



Digital Issuance – An Optimal Model for Digital Assets and Transactions

Executive Summary



Digest

This paper describes an opportunity for radical change: this change can drive extensive improvements in the experience of investors and borrowers, and in the economics of investment. The opportunity is open to all participants in the financial markets, including their regulators; it is not targeted specifically at the buy-side or the sell-side, and it doesn't favour service providers, platform vendors or direct market participants.

The opportunity is presented by digitisation. We look at transactions and assets and ask how they may be best represented in a digital form. We define a model which is optimised for digital issuance, rather than replicating the attributes and behaviours of conventional assets and transactions into a digital world.

The paper seeks to show how rethinking our view of assets and transactions can lead to remarkable benefits: a common form of representation for digital assets is possible across asset classes, and a single digital operating model is practical and achievable as a result. This will deliver transformative improvements in financial products both for investors and for the issuers of capital.

The Author

Dr Ian Hunt is a recognised authority on buy-side operations, investment processes and technology. He is an independent advisor to Moody's Analytics on buy-side innovation and design lead for FundAdminChain, a digital fund trading platform, as well as an advisor to a number of innovative fintechs. Dr Hunt has consulted for many leading investment managers and asset owners in the UK, Europe and the USA, and is particularly known for his work in Distributed Ledger Technology (DLT) and the Investment Book of Record (IBOR). He has acted as the Investment Expert on a series of Madoff trials and other investment fraud cases. Dr Hunt is a Freeman of the City of London, and has a BA in Philosophy, an MSc in Computer Science and a PhD in Mathematical Logic from University College London.



Digital Issuance Papers

The technical paper is a full initial report, intended to cover digital issuance in reasonable depth and breadth, and addressing its application across multiple asset classes. There is a parallel white paper of the same title, covering the same ground in less detail, and published simultaneously.

Both papers aim to show why we need a coherent approach to digital assets, to define an optimal model for digital issuance, and to demonstrate that this model is sound and can deliver substantial benefits. The point is to define a target, and to show that it is a good target; how we get there comes later. The author expects to produce follow up papers, focused on implementation, and addressing different asset classes and product types in more detail.

The Structure of the Paper

This first part of the paper describes the problem with our current view of transactions, suggests an approach to upgrade it, and shows how we can spread the benefit of that change broadly and cheaply through tokens and fractionalisation. It then demonstrates how distributed ledgers can help us to achieve this. The second part, on digital issuance of assets, sets out the radical potential of smart tokens to create a transformative digital operating model for financial assets, and the dramatic impacts that would follow.

What We Can Achieve If We Get Digital Issuance Right

The paper demonstrates how an optimised standard for the issuance of digital assets would deliver dramatic benefits to manufacturers of financial products, to the investor experience, to the ease of regulation, and to the economics of investment. It is within our reach to deliver new and much more flexible products, while simultaneously achieving a profound reduction in complexity, risk and regulation, leading to materially lower costs for all market participants. Investors can have more choice of product, and better access to assets that suit their needs; at the same time, issuers can issue more granular assets that better fit the profile of their funding requirements, and which can be issued more quickly and with more personalisation.

Operationally, if we can achieve a consistent form of representation for digital assets, then we can implement a single operating model across asset classes. All digital assets can be processed in the same way, and the boundaries between asset classes can dissolve: creating new products and asset types becomes straightforward, without operational or technological complexity. As a result, regulation can be made more effective, while being radically simplified through the elimination of redundant processes and roles. System architecture can become simpler and more standardised, making change easier and cheaper, while the requirement for service provision diminishes. Liquidity, trading and liability matching can improve, while security data maintenance, asset-servicing and settlement management shrink, and could evaporate over time.

What Digital Issuance, Digital Assets and Digital Transactions Mean

Because assets are generally represented already on computer systems, there is often confusion about what digital assets are, and how they are distinguished from conventional assets represented digitally. Digital assets are issued only as tokens onto a shared digital network (or 'ledger'), and do not exist in the current registry / custody / depository world¹. Digital transactions are traded, managed and settled by token-transfer on the digital ledger², rather than through physical movements of assets and cash, or through conventional book-entry deliveries and payments between bank / custodian accounts. The paper contracts which define the terms of transactions in conventional assets are rationalised and automated in digital assets: necessary terms are embedded in the digital assets themselves, and processed automatically as part of their life-cycle management, wholly on-ledger.

