

WHITE PAPER

Fluid Dynamics: Taking the First Steps in
the Changing Liquidity Landscape

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Executive Summary & Introduction

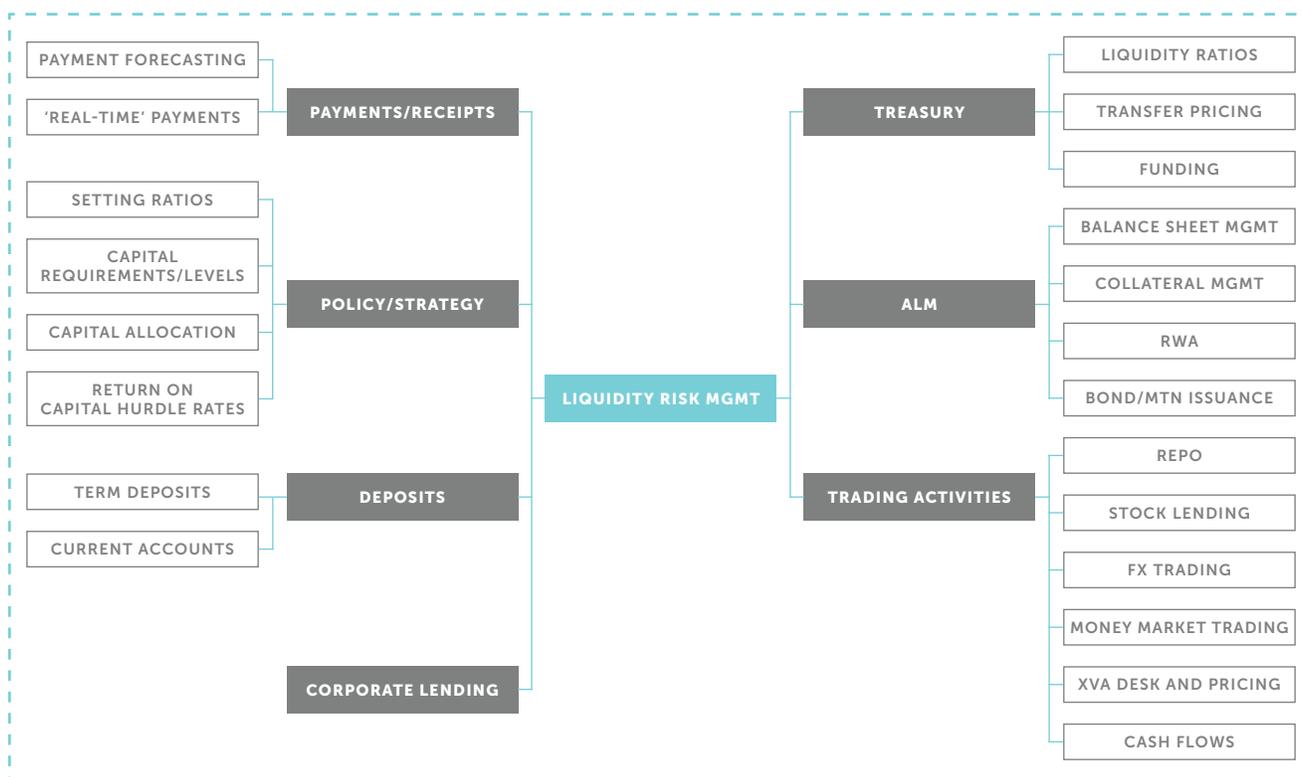
Recent history has provided a salutary lesson in the importance of liquidity risk both systemically and to individual institutions. Although 10 years has passed since the financial crisis, its ramifications continue to reverberate and shape the financial landscape. Much has been written about the fundamental causes of the crisis, but it was clear that a breakdown of trust and the consequential huge systemic reduction in liquidity were key factors. Sound liquidity management is therefore crucial to the financial health of any firm and plays a key role in the functioning of markets and the wider economic system.

Regulation introduced under Basel III has also emphasised the necessity for liquidity planning and the need to maintain and find ways to convert funds on the balance sheet to cash in order to manage the firm’s day-to-day operations and survive under market stress similar to that experienced in 2008.

