

THE  
INVESTMENT  
ASSOCIATION

# FURTHER FUND TOKENISATION:

ACHIEVING INVESTMENT FUND 3.0 THROUGH COLLABORATION

Second Interim Report from the  
Technology Working Group to the Asset Management Taskforce

March 2024



## ABOUT THE INVESTMENT ASSOCIATION (IA):

The Investment Association champions UK investment management, supporting British savers, investors and businesses. Our 250 members manage £8.8 trillion of assets and the investment management industry supports 126,400 jobs across the UK.

Our mission is to make investment better. Better for clients, so they achieve their financial goals. Better for companies, so they get the capital they need to grow. And better for the economy, so everyone prospers.

Our purpose is to ensure investment managers are in the best possible position to:

- Build people's resilience to financial adversity
- Help people achieve their financial aspirations
- Enable people to maintain a decent standard of living as they grow older
- Contribute to economic growth through the efficient allocation of capital.

The money our members manage is in a wide variety of investment vehicles including authorised investment funds, pension funds and stocks and shares ISAs.

The UK is the second largest investment management centre in the world, after the US and manages 37% of all assets managed in Europe.

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**FOREWORD BY  
BIM AFOLAMI MP**  
ECONOMIC SECRETARY TO THE TREASURY



The third industrial revolution – otherwise known as the digital revolution – is ushering in a new and exciting era of innovation and technology.

We now stand on the precipice of a huge technological change. With its reputation for pushing the frontiers of innovation, and its world leading investment management sector, the UK is ideally placed to seize on the transformative capabilities of tokenisation and apply them to investment funds.

The Technology Working Group – superbly chaired by Michelle Scrimgeour, established under auspices of the Asset Management Taskforce, and ably supported by the Investment Association – has been examining how the UK’s investment management sector can harness the impending technological shift that will redefine the status quo.

The Group’s first publication, A Blueprint for Fund Tokenisation, demonstrated the benefits of fund tokenisation and that it is compatible with UK regulation.

This second report, Further Fund Tokenisation: Achieving Investment Fund 3.0 Through Collaboration, articulates a vision for the opportunities that lie ahead.

I hope the publication of this report will help advance the wider conversation on the role of technology in investment management and demonstrate – once again – that the UK is on the side of the pioneers.

While the onus is now on industry to capitalise on the model for tokenisation set out in this report, I am grateful for the collaboration between the Government, the FCA, and industry throughout this ambitious project. I look forward to continuing that collaboration as we move together into a brighter, digitally enabled, future for UK investment management.

## FOREWORD BY SARAH PRITCHARD

EXECUTIVE DIRECTOR, MARKETS AND INTERNATIONAL,  
FINANCIAL CONDUCT AUTHORITY



New technology has the potential to fundamentally change the way asset management works. And for the better. The Asset Management Taskforce's Technology Working Group has played a vital role in bringing people together to discuss what the opportunities are and what is stopping us from taking hold of them. I am delighted that the FCA has contributed towards this work – and the work to support what is described as Investment Fund 3.0.

The FCA has a reputation around the world for supporting innovation, both within the UK and working with others to do so across borders. This report emphasises that such international cooperation is vital as we strive for an open and global framework for fund tokenisation. Interoperable technical and regulatory standards will be important to fully harness the benefits of technology and we will progress discussions on these issues, for example through our membership of the Monetary Authority of Singapore's Project Guardian.

Within the UK, we have confirmed that there are no significant legal or regulatory barriers to the industry blueprint for tokenisation – unlocking the opportunity to implement Distributed Ledger Technology in fund processes. We stand ready to consider any applications under the existing regulatory regime, or test new use case propositions through our sandbox.

The report raises important questions about chain permissions, settlement processes, digital assets and operational risk. We are looking forward to further discussions on these topics with the Investment Association and industry, and we will consider how regulation can support progress on these issues.

I thank everyone who has contributed to the achievements of the Technology Working Group to date and look forward to continuing working together in 2024 to further enhance the UK's role as a hub for innovation.

## FOREWORD BY MICHELLE SCRIMGEOUR

CHAIR AND CHIEF EXECUTIVE OFFICER AT  
LEGAL & GENERAL INVESTMENT MANAGEMENT



In today's rapidly evolving financial landscape, technology will redefine how we think about the future of the asset management sector. As stewards of our clients' capital, it is imperative we stay at the forefront of these developments and embrace new capabilities as they emerge.

As a global leader in asset management, and with a vibrant fintech and professional services ecosystem, the UK is ideally placed to thrive in the emerging digital marketplace of the future. As we concluded in the first phase, fund tokenisation is set to be a key driver of this success, enabling firms to improve efficiency, enhance client service, and create new products and markets. This report presents the findings and recommendations of the second phase of our work and, following substantial feedback, provides an indication of the next stages for fund tokenisation.

We are at the very early stages of understanding the potential of tokenisation; realising that potential requires a collaborative effort. Investment management has and always will be a highly competitive industry. However, as Chair of this working group, I have been struck by the keenness of firms to engage openly and work collaboratively to pursue our collective goals. Firstly, to establish a regulatory and legally compliant tokenisation model, and secondly, to develop that model through adaptive change and third in enabling specific use cases. The time for individual firms to work by themselves will come – but for now, we can make the most progress by working together.

This report is the result of close collaboration across the asset management industry, reflecting the collective views and insights of Group members and based on a broad range of perspectives and expertise. I would like to thank everyone who contributed to this project, along with the excellent team supporting this, led by Derrick Hastie, and to EY and the Investment Association for their valuable contributions and commitment.

The Financial Conduct Authority and HM Treasury have provided constructive engagement throughout the process. It is this collaboration that has created strong momentum for change.

The IA remains committed to this tokenisation workstream and this working group will continue to liaise with the Asset Management Taskforce and other authorities as it progresses. In the meantime, we will now turn our focus to the role of artificial intelligence in the sector, and we look forward to sharing our findings with you in due course.

Innovation is not a one-off event, but a continuous and dynamic process that requires ongoing dialogue and collaboration between all stakeholders.

I hope this report will stimulate further discussion and action to foster a supportive environment for technology innovation in the UK asset management industry – for the benefit of our clients, the economy, and society at large. When we work together, we have the best chance of maximising the rewards.

# EXECUTIVE SUMMARY

The Technology Working Group (the Group) – working under the auspices of the Economic Secretary to the Treasury’s Asset Management Taskforce – has continued its close collaboration between industry, the Financial Conduct Authority (FCA) and HM Treasury (HMT) to identify and articulate the opportunities presented by new technologies such as tokenisation, artificial intelligence, and distributed ledger technology (DLT). This report presents the Group’s second phase of work.

Focussing again on fund tokenisation, this report covers the developments and feedback received since the first report, which outlined a baseline model that is compliant with existing regulation and legislation. The baseline model demonstrates how – with support from the FCA and government – the UK’s investment management sector can realise what the Investment Association (IA) has termed Investment Fund 3.0, driving delivery efficiencies and helping the industry interact effectively with the digital capital market and investors of the future.

To help develop further momentum in the UK market, we identify two key use cases for fund tokenisation and announce that firms will be testing them with support from the UK authorities through appropriate channels, such as sandboxes:

- fully on-chain investment markets, with tokenised funds investing in tokenised securities such as in the fixed income or other asset classes; and
- the use of tokenised money market fund units as collateral where eligible under the UK regime for non-centrally cleared derivative contracts.

The industry is invited to participate in these initiatives, as the best prospect of success lies in sector collaboration with the authorities.

This report should be read in conjunction with the first interim report, *UK Fund Tokenisation: A Blueprint for Implementation*<sup>1</sup>, from November 2023. The Group would like to thank the many contributors from industry and tech firms who have come forward since publication to share their feedback and input, which has helped shape this second report.

The report then examines the possible next stages of development for fund tokenisation, which involve three key steps:

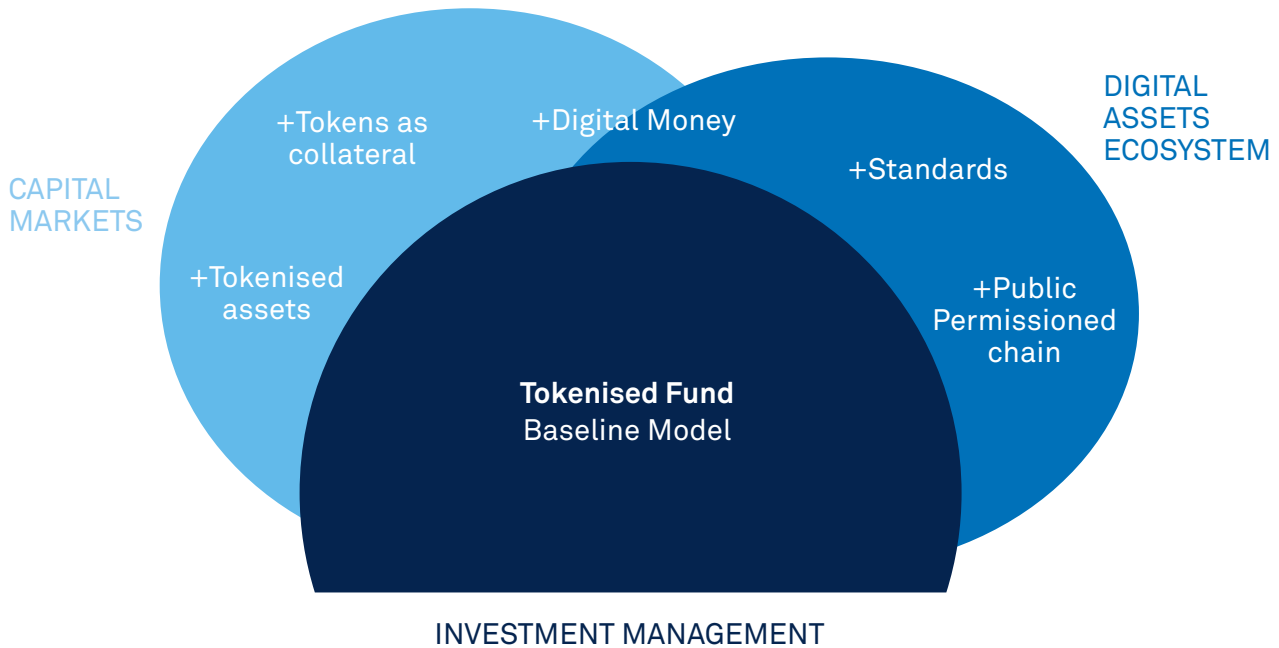
- Allowing on-chain fund settlement via digital money;
- Enabling funds to hold tokenised assets in their portfolio; and
- Expanding the scope of solutions to include the use of public permissioned networks.