¹ I am grateful to a reviewer, Martim Norton dos Reis, for pointing out that digital records could be shadowed in the records of custodians, banks and depositories, if we really wanted to, but that this would miss the point of digitisation, and dilute its value.

² We will refer to assets, transactions and anything else managed exclusively within the shared digital network as being 'on-ledger'. Anything outside this environment we call 'off-ledger'.

Why We Need an Optimal Model for Digital Issuance

Digitisation offers us the opportunity to achieve a step-change in both the cost and the accessibility of investment. To exploit this opportunity, we need to ensure that we get the implementation of digital right: this means having an optimal model for digital assets, for the form of digital issuance and for the processing of digital transactions.

In isolated cases, but increasingly, assets are already being issued in a digital format, and digital custody is becoming accessible³. It now seems inevitable the Central Banks will soon begin to issue cash in a purely digital form too⁴. The issuance of fiat currencies in the form of digital cash will accelerate and catalyse the issuance of digital assets, as we will be able to trade legal tender for assets in a purely digital, and highly efficient form.

What Will Happen If We Do Nothing?

While it is a positive step that assets are being issued digitally, there is no standard approach to this. Diverse issuance models are deployed, and it is inevitable that approaches will become more diverse over time as wider asset types are addressed. This will lead to multiple, isolated ledgers carrying subsets of assets, with diverse issuance models, supported by diverse operations. Doing nothing risks landing us back in a fragmented, inaccessible and unnecessarily costly world.

Regulation of digital issuance is currently somewhere between embryonic and immature. Current initiatives in digital issuance are governed largely by existing regulations, drawn up for a very different context⁵. To be acceptable in current regulatory regimes, digital assets essentially have to behave as conventional assets behave, have to be managed by the same entities as manage conventional assets (who have to carry out the same roles), and have to conform to the same rules. To make it practical for regulators to frame effective rules for digital assets, there needs to be a coherent, optimal and generalised model for digital issuance. Doing nothing risks missing the opportunity presented by digital, because regulation won't let us take it.

The ability to manage investor outcomes could be taken away from organised finance if we do not produce a coherent industry approach to digitisation. Defi⁶, while by no means fully proven or universally accessible, provides an increasingly accessible and sophisticated environment in which consumers can manage their own digital affairs. The rise of NFTs and the growing market engagement with crypto show that investors are increasingly prepared to back assets which are not underpinned by conventional value. Doing nothing risks losing control of client outcomes altogether.

Who Really Matters in Investment?

There are only two parties whose participation justifies the existence of the financial markets. These are the asset owners⁷, who want to invest money, and the capital issuers⁸, who want to raise money, and need access to investment. Size is irrelevant: either may be as big as a nation or as small as an individual investor or borrower. Everyone else in the process is there just as an intermediary, and their role (and cost) is only justified if they make transactions between the asset owner and the capital issuer easier, cheaper, safer, and (in the case of the regulators) fairer. Ideally the two significant parties would interact directly, and with the least possible friction.

³ Digital bonds and commercial paper are probably the most common assets. Digital custody focuses particularly on private key management and custody of cryptocurrencies / cryptoassets.

⁴ China already does, and Sweden expects to by 2026. There are also the Sand Dollar (Bahamas), DCash (Eastern Caribbean) and E-Naira (Nigeria); otherwise, see: <https://www.bis.org/speeches/sp210127.pdf>

⁵ This is true for many regulators; others have retrofitted digital issuance into existing regulations, or built bespoke regs e.g. Malta.