Monitoring liquidity ratios to assess the availability of liquid assets to short-term liabilities or debt obligations is essential. The liquidity ecosystem within a large financial institution can be complex with many variables that can impact the availability of cash. It is therefore essential that treasurers have a complete view of this and the ability to drill down to individual assets and cash flows.

A good cash flow forecast accurately predicts the cash inflows and outflows expected over a pre-defined period in the future – normally twelve months. Large portfolios of transactions, lifecycle events, legal entities and asset classes can result in a ‘vortex’ of cash flow events that changes in real time.

Figure 1: The Liquidity ‘Vortex’



Executive Summary & Introduction (Continued)

In addition to the complexity of the liquidity management landscape, the shift towards real-time domestic payments and faster cross-border payments is also influencing how treasurers measure their intra-day liquidity and monitor liquidity risk.

In the longer term, this may allow institutions to shrink their working capital buffer, reduce borrowing requirements and access new investment opportunities. However, this relies on treasurers having the mechanisms in place to centralize their cash dynamically and forecast cash flow accurately and potentially in real time. Traditional calculations for liquidity ratios and reports of T+1 (at best) will no longer cut it – a new dynamic will have to be adopted.

Historically, intra-day limits have not been a major issue for corporate treasurers, but as the requirement on banks to manage intra-day liquidity more proactively increases, intra-day limits and costs may become a more significant issue for corporate treasurers in the future. This impact will almost certainly become more marked as regulators catch up with the changing payment landscape and demand greater control and scrutiny on a real-time basis.

Exciting developments in new technologies are also beginning to reshape the business models and operations of major corporations. Big data coupled with intelligent automation is opening up huge new opportunities to manage risk, predict client behavior and sift through vast amounts of data to uncover useful insights which can then be monetized.

The as-yet unrealized promise of blockchain-based technologies, which will permit the tokenization of assets, crypto non-fiat currencies and the possibility of a universal real-time ledger, are all exciting developments that have the potential to disrupt current approaches to liquidity management.

This paper sets out to discuss some of the immediate challenges in managing a firms' liquidity and to also look at how new technology and the changes brought about by regulation, macroeconomics and social changes are shaping the strategies and direction of travel. Liquidity management is undergoing seismic changes, and understanding the journey is key to success and, in some cases, warding off an existential threat.

The Move Toward Real-Time Payments

Until recently, most transactions took days to settle. In fact, reducing the settlement period to 'T+1' or even 'T' was seen as something of a utopia. Historically, a longer settlement window was required since most systems and payment networks used batch processing typically overnight to process the large volume of data involved. In addition, today's global payments infrastructure moves money from one payment system to another through a series of internal book transfers across financial institutions. Because these book transfers occur across different systems with a low level of coordination, funds settlement is slow (often 3-5 days, trapping liquidity), prone to errors and costly (\$1.6 trillion in system-wide costs for global cross-border transactions annually).

Consequently, the long settlement periods, although easier to manage, resulted in higher funding costs, Herstatt Risk, and the need to maintain liquidity buffers due to fulfilment uncertainty and 'noise' in the system. This represents a huge drag on the individual firms and economies alike.