The report ends with an update on the actions identified in the first phase report, and some new recommendations to enable the broader implementation of firms’ fund tokenisation strategies. It also provides a model fund prospectus disclosure for firms to utilise, and a summary of emerging technical standards that will enable interoperability.

While the Group’s third phase will focus on artificial intelligence, the IA announces its intention to continue separate work on tokenisation. The emphasis of this is intended to shift towards implementation, and working with firms in order to seize the opportunity that fund tokenisation can bring to them, consumers and the UK.



**FIGURE 1: WIDENING THE INTERACTIONS OF TOKENISED FUNDS BY TESTING EMERGING USE CASES, INTRODUCING NEW STAGES TO THE BASELINE MODEL AND EXPLORING INDUSTRY STANDARDS**



This report is in three parts, plus a set of appendices:

### 1. Responses to, and developments since phase one

the responses received to the Blueprint for Implementation, and a summary of complementary developments over recent months;

### 2. Further use cases

the intention of industry to collaborate on testing some emerging use cases;

### 3. The next stages for fund tokenisation

more detail on the shared vision and new recommendations from the Group for moving towards it;

#### • Appendices

practical guides for firms to consider when utilising tokenisation, consisting of:

- (i) a model fund prospectus risk factors section disclosing the application of DLT in funds and potential downside risks; and
- (ii) a discussion of technical standards for interoperable tokens and networks.



# 1. RESPONSES TO, AND DEVELOPMENTS SINCE PHASE ONE

The first phase report established the infrastructure for fund tokenisation in the UK funds market by developing, with HMT and the FCA, a blueprint for implementation.

The FCA also published a letter<sup>2</sup> and a Fund Tokenisation resources webpage<sup>3</sup> which provided further information for firms.

Together, these documents outlined a baseline model of fund tokenisation that is compliant with existing UK regulatory and legislative frameworks, alongside a shared vision for the future, which positions the UK as a leader in DLT innovation. In other words, UK firms can utilise the baseline model in their business today.

As is often the case with technological development, the Group recognised that a staged approach is necessary in order to develop fund tokenisation over time. Future stages may require legislative or rule changes and might also depend on other developments in the wider global regulatory and technological environment. Industry was invited to help detail the shape of further stages.

With firms now capable of implementing fund tokenisation in the UK, the era of Investment Fund 3.0<sup>4</sup> has arrived. This concept represents a series of possibilities for fund modernisation and innovation, recognising the need for the UK funds industry to adapt to the dual changes of technological advancement and the evolving behaviour and needs of 21st century investors. It is fully complementary to the concept of Web 3.0 and working towards an enhanced, digital, version of financial markets.

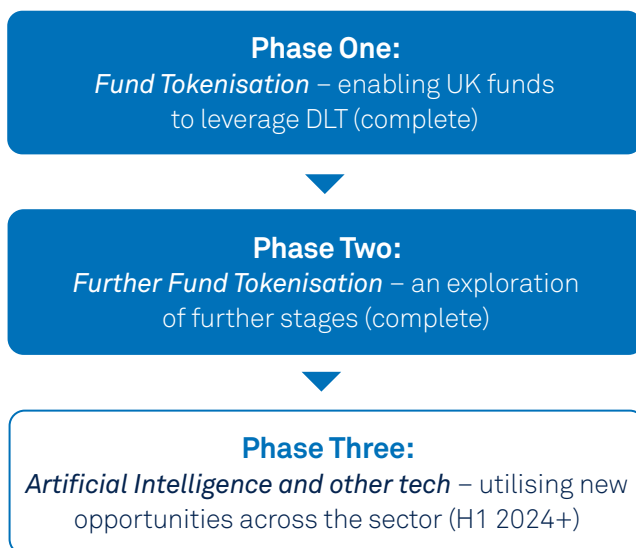
## PHASE ONE RESPONSES

Substantial feedback was received from the funds industry and wider financial services ecosystem which has helped to shape the Group's view of the next steps. The Group thanks everyone who engaged in the process and is encouraged by the level of interest and enthusiasm. The feedback mainly focused on the practical applications of DLT which are the driving factors for future development, as well as thoughts on the priorities for evolving the baseline model – which are set out in section three of this report.

There has also been a significant level of interest from technology companies, big and small, incumbents and new entrants. IA Engine has recently launched its Tokenisation Hub<sup>5</sup> showcasing the products and services that smaller-scale fintechs have on offer, which may be useful for firms to consider alongside existing service providers to the funds industry.

**FIGURE 2: WORK SCHEDULE OF THE GROUP**

### TECHNOLOGY WORKING GROUP



## RECENT DEVELOPMENTS

A number of other developments have taken place since the publication of the first report which provide greater regulatory clarity and/or demonstrate momentum in the digital assets arena:

- Experimentation and testing** The government's Digital Securities Sandbox (DSS) helps enable firms to use developing technology, such as DLT, for the trading and settlement of traditional securities. The enabling regulations were laid in December and are now in force<sup>6</sup> with the next step being for the Bank of England (the Bank) and the FCA to consult on their joint approach to operationalising the DSS.
- Digital money** The authorities have provided more clarity on digital money through the Bank, Prudential Regulation Authority (PRA) and the FCA's Cross-Authority Roadmap on Innovation in Payments<sup>7</sup> that shows planned work on e-money, stablecoins and tokenised bank deposits. Also, two discussion papers have sought industry views, one on the regulatory approach to regulating fiat-backed stablecoins<sup>8</sup> and another on a regulatory regime for systemic payment systems using stablecoins and related service providers<sup>9</sup>. The Bank is consulting on its plans to extend wholesale access to Bank money via its real time gross settlement system (RTGS)<sup>10</sup>. Lastly, Finality, a novel payment system seeking to enable on-chain payments, announced the first live transactions over its DLT-based Sterling Finality Payment System (£FnPS) utilising a digital representation of funds at the Bank<sup>11</sup>.
- Financial stability and resilience** The Bank identified potential systemic risks from tokenisation projects utilising public blockchains, in that they may 'increase the interconnectedness of markets for cryptoassets and traditional financial assets since they are represented on the same ledger', it said in its Financial Stability Report<sup>12</sup>. Separately, the FCA has published proposals to enhance the resilience of UK money market funds (MMF)s<sup>13</sup>. The consultation included questions on the possible advantages of the use of MMF units as collateral, where eligible under the UK regime for non-centrally cleared derivatives, and about what barriers there may be to such use. Where MMF units are used to meet margin requirements, this may be instead of such units being sold by investors to raise cash to post as collateral, and so may reduce redemption pressures on MMFs. A related topic is the tokenisation of MMF units for use as collateral. The consultation asked about the advantages and disadvantages of tokenisation in overcoming operational barriers for use of MMF units as collateral.
- International standards** The identification of mainstream assets in on-chain markets will become easier in future with an announcement that International Securities Identification Numbers (ISINs) and Digital Token Identifiers (DTI) standards will become aligned. The Association of National Numbering Agencies (ANNA) and the Digital Token Identifier Foundation (DTIF) will allow the phased introduction of new ISINs to identify crypto assets, working with DTIs that uniquely identify tokens and the network on which they are located<sup>14</sup>.
- Increasing legal clarity** The Law Commission is consulting on draft legislation to confirm the existence of a third category of personal property<sup>15</sup>, as outlined in its 2023 work. It had concluded then that certain types of digital assets are capable of being things to which personal property rights can attach, even though they do not easily fit within the traditional categories of personal property, and are better regarded as belonging to a separate category. The draft legislation confirms that a thing – including a thing that is digital or electronic in nature – is capable of being the object of personal property rights even though it is neither a thing in possession nor a thing in action (being the two traditional categories of personal property). Separately, the Law Commission is also seeking evidence on the ability to accommodate private international law in the context of digital assets (and electronic trade documents) on issues such as the location of claims and other cross-jurisdictional features<sup>16</sup>.

## 2. FURTHER USE CASES

### EMERGING USE CASES

Some firms on the Group and in the wider IA membership are individually exploring how they can take advantage of the open nature of the regulatory approach confirmed last year. The potential for **operational efficiencies** is attractive and firms are looking for the right opportunity to pair this with an appropriate fund launch.

Fund tokenisation is now not a distant future, but a present reality. By embracing tokenised funds, we can create more efficient, transparent and resilient processes, as well as offer new products and services to investors. The sooner the industry adopts it at scale, working with the authorities to adjust the baseline model where required, the better prepared it will be for the opportunities and challenges of the future.

Separately, some firms are interested to utilise the benefits of tokenised funds in other ways, particularly regarding the interaction of funds with the capital markets. Within the UK, **Money Market Fund** units, for example, are typically held by institutional investors, such as pension funds and insurance companies, or other entities looking for an alternative to holding cash in bank deposit accounts. There is the potential for the use of tokenised MMF units in the context of evolving collateral requirements for non-centrally cleared derivatives contract arrangements.

Non-cash assets are often not able to be accepted as collateral in trades that are cleared by a central counterparty. However, MMF units are also often not used to meet margin calls even in non-centrally cleared markets where they could be. This may be due to the time required to transfer units between parties.

Recent market stresses saw market actors needing to sell their MMF units to meet dynamic derivatives positions with the redemption cash generated, only for counterparties receiving that cash to purchase further MMF units with it. Where MMF units are used to meet margin requirements, this may be instead of such units being sold by investors to raise cash to post as collateral, and so such use may reduce redemption pressures on MMFs. The tokenisation of MMF units for use as collateral may be able to accelerate the relevant settlement process increasing the opportunities for this use case.

As outlined in more detail in the recent joint IA-LiCuido paper<sup>17</sup>, tokenised MMF units may be settled faster on DLT-based networks, which may become particularly useful in the context of an uncleared derivatives arrangement where the exposure between the parties can change frequently, in which case variation margin may need to be exchanged daily or even more frequently.