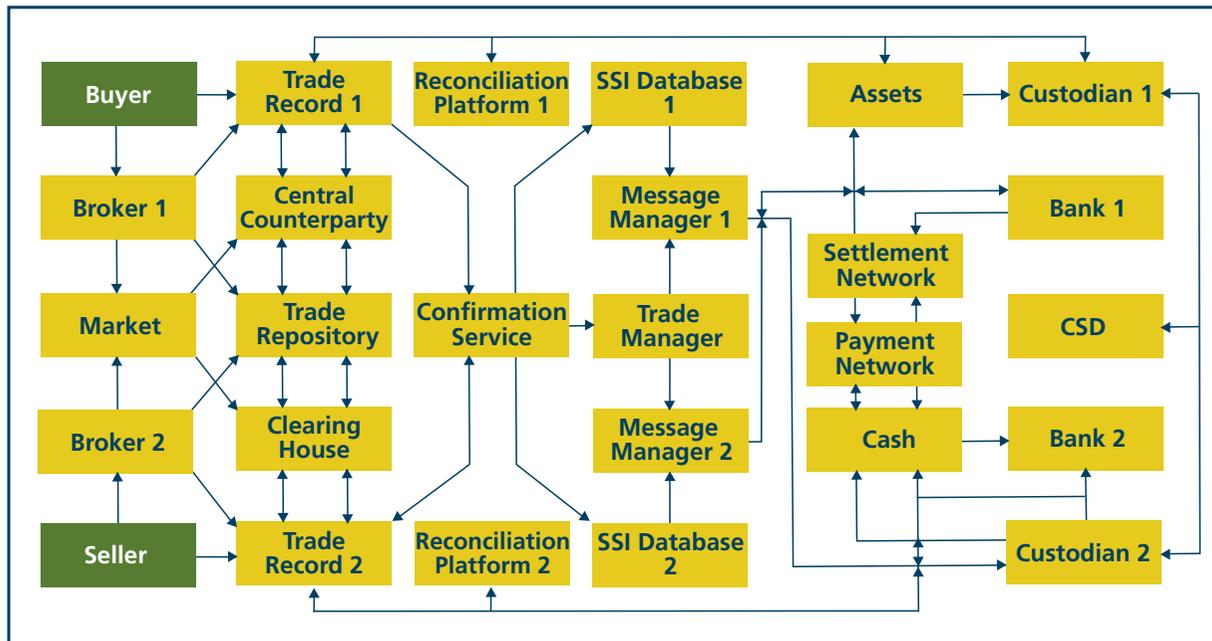
⁶ Decentralised Finance. See https://en.wikipedia.org/wiki/Decentralized_finance for a basic explanation.

⁷ Asset owners include pension schemes, sovereign wealth funds and individuals with savings. They are often represented by (and confused with) influential agents: these are asset managers (on the asset side) and investment consultants (on the liability side).

⁸ Capital issuers include companies borrowing to finance business expansion, and individuals taking on a mortgage to buy a house.

What's Wrong with the Current Model?

While asset classes have different structures and operating models, there is some commonality in the way that we approach the management of transactions. The diagram below is a simplified illustration of the entities and flows involved in a typical transaction of a cash security.



The multiple entities that we have introduced into the process are there to patch over the risks, costs and inefficiencies introduced by our own model of assets, cash and transactions. Each patch has been well-intentioned and implemented more or less effectively. The overall result, however, is a mess. Between the asset owner and the capital issuer, there is a blizzard of intermediary entities and intervening processes, all of which add their own costs and risks. And if this was not bad enough, we then have expansive regulators and expensive regulations because all of this activity, and all of these entities, need to be regulated. We are in a well-intentioned hole of our own making.

Running Out of Road with the Current Model

Our current model of transactions and assets has developed over a long period of time. There has been an extended opportunity to improve it, and many improvements have indeed been implemented; most of these come under three headings.

1. The introduction of intermediaries to mitigate the inherent risk, volume and trust issues introduced by the nature of the current transaction and asset model;
2. The improvement of the processes and technologies deployed by those intermediaries⁹; and
3. The (attempted) reduction of resourcing costs through outsourcing and offshoring¹⁰.

These approaches have delivered a stream of useful improvements in risk, cost and speed, but have now more or less run out of road. If we want to achieve the next step change in benefit to investors and issuers, it won't come from 'more of the same'. Digitisation is not more of the same, and presents us with the opportunity for radical change: if we get the model right.

How Should We Ensure That Digital Transactions Work Better?

To achieve the next step change, we need to replace, not tinker with, the model of assets and transactions that drives current complexity. The paper proposes five fundamental rules for transaction management, targeted to maximise the delivered benefit of digital investment. These are:

1. Have a single transaction record between the parties;
2. Fully immobilise conventional, off-ledger assets and cash¹¹;
3. Make capture, execution and settlement simultaneous;
4. Going further than (3), make the recording of the transaction and settlement of the transaction the same thing; and
5. Establish trust directly between the trading parties.