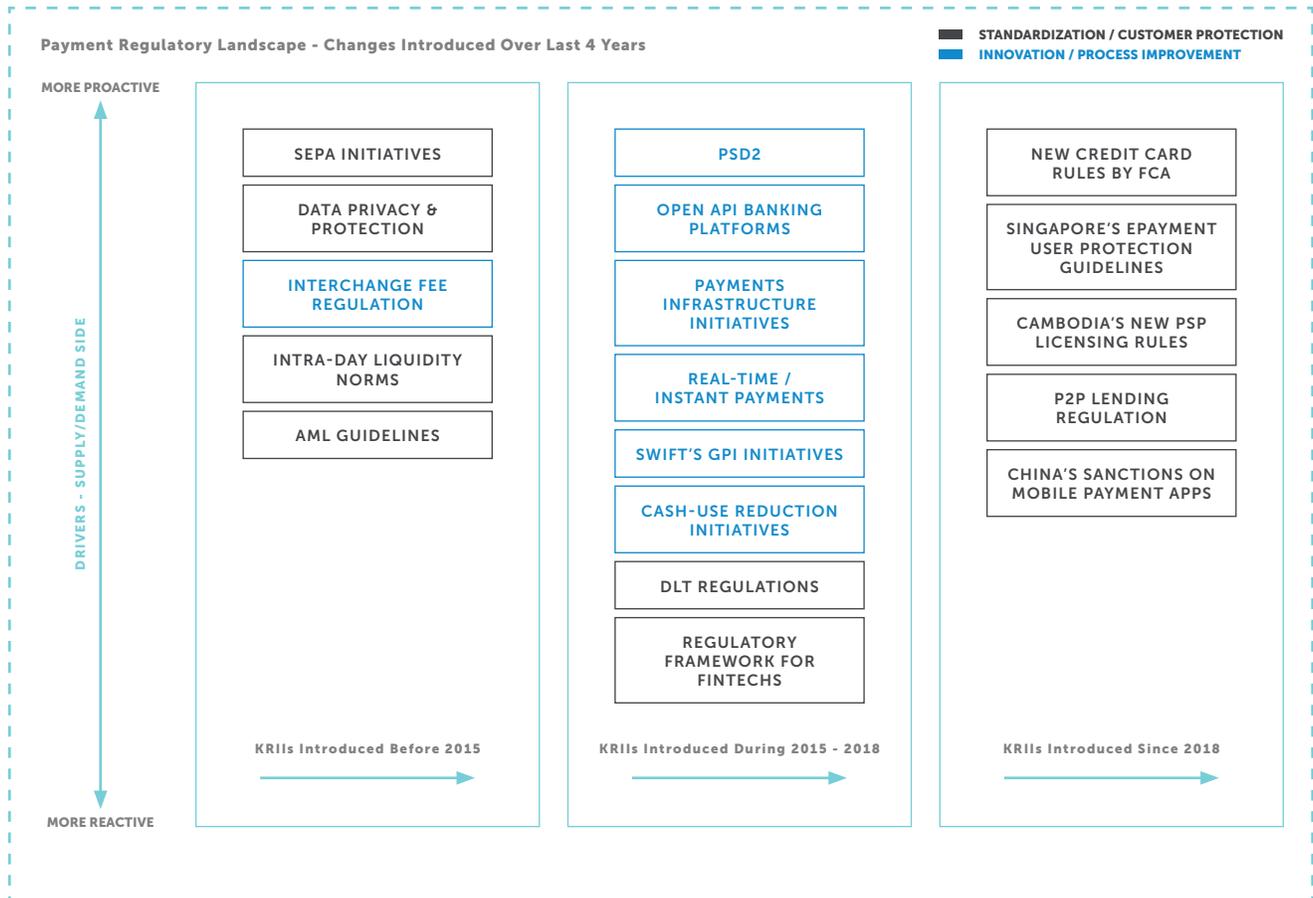
Today's international payment landscape has evolved into a network of relationships involving small or mid-sized banks that prefund accounts or establish lines of credit with correspondent banks. The role of the correspondent bank is to provide liquidity to process the international payments in local currency accounts. This model negates the need for smaller respondent banks to maintain individual nostro accounts in many currencies but does mean that respondent banks have to maintain multiple correspondent banking relationships. A nostro account is a bank account held in a foreign country by a domestic bank, denominated in the foreign country's currency and used to facilitate cross-currency settlement. The correspondent banking model arose due a lack of a global, cross-border payments network. As demand for cross-border payments increases, the system is proving to be inefficient, especially for low-value payments. Clearly, this is crying out for a technical solution.

Today, instant payments are considered (or fast becoming) the norm in many countries, driven by the inexorable march of fintechs and online commerce. Reflecting on this and other changes has prompted some central banks and other clearing and settlement systems operators to upgrade their payment systems. The problem comes when liquidity management systems lag behind these timelines and pace of change.



The Move Toward Real-Time Payments (Continued)

Figure 2: Payment Regulatory Landscape Timeline



The Bank of England (BoE) in the UK has started to upgrade its Real-Time Gross Settlement (RTGS) service (i.e. the infrastructure that holds accounts for banks), building societies and other institutions. The balances in these accounts can be used to move money in real time between these account holders, delivering a final and risk-free settlement.