#### Use Case One: Money Market Fund tokens as collateral

This has been successfully tested in other jurisdictions, and involves the tokenisation of the MMF unit, either by the issuer or the holder, to enable the token to be pledged in bilateral uncleared trades as margin or used as collateral in the repo market. This could help secondary market liquidity and relieve redemption pressure on funds in times of market stress, by eliminating the need for investors to redeem from the fund to access the cash.

A group of firms will be working through this use case with support from the authorities. Firms are invited to express their interest in participating in this by contacting the IA by 26 April 2024.

Tests of this use case have taken place in other jurisdictions, but a test involving domestic funds and/or counterparties will help inform the Bank and FCA's approach to the tokenisation of MMF units and their use as collateral in certain circumstances. The FCA is also developing rules for enhancing the stability of MMFs and will consider this broader context in considering their approach.

The Group is also keen to test the current feasibility of its shared vision of an **end to end on-chain investment industry**, including the potential legislative barriers identified in phase one. This could take a number of different forms but could, for example, demonstrate a retail client investing through a distributor platform (the 'client register' identified in the first report) into a tokenised multi-asset fund ('fund register') and on into tokenised underlying assets ('asset register'), with digital money used as the settlement mechanism.

Such tests could, depending on the stakeholders and scenarios involved, and the application process, utilise the DSS and look at the ability to hold digital securities within portfolios, the identified restrictions of the Companies Act 2006 and the Limited Partnerships Act 1907. They could help with the work of the Scottish Government's Expert Reference Group on Digital Assets in relation to accommodating digital assets within Scots private law (and in this context to the ability of investment funds legally constituted in Scotland to hold digital securities).

Members of the Group are also keen to purchase a UK short-term gilt, green gilt or other debt instrument, something the government is currently examining<sup>18</sup>. Government involvement could demonstrate encouragement for the private sector to experiment with digital securities across the ecosystem, showing that the UK is open for innovative business and potentially driving further activity for the DSS.

Some firms are also interested in utilising DLT to provide **customised investment services** on a much more accessible scale than today, providing greater choice through the greater availability of model portfolio funds, potentially containing fewer securities and therefore capable of being used as building blocks for enhanced customisation. Alternatively, bespoke, segregated mandates have been commonplace for investors of sufficient size for many years and the

technology could allow this service to be provided to a larger part of the mass market too, for example via Direct Indexing<sup>19</sup>, and outside of a fund structure. For UK retail consumers, cost and taxation issues on the product manufacturer side – as well as low appetite for direct stock investment on the demand side – have prevented this product innovation from taking off so far.

## Use Case Two: Tokenised fund buying tokenised securities

Again, other jurisdictions have successfully carried out experimentation on tokenised securities, particularly in the bond market<sup>20</sup>. A group of firms are willing to work through variants of this use case, experimenting with securities from different asset classes, with the authorities, perhaps in the DSS. This is subject to the identification of detailed scenarios, interest from counterparties, the provision of suitable assets by the sell-side and confirmation of the operational details by the authorities.

The aim of the DSS is to assess what permanent changes to legislation are needed to allow for a more widespread adoption of developing technologies like DLT. Buy-side firms should be able to interact with the digital securities in scope of the DSS in the same way they would with their conventional equivalents.

Firms are invited to express interest in participating in variants of this use case by contacting the IA by 26 April 2024.

## TESTING TWO EMERGING USE CASES WITH THE AUTHORITIES

The launch of the DSS is a good chance for market participants to trial some of the emerging use cases, and others, particularly those that involve the interaction with the capital markets via FMI. Firms interested in participating in the DSS should read the Bank and the FCA's joint consultation when it is published.

Separately, the FCA has a well-established route for innovative solutions<sup>21</sup>, such as the original Regulatory Sandbox (enabling innovative propositions to be tested in the market with real consumers), that was recently supplemented with the Digital Sandbox (which provides access to a range of synthetic data sets) and Innovation Pathways (a service that allows authorised firms, unauthorised firms that require authorisations and technology providers to understand how regulation relates to their activities and removing barriers to entry through ongoing monitoring of the rules). The FCA have received over 600 applications to the Regulatory Sandbox since its launch, including applications related to DLT and blockchain. More information on the applications that have been accepted can be found on the FCA website<sup>22</sup>.

The Group creates a special opportunity for firms that have an interest in similar applications to co-operate in experimentation and we look forward to hearing from interested firms.

Despite headwinds, the UK is consistently rated as a global leader in financial services and innovation, with London rated the number one global financial centre<sup>23</sup>, the leader in financial technology and innovation<sup>24</sup>, and second globally for levels of fintech investment<sup>25</sup>. With a robust and vibrant ecosystem of fintech, legal and regulatory, investment, and support functions, the UK is well-positioned to leverage the transformative effects of innovation.

Establishing the framework for fund tokenisation was a vital step in showing that the UK is open for business in this area and providing further opportunities across financial services, in linking investors and funds to the digital capital markets and payments sides. Similar tests and developments are taking place within the capital markets to look at digitalisation of the assets that funds hold within their portfolios.

The Group remains of the view that collaboration within and between different sectors of financial services, and with the authorities is the best way to achieve the best outcomes, positioning the UK as the leading financial services hub in the digital age, better serving customers in the UK and across the world.



# 3. THE NEXT STAGES FOR FUND TOKENISATION

## DEVELOPING THE BASELINE MODEL

Industry feedback on the baseline model and its seven identified characteristics<sup>26</sup> has helped the Group provide a high-level indication of the likely next stages of development.

A staged process was previously agreed to demonstrate incremental progress by changing a limited number of features at a time to provide needed transparency of their impact. The consensus of the industry feedback has been to focus next on three of these seven features: (i) on-chain fund settlement via digital money, (ii) funds being able to hold tokenised assets in their portfolios, and (iii) expanding the scope of solutions to include the use of public permissioned networks.

These have been selected based upon industry feedback as areas that would provide the most significant benefits and are described further below. The description of the original characteristics in the baseline model are shown in the boxes.

**On-chain settlement** is required in order to control more effectively the transfer of ownership of tokens by linking it directly with the payment within the same technology infrastructure, as well as improving the speed of settlement.

There is growing enthusiasm that this may be realisable in the near term given the increasing regulatory clarity on stablecoins and the emergence of commercial bank solutions, some of which are tied to central bank money. The widening of access to the Bank's RTGS to non-bank payment firms provides clear opportunities for innovation as well as the certainty and reliability of central bank funding. This would also represent an upgrade to existing fund market practice, where only a small proportion of settlement utilises Bank facilities.

As other digital money options become available, it will be important for firms to remain flexible as to the types they and their systems can interact with. Design of digital payments infrastructure should take a similar adaptable interoperability approach as to asset tokens.

As modern-day investor expectations on speedier access become more prevalent, and pressure increases on the fund settlement process, reliance upon existing payments infrastructure is likely to become more

### Baseline model Characteristic: Off-chain, usual cycle settlement

Settlement of transactions in the units of the fund would be carried out as they are today (i.e., purchase from / redemption by the manager). Fund settlement is entirely off-chain, with no use of any forms of digital money, and on the same timescales as a typical UK fund (i.e., T+2/3). The payments records will need to interact effectively with the unit register to keep a track of failed or overdue payments and be compliant with the existing client money requirements in CASS in respect of designated investment business.

problematic. While it appears that the imminent US capital market move to T+1 is likely to have a muted impact on the settlement timing for UK funds, it is likely that other markets will shorten their settlement timings over the coming years which will come with a more tangible impact on UK fund settlement. This is something that some payments systems cannot accommodate at the scale required by the funds industry.

Firms continue to have an interest in holding **tokenised forms of mainstream assets**. This would enable the buy-side to operate fully on-chain, by linking investors with the sell-side through efficient fund infrastructure, maximising the benefits from the technology.

### Holds traditional assets

The investment portfolio would be made up of mainstream investment assets held by a custodian, such as equities, bonds and the like, consistent with existing UK authorised funds. For example, despite the use of DLT, it would not hold cryptocurrencies.

As outlined in the phase one report, this change would go a long way to achieve the shared vision in delivering a joined up financial services ecosystem. The DSS, aiming to allow for the use of developing technology like DLT for the trading and settlement of traditional securities, will play a key role in confirming the regulatory environment and encouraging adoption.

Further afield, and despite recent developments in the US ETP market<sup>27</sup>, the Group has no view on cryptocurrencies or other native digital assets, and reasserts its focus on the underlying technology as the future infrastructure for financial services markets.

There has been strong support for expanding the scope from entirely private to **public, permissioned networks** in the medium term. The Group recognises that in the future it is likely there will be a mixture of market infrastructure, including both public and private chains – much like the mixture of trading venues today.

In an ideal world, a single common infrastructure, a ‘super’ or ‘unified’ chain, would emerge to avoid fragmentation and isolated pockets of liquidity, but in a practical sense this is highly unlikely to happen.

In due course, public permissioned chains offer a greater ability for scale, through public chains’ ability to provide open marketplaces that do not require investors to interact directly with each provider. This can result in more liquid secondary markets and maximum access. The permissioned element provides governance by utilising enforced compliance on identity and compatibility for AML/KYC and product restriction reasons.

### Private, permissioned chain

Access to the network will need to be permissioned and tightly controlled to ensure that all participants are identifiable and have a legitimate interest, with data sharing control as appropriate. The parties to the network would have shared visibility of the (relevant parts of the) register without needing to maintain their own individual records.

## COLLABORATION BRINGING RESULTS

Investment management is a highly competitive sector and the race to outperform is as healthy in this market as others in financial services. Firms are keen to identify differentiators and commercial advantage over their peers, and this is also true of the longer-term outlook for tokenisation.

However, at this stage, based upon the industry response to the phase one output and the discussions within the Group throughout phase two, there is a clear view that firms are keen to progress via collaborative efforts, with both one another and the authorities. The ecosystem has derived tangible benefits so far and has a lot of work still to do. Evolving the baseline model and progressing test cases is likely to produce results more quickly than individual firms working alone and, importantly, demonstrates continuing momentum in the UK marketplace. The Group has therefore decided that although its formal attention turns to AI for the next phase, tokenisation work will continue via the IA in order to progress a number of action items.



