

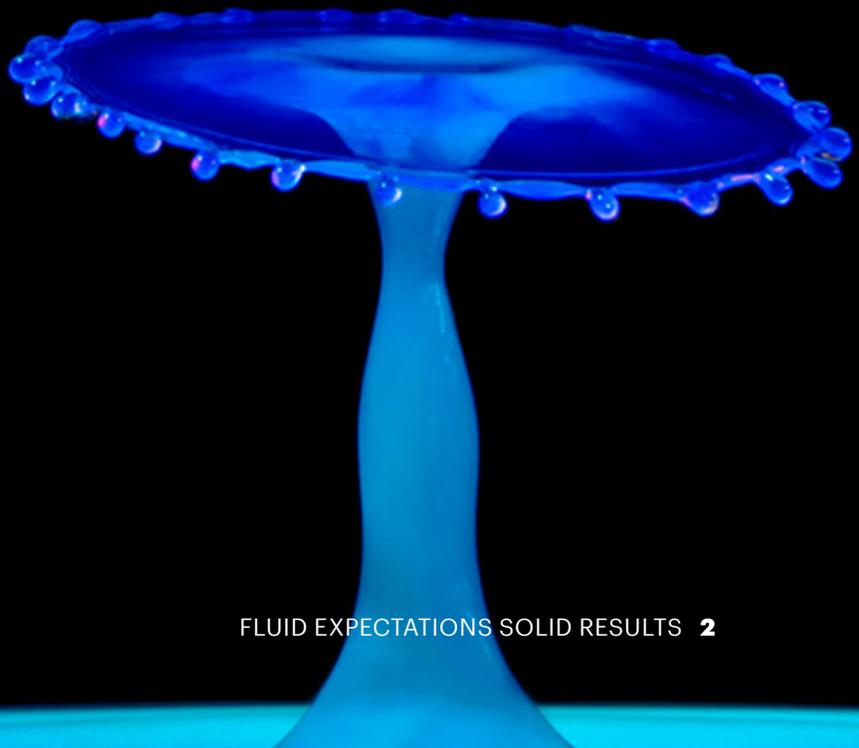
# FLUID EXPECTATIONS SOLID RESULTS

Improve performance and competitiveness  
through Intraday Liquidity Management



# Intraday Liquidity Management: Building a Strategic Capability for Improving Cashflow and Risk Decision-Making

Intraday Liquidity Management (ILM) is the management of an institution's capacity to meet payment and settlement commitments throughout the course of a business day. Emphasis on ILM has significantly increased since the 2008 global financial crisis and has continued with the publication of the Basel Committee on Banking Supervision (BCBS) 248 (Monitoring tools for Intraday Liquidity Management) in 2013.<sup>1</sup> In our view, mastering ILM can lead to enhanced operations, a leaner cost structure, improved risk mitigation and tangible data-driven insights—all contributing to a stronger competitive position.



# LIQUIDITY RISK – A BRIEF PRIMER

**Liquidity risk arises when an institution is unable to make its payment obligations without affecting its financial condition or operations. Should those obligations arise at different time intervals during the day, the institution is exposed to intraday liquidity risk.**

The introduction of the Liquidity Coverage Ratio (LCR)<sup>2</sup> and the Net Stable Funding Ratio (NSFR)<sup>3</sup> as part of Basel III targeted the stability of financial institutions' funding. The LCR requires banks to have sufficient high-quality assets to survive stressed conditions over a 30-day period, whereas NSFR requires banks to have a stable funding profile greater than 30 days and up to 3 months.

Typically banks use maturity ladders of cash flow projections as one of the tools to manage their liquidity risk profile. The cashflow projections are anchored and derived from the end-of-day balance sheet and other financial information. This effectively allows banks to model cash inflows and outflows over various time horizons.

ILM follows a similar approach, except funding surpluses and gaps are determined at shorter time intervals throughout the day (for example, every minute or every hour). Intraday liquidity and end-of-day (EoD) liquidity risk management overlap on the next business day. To the extent that any

stress scenarios can adversely impact intraday funding gaps, they may have to be considered for the same time intervals, along with other variables, for EoD liquidity risk management.

## **The Intraday Liquidity Management Problem**

While EoD liquidity risk is driven by the term and types of assets and liabilities created by front-office trading activity, intraday liquidity risk is driven by clearing and settlement arrangements, market practices and standards for the different trades. These are products that are specific to central bank clearing operations and financial market utilities.

Therefore, a bank requires different information to manage EoD liquidity risk versus intraday liquidity risk. EoD risk management is dependent on trade data from front-office systems and is sourced into risk management systems.

At the core of the bank's capability to manage intraday liquidity is the timely sourcing of relevant data and

information on trade economics and cash flow information, along with the exact time stamp of a given cash flow. An integrated ILM capability can help a bank monitor liquidity risk in real-time and respond accordingly.

With the movement to real-time settlements—at a minimum by the end of the value date<sup>4</sup>—intraday liquidity management has emerged as a key function to support cash settlement throughout the trading day. This recent shift and the drivers behind ILM’s importance as a management capability within a bank’s overall liquidity risk framework can be broadly categorized into three areas:

## **1. STRATEGIC AND OPERATIONAL**

Treasury is transitioning from what was traditionally a stand-alone function to one increasingly working in collaboration with other functions to help reduce the demands on financial resources. Real-time data, leading to the ability to manage liquidity risk in real-time, helps the business reduce cash and collateral buffers provisioned for business-as-usual operations and stressed scenarios. Additionally, increased functionality, through the ability to throttle outflows, can help reduce volatility of cash flows throughout the day.