The Move Toward Real-Time Payments (Continued)

As set out in the BoE's blueprint, as well as replicating the functionality provided today, the new RTGS service will deliver a range of new features and capabilities for payments and settlements between financial institutions.

The Federal Reserve Board has announced that it is working on a service, dubbed FedNow, that will enable all US banks to offer real-time payments 24/7. The system is expected to be operational by 2023 or 2024 and will initially support transfers of up to \$25,000. These value caps are set to increase over the coming years.

Not all initiatives are coming from central banks. Some of the biggest banks in the world — including Wells Fargo, Bank of America, JPMorgan Chase and Deutsche Bank, among others, that collaboratively own The Clearing House (TCH) — have also launched a system reducing processing times from a few days to under five seconds.

"Renewing the service is necessary because the way payments are made has changed dramatically in recent years, reflecting changes in the needs of households and companies, changes in technology, and an evolving regulatory landscape."

Source: Bank of England RTGS Renewal Program Overview



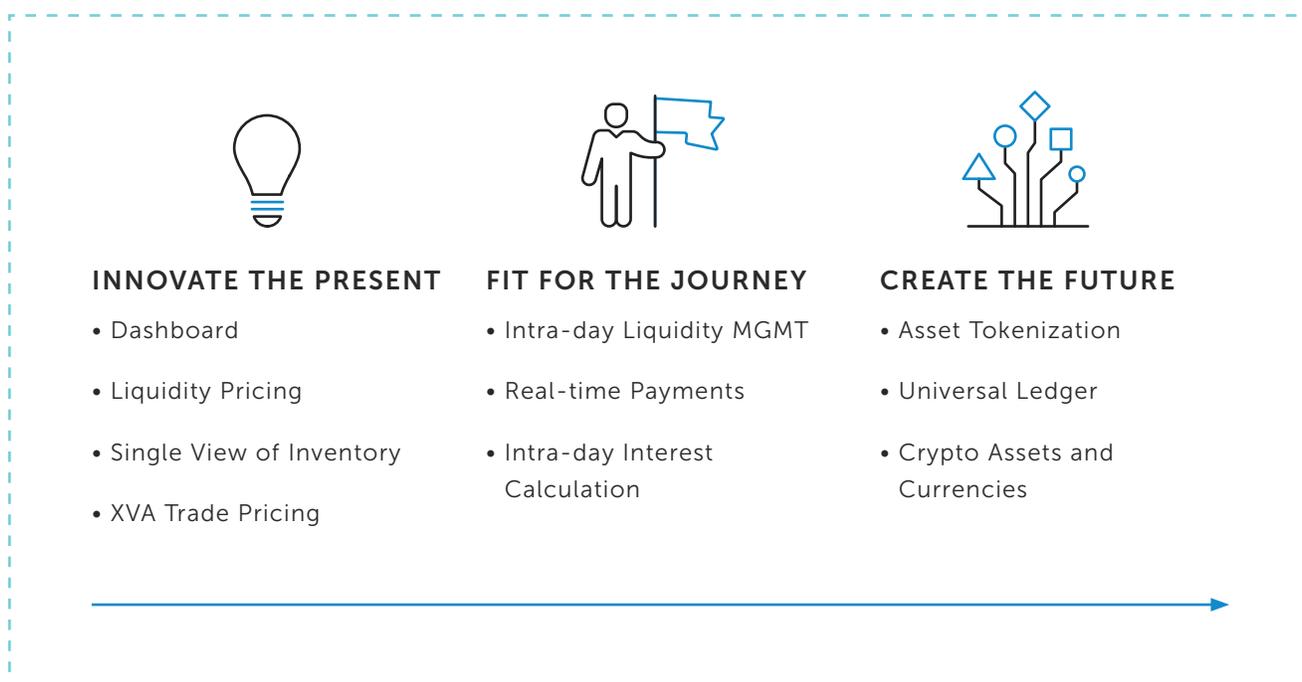
The Road to Success (Continued)

INNOVATING THE PRESENT

These changes will have a profound effect on the way that treasurers plan and manage their liquidity requirements. Looking ahead, it is clear that more change is coming as the opportunities and the promise of new technologies start to become available.