## UPDATE ON PHASE ONE ACTIONS

**Progress made:** (except where stated, the action remains open and on the same timescale, beginning from November 2023)

| Original item identified in Phase One   | Update  |
|---|---|
| <p><i>The IA</i> will act as a conduit between the industry, FCA and HMT to progress future stages of fund tokenisation, demonstrate incremental delivery and help firms engage with relevant officials. <b>Timeframe: 3 months &amp; ongoing</b></p> <p><i>Industry</i> to develop the details of further stages of fund tokenisation. <b>3 months+</b></p>  | <p>This second report is the product of industry feedback for the next stages of fund tokenisation. Although the Group will be moving onto a different subject in phase three, the IA will continue the role of convening industry discussions, facilitating future delivery and interaction with officials.</p>  |
| <p><i>The IA</i> will work with relevant stakeholders to promote industry standards and encourage an open market based upon interoperability and avoiding fragmentation. <b>3-18 months</b></p>   | <p>This report includes an appendix on interoperability and technical standards which reflects the current position. Industry is encouraged to collaborate and contribute to future IA tokenisation work to ensure that the fund industry is appropriately engaged in domestic and international debates as the technology and standards landscape evolves.</p>   |
| <p><i>Industry</i> to decide upon the optimal form of digital money for fund settlement. <b>1-2 years</b></p>   | <p>Feedback to date, detailed in this report, is that various forms of digital money will come to market over the next few years. It is likely that eventually the market will coalesce around a preferred form. In the meantime, network design will need to cater for the various different options.</p> <p>Firms may find this recently-published Glossary helpful when navigating this nascent topic<sup>28</sup>.</p>  |
| <p><i>Industry</i> to explore the possibility of leveraging the Bank of England's work on Synchronisation to enable wider industry access to the RTGS service and enable funds settlement in digital central bank money. <b>1-2 years</b></p>   | <p>The Bank continues its work on the RTGS renewal programme, and is currently consulting on longer market hours and wider non-bank access to RTGS for settlement. The IA and individual firms remain engaged with its Synchronisation workstream.</p>  |
| <p><i>Firms</i> to express interest to participate in HMT Digital Securities Sandbox. <b>3-9 months</b></p> <p>The Group recommends that <i>industry partners work with HMT</i> to identify barriers in legislation for holding digital investible assets, and then to enable necessary legislative change, potentially through the Digital Securities Sandbox or another sandbox. <b>6-12 months</b></p>                                       | <p>The DSS Regulations are now in effect. The next step is for the Bank and the FCA to set out their joint approach to operationalising the DSS. The Group may engage with the FCA and Bank about the opportunities provided by the DSS to progress use case two. Individual potential applicants should contact the regulators to discuss their proposals.</p>   |
| <p>While the Money Laundering Regulations are made by government under legislation, the <i>FCA</i> is exploring whether it could more quickly determine MLR registration applications for firms already authorised by the FCA to carry out regulated financial services activities, where there is a lower risk of harm and where the FCA has evidence of strong control frameworks and non adverse regulatory histories. <b>3-6 months</b></p> | <p>The FCA has a statutory deadline to come to a decision on applications within three months once they have received all the information needed. The process may at times take longer where a different outcome is being pursued such as a refusal. Firms are encouraged to request a pre-application meeting before applying, which can provide an insight into the requirements of the rules and expectations of the FCA when an application is made as well as an opportunity to introduce and explain the proposed business model. Firms should also review the pre-application information available on the FCA website<sup>29</sup>.</p> |
| <p>The Group recommends that the <i>government</i> support building awareness of the digital identity legal framework set out in the Data Protection and Digital Information Bill, including the trust framework, and encourage industry adoption. <b>9-24 months</b></p>   | <p>The Department for Science, Innovation &amp; Technology continues to lead a programme to support the adoption of secure and trusted digital identities across the economy. In March, HMT launched a consultation on improving the effectiveness of the Money Laundering Regulations (MLRs) which, among other things, explores whether bespoke guidance would give MLR-regulated firms clarity in using digital identities to comply with their regulatory obligations, whether such guidance would be sufficient by itself and, if so, what it should contain<sup>30</sup>.</p>   |

### Still to be taken forward:

The Group recommends that *HMT* consider whether further action is needed on access to business accounts. **1-2 years**

### The authorities will be able to progress these items following phase two:

Once the further stages are detailed, *FCA* to consider impacts on Handbook rules. **9-12 months**

Once the further stages are detailed, *HMT* to consider impacts on legislation. **9-12 months**



## NEW ACTIONS ARISING

### 1. Digital issuance of a UK government gilt

The Group has offered to work closely with HMT and the Debt Management Office to facilitate a native digital government debt instrument issuance. Members of the buy-side are keen to purchase a UK short-term gilt, green gilt or other debt security to demonstrate encouragement for the private sector to experiment with digital securities. This could facilitate and encourage the end-to-end capital markets ecosystem on digital securities, show that the UK is open for innovative business and potentially drive further activity for the DSS.

*Government to continue to examine, and engage with firms on, the possible applications and benefits of applying Distributed Ledger Technology to a sovereign debt instrument.*

**HMT & Industry | 6-12 months**

### 2. ISA eligibility of fund tokens

Although the status of tokens, representing shares or units in a fund, is not fundamentally different from the existing arrangements, certainty on the ability of retail investors to hold them within Individual Savings Accounts (ISAs) and other tax-wrapped products would be helpful.

*Government to review the eligibility of fund tokens for ISA and other tax-wrapped products.*

**HMT | 6-12 months**

### 3. Implementation

There is now a clear pathway (figure 3) for firms to implement fund tokenisation, whether that is a baseline-model compliant proposition, or one that uses a testing option to progress a specific use case.

*Firms, either collectively or individually, to implement fund tokenisation or test emerging use cases.*

