash) and what are capital clows. That distinction does not exist in any clean form in the smart token model, so conventional tax treatments do not fit easily into the model; therefore, the tax treatment

of flows from native digital funds is wholly unclear at this stage. Any concept which is the equivalent of equalisation would need to emerge from consideration, and clarification, of that tax treatment.

Legal and Regulatory Implications

The off-ledger assets and cash referenced as collateral by title tokens are conventional, and will be subject to existing regulation, even though their ownership is represented and transacted on-ledger, and requires a different treatment. However, native digital assets and funds are wholly different in form: there are inevitable and pervasive regulatory and legal issues with them. Existing regulations and laws were drafted to handle conventional funds, assets and cash, moving between conventional registers, custodians and bank accounts.

The flexibility of digital funds does not sit well with the categories of collective vehicle defined in statute and regulation. Current regulations on collective schemes (per the COLL Handbook of the FCA) mandate a slew of intermediaries with defined roles in the current process. Open-ended and closed-ended funds are defined with hard boundaries, as are principal-traded and market-traded funds. The regulated roles are either not required for native digital funds, or are materially different. The boundaries between fund types do not exist in a hard form for native digital funds either. Consequently, the existing regulations are obsolete in these contexts.

It is not clear that pledges have an established legal or regulatory status. Any implementation of a purely digital fund would therefore need to address, or avoid, these issues, pending the emergence of appropriate regulation and law for native digital assets.

Conclusion

A digital fund is a highly flexible vehicle, capable of supporting an unlimited range of investment products for the end-investor. The attributes of the fund are entirely defined by the pledges which the fund manager wishes to make: these will represent both products and the equivalent of share classes. The products of the fund can be open-ended or closed-ended at the discretion of the manager. There is a natural secondary market, as investors may trade and fractionalise their tokens without limitation, and exchange-trading is possible through a smart market. Any digital fund can also be traded principal, to the extent that the fund manager wishes to make the relevant pledges.

Digital fund investments conform to the smart token issuance and operating models, and all management of token lifecycles is standard in form, from Indications of Interest through to settlement. The investments, and the tokens that represent them, will therefore be self-actuating; this will enable a high degree of automation, and a lower cost of operation. However, digital funds have some additional requirements at the fund node, to accommodate a persistent cluster, to strengthen asset / liability management and to provide liquidity analysis.

The absence of a mature legal and regulatory framework for digital assets, and appropriate for the attributes of smart tokens, is a potential hurdle to be overcome. One component of future regulation is likely to be the need for assurance, on behalf of the investors, that the mix of assets and liabilities in the fund cluster is realistically valued, and consistent with the delivery of the fund's outbound pledges.

Current fund structures are overburdened with a weight of regulation, and a tribe of regulated entities. Costs are high, but flexibility of product and choice of outcomes for the investor are lacking. The fund operating models are complex and heavily intermediated. Unlimited liquidity is promised,

but is often not real. Native digital funds address these issues systemically within a common operating model, which is the same for the underlying assets, the funds, the platforms and the distributors. They offer a future of low-cost investment and an unlimited choice of outcomes for the end-client.

At some point, an ambitious jurisdiction will put in place a proportionate regulatory regime and legal framework for native digital assets, and will facilitate the launch and operation of native digital funds. Clients in that jurisdiction will benefit from much lower cost funds that deliver much broader and targeted investment outcomes. Assets will inevitably flow out of conventional funds and into the new model. Slower and more conservative jurisdictions will have no choice but to respond, or to see their significance as a domicile in retreat.