There's an old joke in Ireland about a tourist who asks one of the locals for directions to Dublin. The local replies: "Well, sir, if I were you, I wouldn't start from here." Although every firm is facing these new challenges, not all of them are starting from the same place due to the size, complexity and shape of their businesses. Here at EPAM, we believe that there are some key stages along the journey to the future direction of liquidity management. Some of these are no doubt already being worked on by some firms. Others are still the preserve of innovators and early adopters of new technology and disruptive business models.

Figure 3: Roadmap for the Future of Liquidity Management



Real-time clearing and settlement processing will require a new infrastructure within financial services companies and banks that is quite distinct from today's end-of-day processing and periodic updates to liquidity positions. Indeed, the competition from fintechs and start-up firms eager to enter the payments space is also gathering pace. Banks and infrastructure providers need to prepare for this and change the way they model their liquidity buffers, funding and collateral requirements.

The Road to Success (Continued)

INNOVATING THE PRESENT (CONTINUED)

The need to manage liquidity intra-day is not new and forms an important part of banks' risk management frameworks. This includes:

- Producing a daily gross cash flow report (inflows and outflows) and identifying net funding shortfalls
- Comparing intra-day liquidity positions against expected activity and existing balances and collateral
- Having visibility and the ability to move assets and tap funding sources to meet all intra-day requirements and to deal with unexpected events

Since 2017, systemically important banks have been required to report on seven liquidity measures specified under BCBS 248 guidelines issued by the Basel Committee for Banking Supervision. Financial companies and banks need to ensure that they have clear visibility on a real-time basis. This needs to include all liquidity sources that are held in the different venues and clearing systems. All of this suggests that a centralized approach needs to be adopted and a review of account and entity structures conducted in order to rationalize and reduce the number of liquidity venues and simplify the task of building a more dynamic liquidity management capability. Open banking and industry API standards that form part of the open banking initiative will also facilitate this.

Better precision of cashflow forecasting can be achieved through improved processes and technology; however, this needs to be linked to a dashboard or 'cockpit' to enable real-time oversight and alerts. Collaboration with the Risk, Finance, and Operations functions within a bank is also key to ensuring a 'single version of the truth' is available. This should extend to a single version of all inventory available for use by Treasury and provide insights that optimize working capital and collateral usage.

Once this level of accuracy and confidence in the data has been achieved, treasurers can begin to determine which businesses are providers and which are consumers of liquidity within the firm. This can then facilitate a transfer pricing approach whereby consumers of liquidity can be charged according to their absolute requirements and how they finance their businesses to take advantage of lower rates and efficient use of balance sheets.

Many trading businesses have now started to add funding and liquidity pricing into their client trades in order to recover the true cost of accepting the trade into their portfolio. These so-called Funding Valuation Adjustments (FVA) and Liquidity Valuation Adjustments (LVA) are similar to Credit Valuation Adjustments (CVA) and Capital Valuation Adjustments (KVA) — all collectively known as 'XVA.'

The Road to Success (Continued)