**Industry | 1-12 months**

FIGURE 3: IMPLEMENTATION ROUTES

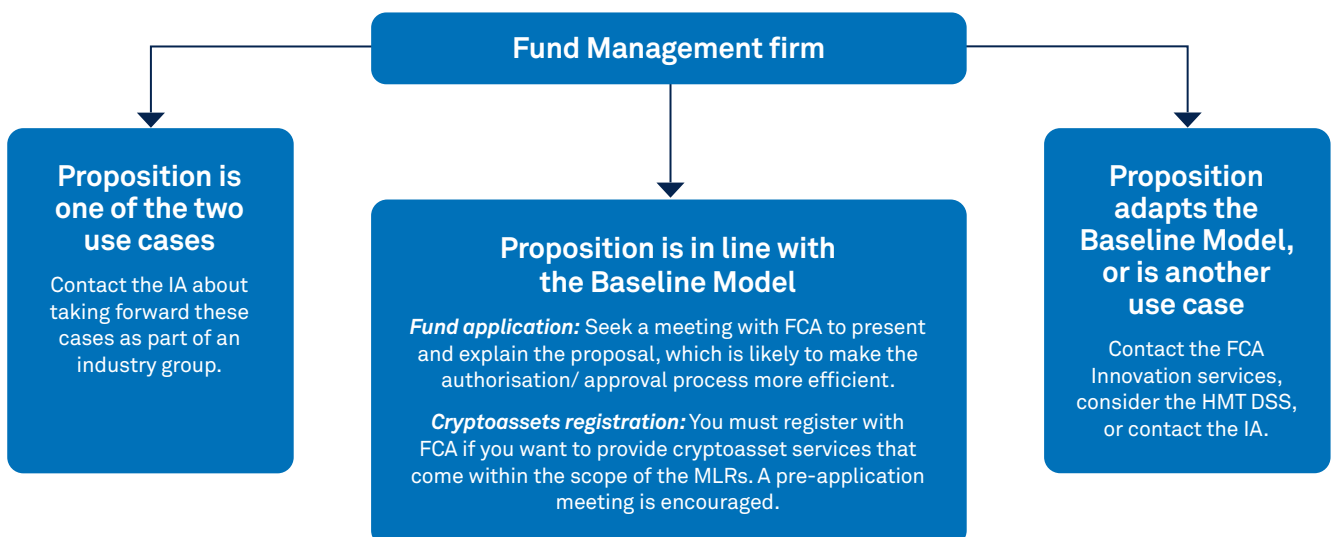
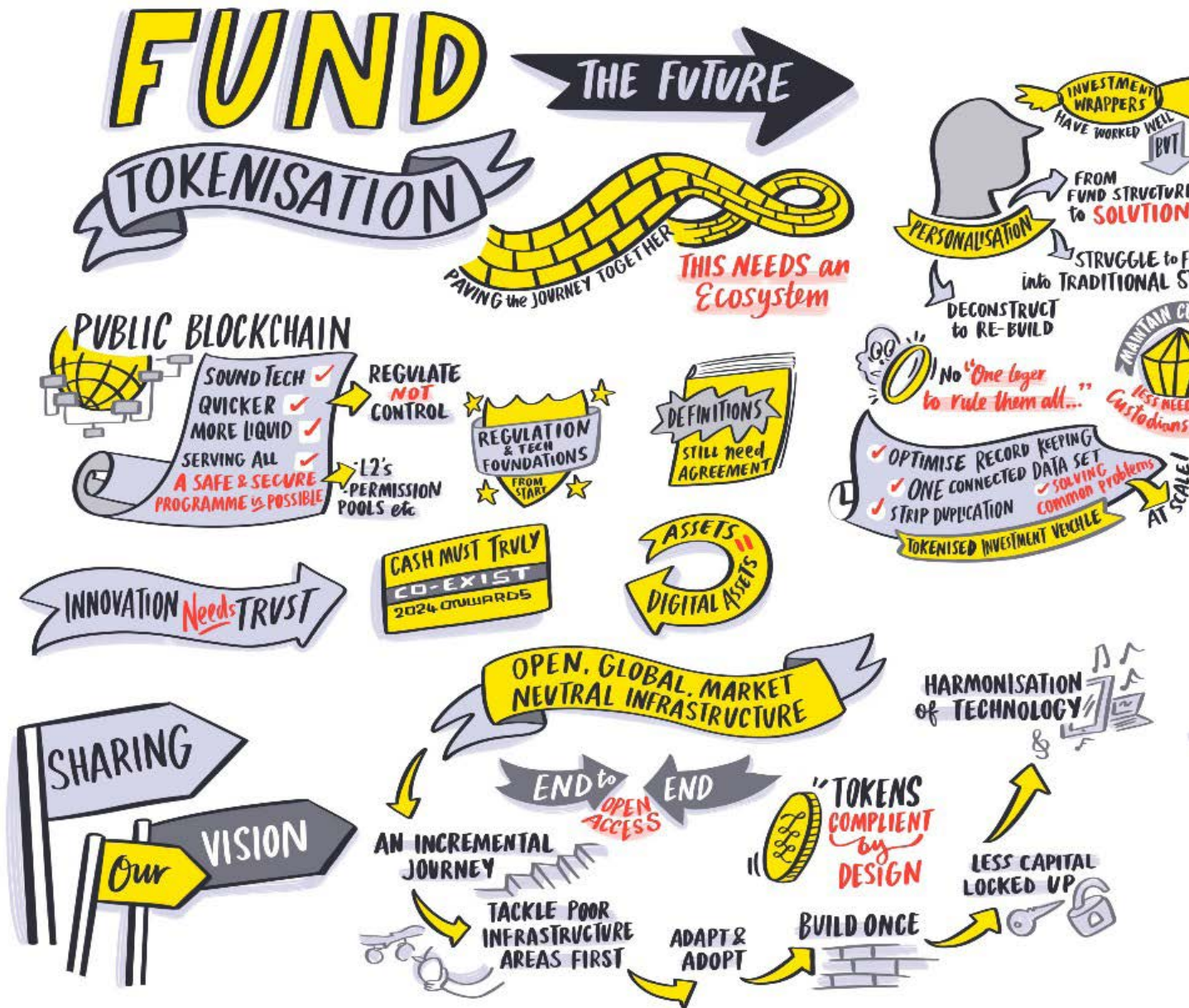
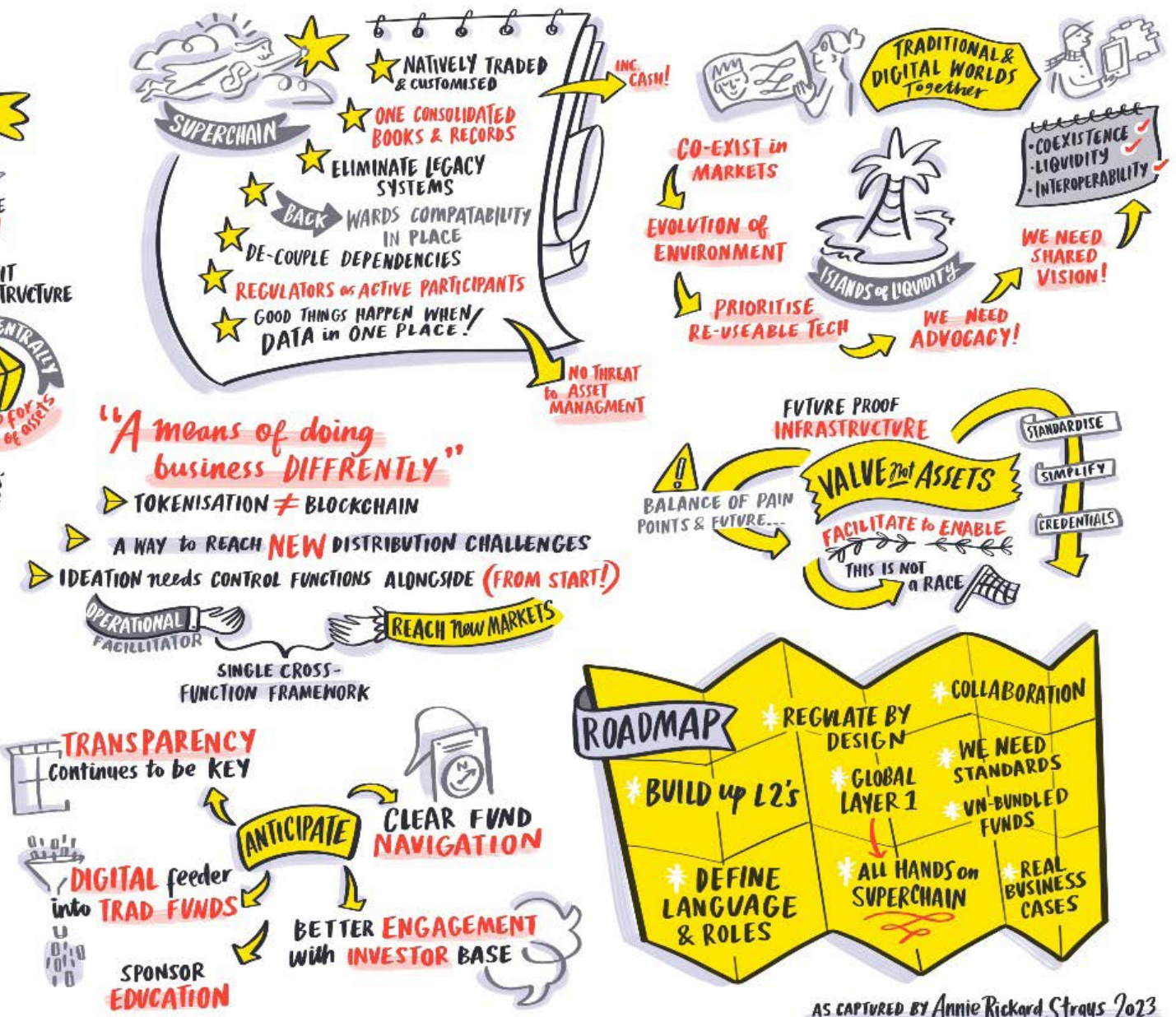


FIGURE 4: VISUAL SUMMARY OF A GROUP DISCUSSION IN NOVEMBER 2023, COURTESY OF EY





# CONCLUSION AND NEXT STEPS

The Group – backed by HMT and the FCA – has clearly set out how the UK funds industry can best harness the potential of tokenisation for the UK asset management industry. The two reports on tokenisation produced by the group demonstrate: (i) that firms can pursue a baseline model of tokenisation in the UK, (ii) some use cases for how that model might be applied to firm's business models (e.g. in improving MMF collateral management) and (iii) what the future evolution of tokenisation in the UK might be.

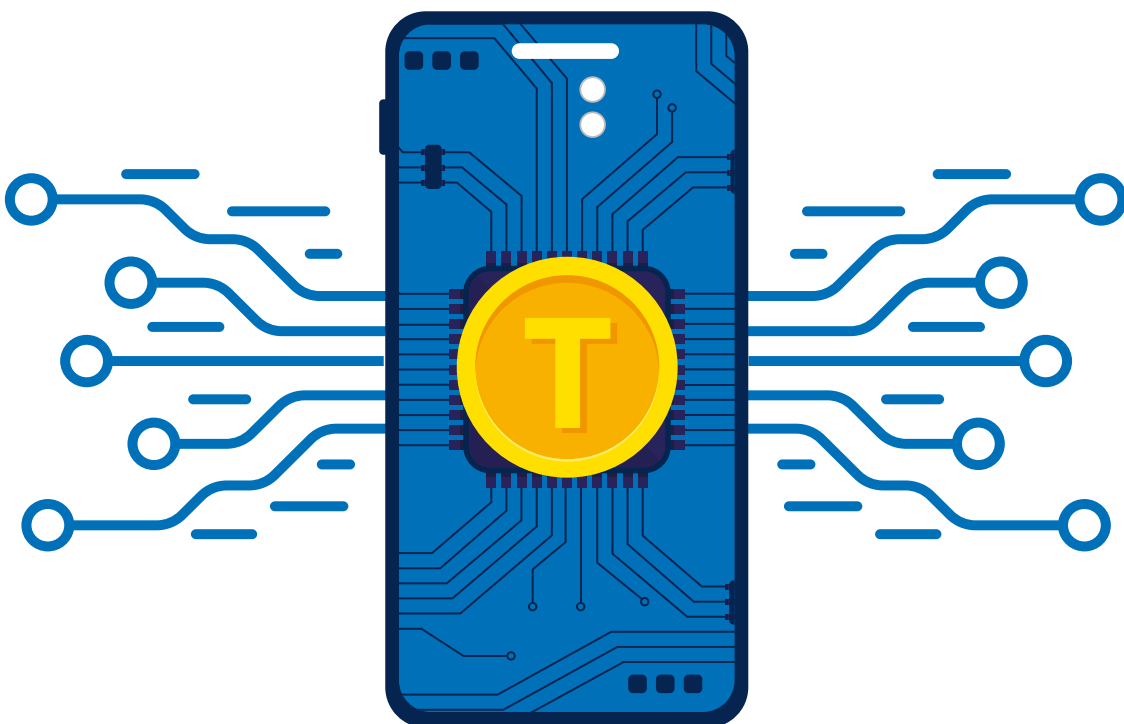
The collaborative effort with government, regulators and a wide range of market participants has demonstrated investment fund innovation by first creating the regulatory infrastructure for fund tokenisation in the UK funds market, and secondly setting out a clear plan for future development.

Firms are urged to execute their tokenisation strategies or collaborate with peers to advance the emerging use cases with the authorities in a collaborative manner. To express interest in the latter, please **[contact us](#)**<sup>37</sup> by the 26 April 2024.

The IA will keep working with its membership to support firms in these next steps and will liaise with other key stakeholders to ensure the implementation of all of the recommendations and to monitor progress with the Asset Management Taskforce.

The Group will now focus on phase three and the impact of artificial intelligence on the industry.

While the UK has made progress by adopting tokenisation, there is no room for complacency and this work should be seen as just the beginning. The investment industry should use both the content of the findings so far and the method of working collaboratively to further its innovation journey in fully achieving the aims of Investment Fund 3.0 for the benefit of investors and the UK.



# APPENDIX 1: MODEL RISK FACTORS<sup>1</sup>

*The following draft model prospectus has been developed for the purpose of Tokens representing units in a collective investment scheme, issued in accordance with the baseline model from the [Blueprint for UK Fund Tokenisation report](#) ('**Blueprint**') dated November 2023. The utility of this model fund prospectus may be limited to the framework set out in the *Blueprint*. Any future changes in the model and experience provided by transactions in the market could affect the accuracy of this document and must be amended prior to use based on relevant laws and regulations which are subject to change in the future.*

*Fund operators will need to ensure the text of this model prospectus is suitably adapted so that the specific technological terms relating to their fund are used and the relevant risks are appropriately disclosed for their investor base. The Financial Conduct Authority ('FCA') will consider all applications on a case by case basis.*

## **Proposed riders – Phase 1**

These riders assume:

the nature of the 'Tokens' as conventional units in digital form has been explained elsewhere in the prospectus; and

the relevant issuance is simple, involving only permissioned distributed ledger technology ('DLT').