If we want a digital revolution, not a digital repetition, then we need to follow these five rules.

An Optimal Model for Digital Issuance of Assets

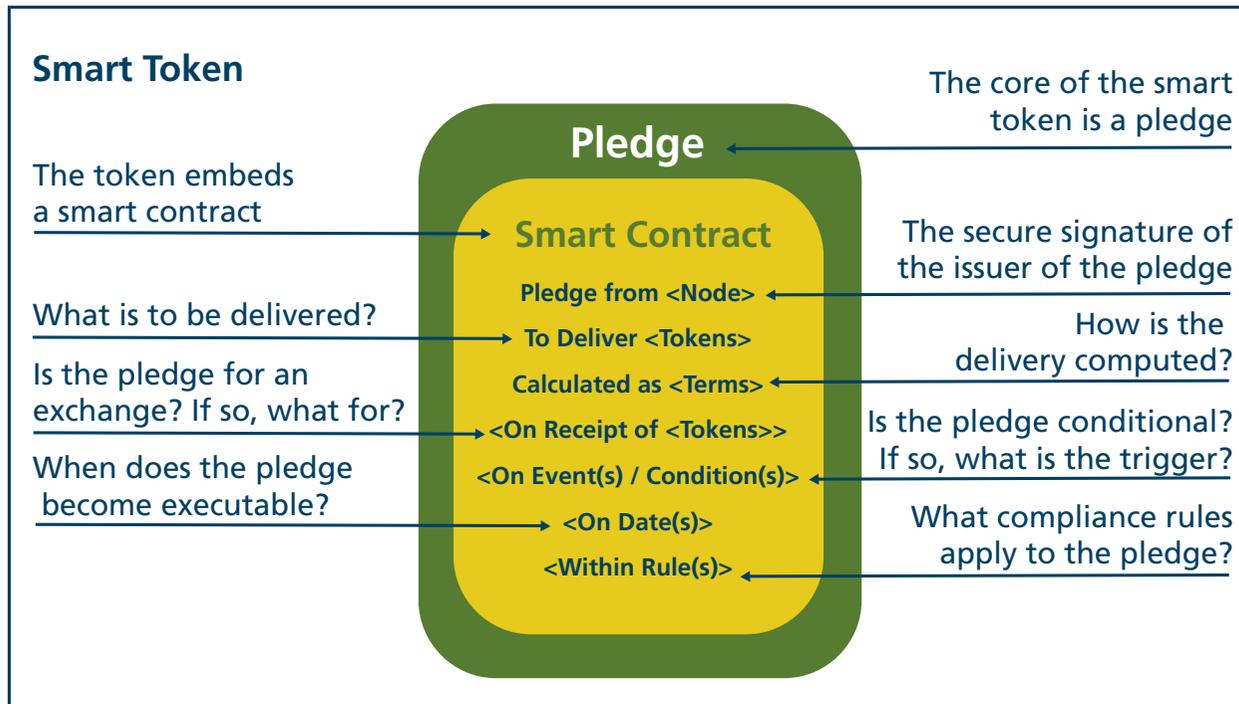
The basic building block of our proposed model is a token that is 'smart', which means that the token itself knows when to initiate its own actions, knows what it can do to itself and to other tokens, and has the ability to self-execute. In the digital world, delivery is not payment or transfer of assets, it is a flow of tokens, and the main capability of smart tokens is to move tokens (including themselves) between nodes. This contrasts with conventional approaches, where the tokens are just data, and intelligence is located within business applications: these operate on and control tokens, which are essentially dumb. In our model the tokens are smart and manage themselves.

⁹ Some of these improvements have been made to enable settlement cycles to be shortened for some asset classes.

¹⁰ Offshoring and outsourcing have a mixed track record in cost reduction. Surveys from global custodian banks (in particular from BNYM and State Street) show that many cost-cutting initiatives have fallen short of success.

¹¹ For all tokenised assets – inevitably there will be a period of migration over which conventional, untokenised assets will not be immobilised.

The standard form of smart token is illustrated below.