FIT FOR THE JOURNEY

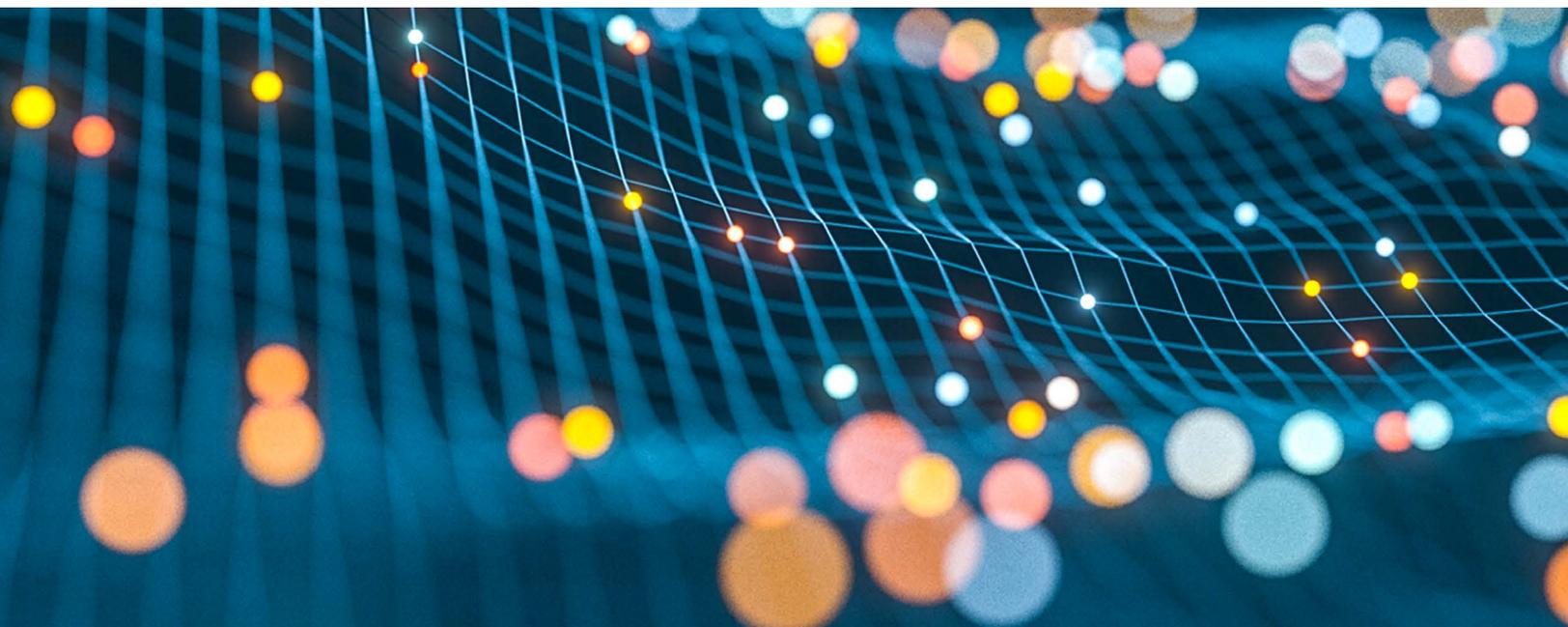
Having achieved visibility and confidence over their liquidity positions, the challenge is to simplify and rationalize account structures to prevent liquidity becoming fragmented into small pools or shapes that become trapped. This implies good and accurate forecasting and the ability to ring-fence to cover payment obligations.

Centralizing liquidity management is starting to gain traction with many corporate treasurers who are reducing the multitude of accounts and currencies held in different banks. Some of the larger banks are providing value-added services through partnership or acquisition of fintechs. This includes liquidity solutions that provide intra-day pooling and virtual accounts and on-behalf-of (OBO) solutions.

Traditionally, transactions and information have been exchanged using online portals, host-to-host, or via SWIFT (MT900 end-of-day statements). Real-time payments and collections will become impossible without a new mechanism for monitoring activity. This is where the use of APIs is key, as it provides treasurers with an aggregated real-time view of liquidity positions and underlying transaction information across all accounts irrespective of which bank they are held at. This reduces cost, risk and the hassle of piecing together information from various sources (systems) and accounts.

This now starts to open new possibilities for redesigning end-to-end process flows and for the introduction of rules-based automation for execution particularly related to foreign exchange activity. A virtuous circle of accuracy and speed of information leads to better visibility and the ability to act (even using AI and dynamic rules-based payment initiation).

Collaboration across the industry is also helping to accelerate the availability of customized solutions and value-added services. Emerging technology in clearing and settlement architecture is also driving improvements around instant payments and lowering thresholds.



The Road to Success (Continued)

CREATE THE FUTURE

Future real-time liquidity solutions are likely to be based on a plethora of new technologies ranging from robotic process automation (RPA), machine learning (ML) and artificial intelligence (AI) to distributed ledger-based on blockchain.

These technologies have the potential to fundamentally change banking and transaction processing. They will provide the ability to process large amounts of data quickly and will enable banks and treasury functions to identify intra-day liquidity and collateral patterns, volatility spikes, fraudulent activity and outlier transactions.