## **Distributed ledgers**

Distributed ledgers are digital networks that record information across multiple computers simultaneously. They rely on mathematically secured (i.e., cryptographic) and algorithmic protocols for transaction processing and recording.

The integrity and security of a network may be compromised by malfunctioning nodes or errors in the underlying source code, as well as by advancements in mathematics or technology (such as digital computing, algebraic geometry, or quantum computing). In extreme cases, such issues can lead to the complete failure of the network, and loss of information and assets. However, the Tokens have been issued with investor safety in mind and, as is explained below, the risk of loss to investors is no greater than in the case of an issuance of Units using traditional methods.

## **Permissioned DLT and Tokens**

In the case of the Tokens, only permissioned DLT systems are used. This permissioned DLT involves private networks that are controlled by the authorised fund manager ('AFM') and parties appointed by the AFM, with access being limited to investors and identified service providers. All participants on the DLT can be identified and have a legitimate interest in transactions related to the Tokens. Access to the digital network on which the Tokens are processed and recorded is permissioned and strictly controlled.

## **Emerging technology**

DLT is an emerging technology and, in some cases, introduces novel capabilities. However, the Tokens are processed and recorded solely on a DLT system that is tried and tested and operates to equivalent standards as traditional methods of unit issuance and in accordance with all applicable legal and regulatory requirements.

The AFM uses a DLT system operated by [TBC] which operates to the [same standards [●]]. The AFM's business model does not rely on further investment in or development of either the [TBC] DLT system or DLT industry related technologies more generally, nor does it rely on widespread public acceptance or adoption of the technologies, including in relation to the timing of settlement of transfers.

## **Cybersecurity related risks**

*[Note: this rider is included here on the basis that it may be considered logical to place the cyber risk factor paragraph(s) within the section on digital assets. If users prefer to split them, this paragraph may be deleted. If users prefer to retain their usual cyber risk language, this paragraph can be replaced with that language.]*

Cybersecurity failures or breaches could disrupt business operations, resulting in:

- financial losses,
- interference with business activities,
- disclosure of confidential information,
- impediments to trading,
- submission of erroneous trades or creation/redemption orders, and
- the inability to transact business.

<sup>1</sup> The Group would like to express its thanks to CMS for producing this appendix and to those, including members of the IA Legal Committee, who provided additional input. The appendix is made available in raw form on the IA website – [UK Tokenised funds: Model risk factors for fund prospectus](#) – and subject to the terms of use described there.

Exploitable flaws leading to security breaches, (such as hacking, and malicious software coding) may lead to the misappropriation of Tokens, corruption of data, operational disruption, and issues related to the unexpected functioning of the platform, impacting the settlement, registration, and transfer of Tokens.

The consequences of such failures or breaches may include: violations of privacy laws, regulatory fines, penalties, reputational damage, reimbursement or compensation costs, and additional compliance expenses. These may negatively impact the financial position of the AFM and potentially mean that it fails to meet its obligations. These risks are not specific to DLT; rather, they exist in all instances where relatively sophisticated digital technology is utilised to facilitate unit issuance. For specific risks relating to the use of DLT, see below (*Technology risks relating to the use of DLT*).

The AFM operates business continuity plans, including [*TBC per project*].

### **Confidentiality and the Transmission of Data**

The secure transmission of confidential information and the continuous ability to transact on electronic trading platforms are critical elements of operations. The AFM, its people, third-party service providers, and investors may be vulnerable to targeted attacks, unauthorised access, fraud, computer viruses, denial-of-service attacks, digital terrorism, firewall or encryption failures, and other security issues. [As the regulatory environment related to information security, data collection and use, and privacy becomes more rigorous / In the view of the AFM,] security standards applicable to the Tokens and the [*TBC*] DLT system are at least equivalent to those used in the case of an issuance of units using traditional methods.

### **Technology risks relating to the use of DLT**

Risks associated with cybersecurity breaches, operational disruptions, and related concerns specifically targeting DLT systems may evolve over time due to advancements in cryptographic and algorithmic technologies and techniques. These risks arise where DLT is utilised and include:

- *Security breaches and faults*

Malicious actors may manipulate networks and smart contract technology, creating similar disruptions and potentially resulting in losses for AFMs and investors.

- *Malfunctions, technology failures and updates:*

Risks relating to the malfunction or unexpected function of the platform, which may have adverse consequences on the settlement, registration and transfer of Tokens. For example, outage time and connection errors in DLT may lead to inefficiencies for AFMs and for investors (for example, in the investors' ability to redeem the Tokens).

Similar consequences may arise due to scheduled and routine maintenance to the platform; here, the participant may face short periods of time where they may not be able to access the underlying platform to buy or sell Tokens, or receive information regarding Tokens. Where there is a failure to update (or update in a timely fashion) a protocol or network, the platform may become more susceptible to the risk of exploits or hacks.

- *The underlying technology:*

The use of new platforms introduces potential inherent flaws (such as coding errors or other human errors) and limitations in the technology. Similarly, where new platforms are being used, there is a risk that they may contain inherent vices or limitations and may be susceptible to exploitable flaws that may result in security breaches.

***[Note: In Phase 1, it is expected that AFMs (i.e., not the fund or investors) will bear the risk of the use of DLT and will ensure that any recourse to it and/or its third parties can be satisfied as described elsewhere in this prospectus.]***

However, these risks are not specific to DLT. They are conventional risks associated with the use of technology in any form and, therefore, are already existing within financial services and securities issuance. While they may evolve and adapt with the application of DLT, they can be addressed through the implementation of proper procedures and plans.

The AFM only uses services that have been extensively tested to equivalent standards to those used in securities issuance using traditional methods. The services do not involve uses of DLT that could give rise to risks arising from irreversible transactions or failures of systems to be interoperable. The AFM's systems include back-ups that replicate the traditional methods of securities issuance. In the view of the AFM, no novel risk of loss to investors arises from its use of DLT systems. The AFM's use of DLT systems may promote the robustness of securities issuance through improving transparency, thereby reducing instances of fraud and market manipulation, and streamlining operational processes.

**Private keys**

*[Note: in Phase 1, it is expected that investors will not be required to manage private keys, which will be dealt with by the tokenisation platform / AFM]*

Investors will not be required to manage any private keys in order to access their investments.

*[Note: In cases where the design of the tokenisation involves use of private keys, the following language can be used as a base]*

[The ownership and transfer of digital securities, including the Tokens, relies on safeguarding private keys to prevent unauthorised transfers. The private keys related to the Tokens are held *[TBC per project]*.

Only the owner of the private key will have access to and control over the Tokens. The loss, theft, or destruction of the private keys may be irreversible.

The underlying risk is not novel insofar as it is observable in traditional securities issuance, that is, where the system of a service provider may lose access to data, the risk of loss to investors from loss of access to data is minimised through *[TBC per project – additional measures implemented to protect retail investors, such as a centralised mirror record]*.

**Service Providers**

At the date of this document, the AFM and/or its delegates or the Depositary have appointed specialist service providers to perform certain roles in relation to the Tokens. These are:

- tokenisation platform operator *[TBC per project]*;
- digital assets custodian *[TBC per project]*; and
- specialist registrar *[TBC per project]*.
- *[others? Potentially KYC/AML providers; compliance and audit providers etc.]*

As with its other technology and professional service providers, in the ordinary course the AFM may appoint new or alternative DLT service providers where it judges that it is commercially beneficial to do so, taking account of relevant regulatory requirements concerning delegation of functions and management of operational risk.

*[From IA report: Traditional registers are replaced by DLT records which decrease costs and increase efficiency. This real-time record-keeping system shared across all parties servicing the fund will eliminate the need for participants to reconcile their data with a centralised register. The AFM will be able to demonstrate it is able to exercise control over the register by executing one-sided transactions outside of the consensus mechanism, or stop transactions when necessary. By removing some intermediaries, such as fund administrators, cashflow can be moved at a faster pace.]*

**[Smart contracts**

*[Note: In Phase 1, it is assumed that smart contracts will not be utilised to administer or generate Tokens]*

The Tokens are not generated or administered according to the terms of any “smart contract” and therefore risks associated with use of smart contracts do not apply to the Tokens.

All contracts relating to the Tokens are in natural language and entirely subject to human operation.]

**Legal uncertainty**

*[Note: In Phase 1 it is assumed that the law of UK jurisdictions only will govern Tokens]*

The terms of the Tokens are governed by English law. While English law applicable to securities is well-established, both in statute and judicial precedent, and English courts and practitioners are very familiar with the legal issues raised by the structuring, issuance and transfer of Tokens, the legal aspects of the tokenisation of funds remain somewhat uncertain, and no court decision has yet been published on the topic.

Disputes regarding certain aspects of the acquisition and transfer of tokenised securities in the form of digital tokens, for example, the validity of transfers, cannot therefore be excluded. If a court were to decide that a transfer on the relevant DLT is not sufficient to transfer the rights and obligations associated with tokenised securities, the validity of transfers of the Tokens effected by transferring the relevant tokens on a DLT may be challenged.

However, transfers of this type have taken place in practice over many years and come before the English Courts in criminal and civil litigation cases without judicial concern to date.

[The risk of a successful challenge to a transfer of the rights and obligations associated to the Tokens is extremely low. Even if the risk materialises, investors will not suffer loss since the DLT register is backed-up by a copy held by the AFM in exactly the same manner as for conventional units. In the event of any dispute as to the transfer of a Token, the copy register, maintained on behalf of the AFM outside the DLT system, would evidence the transfer.]

### **Regulatory risk**

The integration of DLT into financial products is a recent development, and the regulatory frameworks governing its use in the financial sector are evolving. Regulatory changes at both national and international levels are anticipated, and actions restricting the AFM's use of the technology cannot be ruled out.

However, as a general matter, the FCA has stated (in the Blueprint) that it has not identified any obvious barriers in its Handbook to the implementation of UK authorised fund tokenisation of the type represented by the Tokens.