Just as for optimal digital transactions, there are five rules for optimal digital issuance:

1. Issue digital assets as clusters of smart tokens pledging future flows of value;
2. Transfer intelligence from business systems onto the tokens: make them smart;
3. Make the smart tokens self-actuating, self-executing and self-controlling, so that their triggers, their capabilities and their constraints are all coded on the tokens;
4. Make the tokens individually tradeable and fractionalisable; and
5. Measure value and risk at the level of the individual tokens, not of the assets.

Representing and issuing assets in this form allows us to build multiple asset classes from the same underlying components, and to transact and process them within the same operating model. Floating rate bonds and deposits, OTC derivatives, pay-downs, callable and amortising instruments are as straightforward to represent and process as fixed rate bond or deposit. There is nothing special about collateral or securitisation in the smart token model either.

In the proposed model, anything which can exist entirely on-ledger, is represented only on ledger, and in exactly the same way, as a cluster of self-executing smart tokens. The value that they deliver is wholly represented on-ledger too. The only entities which can't be represented wholly digitally are assets which are essentially tangible, like racehorses, office blocks, companies and Picassos. For these assets, we have to use title tokens to represent ownership, although their related income and costs can be represented by smart tokens in the same cluster. That includes equities.

Benefits of the Smart Token Model

The consequences of the smart token model proposed for digital issuance are radical, and hugely beneficial, on both sides of the P&L account. A single, universal model of issuance and transaction can be applied to all asset classes and flows, underpinned by a single operating model that is secure, low-cost, scalable, flexible and transparent. In more detail, the key impacts for investors / asset owners and borrowers / capital issuers include:

- Allowing asset owners and capital issuers to interact freely and directly;
- Much easier and quicker delivery of new and more flexible financial products;
- A wider market of investors and borrowers to sell to, and products to sell;
- A common means of representation across all digital issuance and all digital transactions;
- Radical simplification of the entities and processes engaged in delivering financial products;
- Improved liquidity, alongside more flexible, more granular trading;
- More granular risk management and more realistic valuation of flows;
- Visibility of all assets and liabilities at all times on the same platform;
- More precise matching of assets and liabilities, with a much lower cost of hedging; and
- Elimination of order management as a separate platform.

The benefits of the smart token model, in some cases, apply to service providers, as well as to investors and borrowers; these wider benefits include:

- The opportunity to deliver a new range of services at network level;
- A single operating model across asset classes;
- An order of magnitude reduction in operational costs and complexity;
- Elimination of registry and position maintenance;
- Elimination of settlement management;
- Elimination of income entitlement calculation, payments and reconciliations;
- Radical simplification of corporate actions;
- Radical simplification of cash management and elimination of payments;
- Radically simplified and standardised business system architecture; and
- Elimination of the need for a security master and its associated demands for maintenance and data sourcing.

This is a big list of high value benefits. Together, they more than justify the considerable cost and disruption of a transition to the smart token model for digital issuance.



Conclusion

The paper puts forward a radical model for digital issuance which delivers standardisation of the representation of assets and the management of transactions across asset classes, unlimited trading flexibility for both issuers and investors, and a transformation in the economics of investment.

To deliver this radical model, we need to follow the fundamental rules of digital issuance and transaction set out in the paper. The prize is high: if we follow all of these rules, then we can optimise the benefit of digitisation, and achieve the next step-change in the efficiency and accessibility of investment. We will break down the barriers between instrument classes, and eliminate their bespoke operating models. A wider population will gain access to investment, and a wider set of assets will be investible. Capital issuers will come closer to asset owners, and more flexible, more appropriate investment products will be easier to launch.

If we don't collaborate across industry participants to ensure that these rules (or something like them) are followed, then we risk missing the generational opportunity presented by digitisation. We will end up with a proliferation of approaches to digital issuance, solidifying boundaries between asset classes, and stuck with asset-specific operating models. The current blizzard of intermediaries will remain, as will the cost, complexity and extensive regulation that they entail. In other words, we are quite likely to end up in a digital version of exactly where we are now. And we just might lose the control of client outcomes to Decentralised Finance. That's well worth avoiding.

The paper presents the opportunity of digitisation, shows how and why we should grasp that opportunity, and provides a call to arms to all participants to create the right legacy of digital issuance across financial markets.



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