Distributed ledger technology (DLT) is also frequently mentioned as having huge potential to disrupt current practices and liquidity management models. Despite large investment and interest, the development of viable solutions is still at an early stage. However, the concept of centralization of trust and the move from transactions requiring trusted centralized entities will have a big impact on areas such as collateral management, post-trade settlement and the tokenization of assets for liquidity management.

DLT could facilitate and promote industry collaboration with real-time liquidity exchange between banks and the opportunity to manage liquidity systemically to prevent bottlenecks and a build-up of the types of risk seen during the financial crash of 2008.

Some market participants are already discussing the establishment of a global liquidity portal and the use of open platforms to unlock opportunities associated with real-time liquidity.

Asset Tokenization – The Future?

Asset tokenization refers to the issuing of a blockchain token that digitally represents a real tradeable asset. This is analogous to the securitization that happens today i.e. equity in a company is securitized into shares. Just like securities, the digital tokens can be traded on a secondary market.

By tokenizing assets — especially private securities or illiquid assets such as fine art — these assets can be traded in a wider market of traders, thus increasing liquidity and unlocking the true value of an asset using the efficiency of a fair and transparent market. Digital token transactions are completed using smart contracts (which use pre-defined parameters to trigger events). This can lower transaction costs through automation and lead to faster trade execution.

Each token has the holder's rights and legal responsibilities embedded directly onto the token. This constitutes an immutable record of ownership. Since tokens are also divisible, investors can buy small percentages of the underlying assets. This opens the opportunity to a wider market of investors and would thus increase liquidity.

The ability of even retail investors to own small percentages of, say, a building will usher in a new way to approach wealth management and promote personalization and customization of investments along ethical and environmental lines.

Tokenization could unlock trillions of dollars currently held in illiquid assets. This token-based economy and decentralized financial system will require all market participants to rethink how they transact, store, tax and regulate in a tokenized world.



Conclusion

As the market moves further into the ‘real-time’ paradigm, the Treasury function will need to keep pace with this acceleration from a monitoring and funding point of view to ensure that an organization is able to deliver on its obligations and understands the pools of funds available to it and the associated cash-flows.

Alongside this activity, liquidity risk calculations will need to be available in a more timely and accurate manner. It will no longer be enough to wait for overnight processing and batch runs to get the data feeds from upstream systems. Liquidity ratios and reporting based on stale data and figures will no longer be acceptable to regulators – institutions will need to be able to demonstrate an ability to calculate up-to-date ratios at any time.

The enabler for much of this capability will be improved technology. Accurate, real-time data feeds will allow treasurers and risk managers to obtain a view on an organization’s positions, obligations, funding ladders and cashflows; and when these feeds are combined with intelligent automation and analytics, the liquidity risk function will truly be able to report on current exposures and plan for any future events.

While fintechs and technological innovations such as DLT and tokenization promise changes in the future, an organization’s liquidity risk function should already be taking its first steps up the podium by understanding all available sources of collateral and funding available while ensuring that real-time valuations and movements are available via a risk dashboard. The ability for real-time calculation and monitoring of the liquidity ratios, using this data, should become the norm. By moving away from T+1 monitoring and reporting, regulators are already overseeing real-time payments and settlement, and they will expect the risk functions to follow suit.

ABOUT EPAM SYSTEMS

Since 1993, EPAM Systems, Inc. (NYSE: EPAM), has leveraged its core engineering expertise to become a leading global product development and digital platform engineering services company. Through its 'Engineering DNA' and innovative strategy, consulting, and design capabilities, EPAM works in collaboration with its customers to deliver innovative solutions that turn complex business challenges into real business opportunities. EPAM's global teams serve customers in over 25 countries across North America, Europe, Asia and Australia. EPAM is a recognized market leader among independent research agencies and was ranked #8 in FORBES 25 Fastest Growing Public Tech Companies, as a top information technology services company on FORTUNE'S 100 Fastest Growing Companies, and as a top UK Digital Design & Build Agency. Learn more at www.epam.com and follow us on Twitter @EPAMSYSTEMS and LinkedIn.

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