Additionally, if adopted by the government and enacted by Parliament, the Law Commission of England and Wales' proposal for a draft Digital Assets Bill would clarify that digital assets are recognised by statute as a type of property under English law. At the time of this document, the *Law Commission has launched a call for evidence* to inform the Bill.<sup>2</sup>

*[Note: the above paragraph should be updated as appropriate to reflect the progress of the Digital Assets Bill]*

The Tokens, taking into account the means by which they are created and operated as tokenised securities, have been approved for issuance by the AFM's regulator *[TBC per project]*.

### **The AFM**

The AFM is a *[describe legal entity]*. It does not have and does not need to have any special characteristics to issue tokenised securities.

### **Unit holders**

*[Note: Unit holders will need to consider relevant local law requirements in their respective jurisdictions]*

Unit holders may need to take specific measures to ensure compliance with relevant regulations in their respective jurisdictions including, but not limited to, local tax-related considerations.

### **Regulatory Sandbox**

*[Note: include (cross-referring to an explanation of the benefits of the Sandbox for the issuance) if issuance is under a Sandbox structure. Note also that the Digital Securities Sandbox is distinct from the FCA's Regulatory Sandbox. If the issuance is under a Sandbox, ensure the correct structure is being referenced]*

The transaction is conducted within the framework of [the UK's "Digital Securities Sandbox,"]. This sandbox and its authorised market infrastructure operates *[TBC per project]*.

### **Environmental impact, DLT systems**

*[Note: In Phase 1, it is assumed that the use of DLT systems will have minimal environmental impact]*

There is a perception that DLT systems are not an environmentally sustainable technology. This relates to instances of DLT operating "Proof of Work" technologies which are energy intensive. *[Set out environmental impact of Tokens as compared to an issuance of units using traditional methods, which may be positive.]* However, no "Proof of Work" technologies are used in the issuance or trading of the Tokens. The Tokens are created and operated using a permissioned DLT *[TBC per project]*. Accordingly, the conventional environmental concerns are not applicable for the Tokens.

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<sup>1</sup> *[Note: The Law Commission's draft Bill concerns the law of England and Wales only. The Scottish system of property law is distinct, with digital assets being considered separately by the Scottish Government's Expert Reference Group on Digital Assets. If there is a Scots law element to the relevant fund, this paragraph should be removed]*



## Glossary

*[Note: if desired, the following may be inserted as an appendix to the prospectus and/or included as a glossary to these riders]*

| Term                               | Definition  |
|------------------------------------|---|
| [Consensus mechanism]              | [Consensus is required for updates or transactions on blockchains. It refers to the need to validate new data before writing updates of information to the distributed ledger. There are different types of consensus mechanisms. Early crypto consensus required agreement by the majority of relevant actors as to the status of the ledger, whereas more recent versions use distributed consensus mechanisms, relying on a fewer number of nodes required for establishing consensus. A permissioned DLT operates only using nodes controlled by organisations directly appointed by the AFM.]  |
| Digital asset custodian            | Firms who, by way of business, provide services to safeguard, or to safeguard and administer—<br>(a) cryptoassets on behalf of customers, or<br>(b) private cryptographic keys on behalf of customers in order to hold, store and transfer cryptoassets, will be “custodian wallet providers” within the meaning of regulation 14A of the Money Laundering, Terrorist Financing and Transfer of Funds (Information on the Payer) Regulations 2017 (‘MLRs’) and need to be registered under the MLRs.  |
| Distributed Ledger Technology/ DLT | The infrastructure and rules that allow independent computers in different locations to propose and validate transactions. DLT systems and processes allow computers to update records in a synchronised way across a DLT network.<br>A distributed ledger is a common record of information that is shared across multiple locations. DLT is formed of a network of independent computers – if a record is updated on one of those computers, then the records across all the computers that are part of the network also get updated.<br>DLT allows information, including records of transactions, to be stored securely using cryptography. |
| Node                               | A node is a computer that assists in the running of the blockchain’s software so that transactions or transfers can be validated and then recorded.   |
| Permissioned DLT                   | Permissioned DLT are networks where all participants are known, and authorisation is required before any usage or activity validation may be undertaken on the network.<br>Permissioned DLTs restrict access to authorised users who must identify themselves through certificates or other digital means.  |
| Private key                        | A private key is a secret key that must remain known only to the recipient. A key is somewhat comparable to a pin or verification code.<br>Transactions are conducted using a private key in conjunction with the public key. This grants access to the value of the transaction the player has stated which is held on the funds you have on a platform.<br>The key pair is mathematically related so that whatever is encrypted with a public or private key can only be decrypted by its corresponding counterpart.  |
| [Proof of Work/PoW]                | [Include only if using PoW] A consensus mechanism that is used to validate new information added to a distributed ledger technology platform. It involves solving complex mathematical puzzles, using cryptography, and can use significant computer power (and thus energy consumption). Typically, the validator is rewarded, for example with the cryptoasset that is being used for the transaction it is validating.]  |
| Protocol                           | The rules of the distributed ledger. They define how records are added, validated and synchronised. Protocols also validate the rights of a digital asset.  |
| Regulatory Sandbox                 | A framework established by the regulatory authorities to allow for selected businesses to test their products, services, or business models within a controlled environment.<br>Where a business is selected to participate in a sandbox, it will only be permitted to do so for a set period of time. The regulatory authority will closely monitor and evaluate the participant’s business and the participant may require regulatory approval before launching the business outside of the sandbox.  |
| Smart contract                     | A self-executing contract with terms of the agreement between parties being directly written into lines of code.  |
| Source code                        | The programming instructions that make up the software running the crypto or DLT system.  |
| Tokenised/Tokenisation             | The transformation of the rights to an asset into digital form (tokens).  |

# APPENDIX 2:

## INTEROPERABILITY AND TECHNICAL STANDARDS

The investment funds industry functions through a complex range of interactions and relationships to overcome silos and an environment of inconsistent financial market infrastructure. This concept of ‘interoperability’ will be equally important in the digital version of markets of the future.

Moreover, the shift from existing infrastructure will take time and so, for the near-term at least, effective, secure, and dependable connections with current financial systems and infrastructures will be essential.

As the concept of a ‘unified ledger’<sup>1</sup> is an unlikely outcome, the interoperability of chains – not only for funds but also for the asset classes they invest in and investors they serve – will be crucial. The capacity for different networks to exchange and access data with each other either through embedded functionality or applications provided by third parties will enable a highly efficient and scalable financial ecosystem through the flow of information and assets in a timely, frictionless and cost-effective way. Importantly, it will prevent the fragmentation of markets and liquidity that could occur if tokens were only accessible on separate chains that could not connect, and become trapped, reducing access, liquidity and limiting the potential benefits of tokenisation.

The technical standards that support this interaction are in early stages but it will be critical for standards to be established for funds to ensure that they are able to succeed in the future marketplace. This document outlines some emerging technical standards and other relevant factors for firms to consider while developing their fund tokenisation strategy.

### INTERNATIONAL STANDARDS AND INTEROPERABILITY DEVELOPMENTS

Various standards, protocols and other technical structures aim to enable interoperability among different chains and kinds of assets. The UK funds industry joins an existing debate on this topic and consequently there is a lot of work that we can utilise and adapt; firms should therefore take an aligned, yet open and agile approach in light of rapid change in this field.

A submission to the **International Monetary Fund** has introduced a conceptual model named ASAP<sup>2</sup> (Access, Service, Asset, Platform) for modelling digital asset platforms with four layers. It says that just as TCP/IP became fundamental to the interoperability of the internet, ASAP could similarly promote cross-platform interoperability, including across various jurisdictions.

The **Global Blockchain Business Council** (GBBC) has a comprehensive listing of technical standards and a taxonomy of commonly used terms within digital assets and blockchain. Their Global Standards Mapping Initiative<sup>3</sup> is a useful reference guide for firms and tech companies in ensuring their developments follow global industry practices. One such standard is the **International Organization for Standardization’s** ISO/TC 307 for blockchain and distributed ledger technologies<sup>4</sup>, which is assisted by the British Standards Institution and noted by the European Commission<sup>5</sup> for the wide global outreach and involvement of EU States in its development. More is due from ISO this year including the conclusions of its working group on interoperability (its ‘WG7’).

Another initiative in progress, in the context of bridges that aim to connect disparate blockchain ecosystems, is the Internet Engineering Task Force who are working on a **Secure Asset Transfer Protocol** (SATP)<sup>6</sup> to enable to transfer of digital assets between networks. The proposed protocol will be asset-agnostic and is intended to be a core infrastructure akin to today’s internet routers operating with border gateway protocol.

<sup>1</sup> Bank for International Settlements: *Blueprint for the future monetary system: improving the old, enabling the new* June 2023

<sup>2</sup> Budau & Tourpe: International Monetary Fund Working Paper 24/19 – *ASAP: A Conceptual Model for Digital Asset Platforms* February 2024

<sup>3</sup> Global Blockchain Business Council: *Global Standards Mapping Initiative* Accessed March 2024

<sup>4</sup> International Organization for Standardization: *ISO/TC 307 – Blockchain and distributed ledger technologies* Accessed March 2024. Working Group 7 is scheduled to conclude later this year

<sup>5</sup> European Commission: *Rolling Plan for ICT Standardisation* Accessed March 2024

<sup>6</sup> Internet Engineering Task Force: *Secure Asset Transfer Protocol* Accessed March 2024

<sup>7</sup> Global Digital Finance: *Networks* Accessed March 2024

**FinP2P**<sup>7</sup> is an emerging interconnectivity routing network that claims to enable financial institutions to issue, trade, and instantly settle digital securities. It is a network transaction routing protocol, but does not use a chain itself, rather a network of nodes connected to chains through APIs which may enable the connection of blockchain nodes using different technologies, including public and private.

The **EU Blockchain Observatory**<sup>8</sup> has summarised different methods for interoperability, such as public connectors, atomic swap protocols, cross-chain market makers, and application-specific blockchains and concludes that there are multiple obstacles to address which require concerted efforts. Similarly, the **Digital Dollar Project**<sup>9</sup> has highlighted the danger of a lack of coordination between market participants and alignment among digital assets experiments which can result in fragmentation and interoperability challenges.

The **Monetary Authority of Singapore's Project Guardian**<sup>10</sup> previously introduced a common framework for the design options in enabling the trading of digital assets across networks and liquidity pools, and more recently proposed a common model for linking digital asset networks implemented on different DLTs<sup>11</sup>. Importantly, Guardian explores a number of financial services use cases, including in asset management, that brings the concept of IT standards closer to home.

A new standard for security tokens has recently been approved by the **Ethereum Community**, ERC-3643<sup>12</sup>, which is a token protocol for conventional assets via permissioned tokens. It claims to ensure that only users meeting pre-defined conditions can become token holders, even on permissionless blockchains, which could be useful for funds that have location-based restrictions, minimum holding or other rules that require management. However, older and more established security token standards ERC-20 and ERC-1400 have other useful features and a longer track-record. It is likely that other protocols will become available over time, including on other chains.

However, it should be noted that Ethereum standards are only relevant for Ethereum Virtual Machine (EVM) chains, and although these cover more than just the Ethereum chain itself these other chains are not necessarily interoperable with each other. Nor can Ethereum's current relative popularity be taken for granted.

In recent days, the **Canton Network** demonstrated an interoperability pilot of twenty-two independent distributed ledger applications (dApps) across multiple participants in the capital markets value chain using a public-permissioned structure<sup>13</sup>.

## FUND INDUSTRY-SPECIFIC CONSIDERATIONS

Onyx by JP Morgan and Bain & Co. have suggested an anatomy of a fund token<sup>14</sup> which contains a proposed definition for data, across three layers, which could be embedded in a token representing an interest in a fund:

- Conventional **identifiers** for the fund, such as its name and ISIN;
- A **dataset** for the fund investment, including price, the proportion of the fund held, and expense data;
- Fund lifecycle **business logic** to act upon scenarios, such as subscriptions, distributions and redemptions based upon pre-defined operational actions.

This combination provides information for holders and certainty around the processes that will be carried out by smart contracts when conditions are met.

Fund tokens should also contain additional data such as regulatory disclosures and information on the underlying portfolio; providing information on these assets would be beneficial in digitising the entire fund data set, with the fund token becoming a token of underlying tokens.

<sup>8</sup> EU Blockchain Observatory and Forum: *The current state of interoperability between blockchain networks* November 2023

<sup>9</sup> Digital Dollar Project: *Interoperability Standards for Digital Assets* November 2023

<sup>10</sup> Project Guardian: *Enabling Open and Interoperable Networks* June 2023

<sup>11</sup> Project Guardian: *Interlinking Networks Technical Whitepaper* November 2023

<sup>12</sup> ERC3643 Association: *What is ERC3643?* Accessed March 2024

<sup>13</sup> The Canton Network: *The Canton Network Completes the Most Comprehensive Blockchain Pilot to Date for Tokenized Real World Assets* March 2024

<sup>14</sup> JP Morgan Onyx and Bain & Company: *How Tokenization Can Fuel a \$400 Billion Opportunity in Distributing Alternative Investments to Individuals* 2023

## Existing major financial market standards

Successful financial markets standards are typically designed and delivered through collaboration rather than imposed by external authorities or vendors, and are interoperable and compatible with existing and emerging technologies. Standards that can adjust to different systems and formats, and that can support a variety of products and services are more likely to attract and retain users.

Some examples of standards that are widely used in financial services today, and that we might be able to learn from, are the Financial Information eXchange (FIX) protocol, the International Swaps and Derivatives Association (ISDA)'s Master Agreement and Common Domain Model, and the Society for Worldwide Interbank Financial Telecommunication (SWIFT) messaging standard.

The **FIX** protocol was initiated by a group of brokers and asset managers who wanted to improve the efficiency and transparency of their trading processes. FIX is extensively used for pre-trade, trade, and post-trade communication and is widely compatible with network technology. The **ISDA Master Agreement** was developed by a consortium of banks and dealers who wanted to reduce the legal and operational risks of their derivatives contracts. Both standards were created through a process of consultation and feedback among their respective members and continue to evolve based on changing market conditions and regulatory requirements.

Separately, the **ISDA Common Domain Model** is a blueprint for how derivatives are traded and managed across the trade lifecycle and, importantly, is an implementation-agnostic way of capturing attributes and functionality, without making assumptions about the physical storage and transmission formats. This type of standards model may be useful for a complex multi-chain world consisting of both private and public chains.

SWIFT provides services related to the execution of financial transactions and payments between banks worldwide and processes more than 50 million messages per day. It has recently claimed that their message set is now compatible with DLT<sup>15</sup>.

## INDUSTRY NEXT STEPS

Standard protocols are essential for a well-functioning financial system and their introduction would have a significant impact on the adoption of fund tokenisation, but there is still a lack of development and collaboration on such standards.

In the short term, given the speed of change, firms should adopt a flexible and adaptive approach as the technology environment evolves and to avoid the possible risks of repeating current practices or becoming stuck with obsolete technology and chains that limit their interaction with certain asset classes or types of clients.

For long-term benefit, firms in the funds sector, and the sector as a whole, will need to work together effectively with their peers, to prevent the advantages of tokenisation from being constrained. Any fund industry standards will need to be compatible with the developments that occur in other areas. We should tackle the current limitations of certain standards to link and interact with other solutions; some of this will have to be led by the industry as trials and initial deployments pave the way. As the Group recommends, it is crucial that the investment industry participates actively in these discussions in the coming months.

<sup>15</sup> SWIFT: [\*Swift unlocks potential of tokenisation with successful blockchain experiments\*](#) August 2023

# ENDNOTES

- <sup>1</sup> Asset Management Taskforce Technology Working Group: [UK Fund Tokenisation: A Blueprint for Implementation](#) November 2023
- <sup>2</sup> Financial Conduct Authority: [Letter to Technology Working Group](#) November 2023
- <sup>3</sup> Financial Conduct Authority: [Fund Tokenisation](#) Accessed March 2024
- <sup>4</sup> Investment Association: [Investment Fund 3.0](#) Accessed March 2024
- <sup>5</sup> IA Engine: [Tokenisation Hub](#) Accessed March 2024
- <sup>6</sup> HM Government: [The Financial Services and Markets Act 2023 \(Digital Securities Sandbox\) Regulations 2023](#) December 2023
- <sup>7</sup> Bank of England, Prudential Regulation Authority and the Financial Conduct Authority: [Cross-authority roadmap on innovation in payments](#) November 2023
- <sup>8</sup> Financial Conduct Authority: [DP23-4 Regulating Cryptoassets Phase 1: Stablecoins](#) November 2023
- <sup>9</sup> Bank of England: [Regulatory regime for systemic payment systems using stablecoins and related service providers](#) November 2023
- <sup>10</sup> Bank of England: [Reviewing access to RTGS accounts for settlement](#) February 2024
- <sup>11</sup> Fidelity: [Fidelity Commences Initial Phase of Sterling Payment Operations in a World First for Both Wholesale Finance and Digital Asset Markets](#) December 2023
- <sup>12</sup> Bank of England Financial Policy Committee: [Financial Stability Report](#) December 2023
- <sup>13</sup> Financial Conduct Authority: [CP23/28 - Updating the regime for Money Market Funds](#) December 2023
- <sup>14</sup> Association of National Numbering Agencies: [ANNA and DTI Foundation align ISIN and DTI standards for Digital Tokens](#) October 2023
- <sup>15</sup> Law Commission: [Digital assets as personal property - short consultation on draft clauses](#) February 2024
- <sup>16</sup> Law Commission: [Digital assets and ETDs in private international law: Call for evidence](#) February 2024
- <sup>17</sup> LiCuido and Investment Association: [Money Market Funds & Tokenisation: Collateral Opportunities](#) March 2024
- <sup>18</sup> See paragraph 4.37 of HM Treasury: [Spring Budget 2024](#) March 2024
- <sup>19</sup> Investment Association: [Investing For The Future: Three Potential Paths For A Tech-Powered UK Fund Industry](#) July 2022. See Scenario Three for a discussion of customised investment portfolios and Direct Indexing.
- <sup>20</sup> There are many such examples, one of which is the European Investment Bank raising £50m via a Luxembourg bond issuance using a mixture of public and private chains - BNP Paribas: [EIB achieves milestone with first ever digital bond in British Pounds](#) February 2023
- <sup>21</sup> Financial Conduct Authority: [Innovation Hub](#) Accessed March 2024
- <sup>22</sup> Financial Conduct Authority: [Regulatory Sandbox Accepted Firms](#) Accessed March 2024
- <sup>23</sup> City of London Corporation: [The Global City](#) January 2024
- <sup>24</sup> Long Finance: [The Smart Centres Index 8](#) November 2023
- <sup>25</sup> Innovate Finance: [FinTech Investment Landscape 2023](#) January 2024
- <sup>26</sup> The seven characteristics are detailed in the [Blueprint](#), but in summary are: 1- Authorised Fund: it would be established in the UK and FCA authorised, with no changes to the legal and regulatory roles of the parties to the fund; 2- Holds Traditional Assets: the portfolio would be made up of mainstream investment assets held by a custodian, and not cryptocurrencies; 3- Off-Chain, Usual Cycle settlement: settlement of fund unit transactions would be carried out as they are today with no use of any forms of digital money, and on the same timescales as a typical UK fund (T+2/3); 4- Private, Permissioned Chain: access will need to be permissioned and tightly controlled; 5- Fund Valuation: the fund would continue to provide a daily valuation point (or on another timescale consistent with existing regulation and market practice), rather than intra-day/real-time valuation; 6- Control Over The Register: the traditional fund register would be replaced by DLT records but firms would need to be able to exercise control over it by having the ability to execute one-sided transactions; 7- Future-Proof: developments under this scenario should not restrict future innovation or interoperability.
- <sup>27</sup> US Securities and Exchange Commission: [Statement on the Approval of Spot Bitcoin Exchange-Traded Product](#) January 2024
- <sup>28</sup> UK Finance, CMS et al: [Digital Currency Glossary](#) January 2024
- <sup>29</sup> Financial Conduct Authority: [Cryptoassets: AML / CTF regime - Registering with the FCA](#) Accessed March 2024. Requests for pre-application meeting can be submitted to [DigitalAssetsPreApp@fca.org.uk](mailto:DigitalAssetsPreApp@fca.org.uk)
- <sup>30</sup> HM Treasury: [Improving the effectiveness of the Money Laundering Regulations](#) March 2024
- <sup>31</sup> Email [tokenisation@theia.org](mailto:tokenisation@theia.org) with detail on the scenario you would like to test and your capabilities



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