## **2. FINANCIAL**

Cash and collateral held at financial market utilities (such as central banks and clearinghouses) should be improved so that a source of liquidity is not “trapped” where it is not needed. Sources of intraday liquidity should be available as and when required, rather than held centrally. This aspect includes management of intraday liquidity across legal entities, geographies and/or currencies.

## **3. REGULATORY REQUIREMENTS**

As part of a broad, but comprehensive, set of guiding principles for liquidity risk management published in 2008,<sup>5</sup> the BCBS emphasizes the importance of intraday liquidity management. Principle 8 requires banks to have an intraday, rather than an end-of-day view of liquidity. Four years later, the committee began publishing guidance on key indicators to measure intraday liquidity and consulted with banks in 2012,<sup>6</sup> and in 2013, BCBS required banks to report their intraday liquidity positions monthly. The requirement covers all aspects of intraday liquidity (such as sources and/or uses and start-of-day positions) and requires the application of specific stress scenarios to ILM.<sup>7</sup> Critically, this regulation enforces the need to store historical data.

In the UK, the recent Pillar 2 requirements from the Prudential Regulation Authority (PRA) require greater focus on liquidity risks, such as double duty of assets, not covered by the LCR and NSFR.<sup>8</sup>

# THE CASE FOR ILM

**A target operating model for intraday liquidity management should satisfy both operational and regulatory requirements over the long term. There should also be buy-in across functions and businesses to realize the benefits of an enhanced ILM framework.**

As seen in Figure 1, the liquidity management function should form an integrated part of an effective balance sheet and P&L framework, complementing existing capital management capabilities.<sup>9</sup>

Globally, banks and other financial institutions remain at varying levels of maturity in their ability to manage liquidity during the day. At the most basic level, institutions tend to apply a cash management approach to intraday liquidity with risk frameworks and limits not completely linked to intraday risk drivers. The result is that institutions often hold higher buffers and set limits that may not be completely synchronized with a risk view informed by transparency into the intraday liquidity risk drivers.

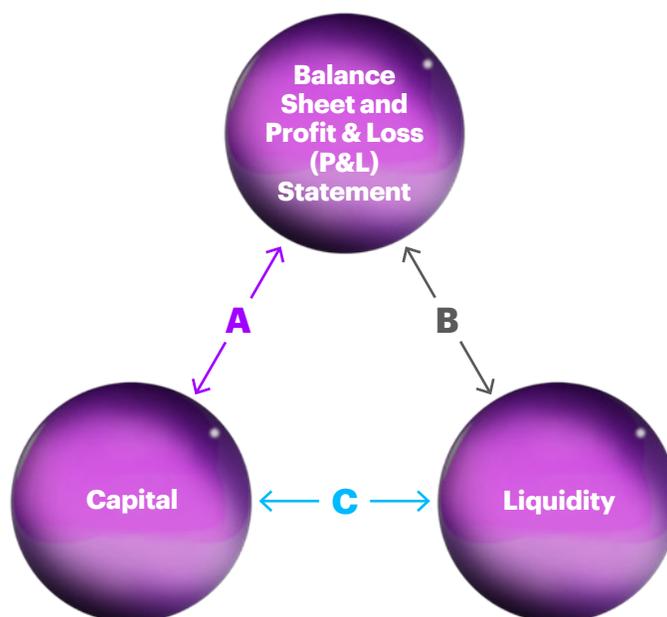
At the core of building ILM as a capability is a bank's skill in properly using and leveraging appropriate data that is connected and traceable across systems and functions. Establishing this capability should bring business benefits through enhanced operational capabilities, better decision-making, and tangible data-driven insights.

Our experience indicates that building a business case for ILM, one that is supported both by quantitative and by qualitative insights, requires a targeted and agile approach that can help create a complete picture of the materiality and drivers of liquidity usage. Isolating the root causes of liquidity usage as a first step can assist in determining the potential overall benefit.

Analysis of historical data over time (for example, over a period of one year or more), can determine whether there is predictability in the observed patterns and trends. In developing the overall business case for the bank, such an analysis can help reveal the size of the "ideal" cash buffers that would have been required during the day. This, in turn, may indicate how cash could be better used elsewhere in the bank.

Quantification of this benefit tends to vary depending on the typical materiality or volume of payments for a specific bank during the business day.

**Figure 1. Integral view of a bank's financial management**



## A

- Capital costs
- Consistent planning of capital (allocation) and balance sheet items
- Consideration of accounting principles (fair value vs. book value)
- Consideration of risk-bearing capacity
- Fungibility of capital, regulatory and accounting minimum requirements
- Risk-weighted assets enhancement
- Consideration and enhancement of key performance indicators (KPIs) such as return on investment (RoI) and return on equity (RoE)
- Rating enhancement
- Strengthening of capital quality and capital quantity (e.g. common equity tier)

## B

- Opportunity costs/losses due to liquidity requirements
- Transfer pricing of liquidity costs to liquidity providers and consumers
- Enhancement of trapped liquidity (due to local liquidity requirements)
- Consideration of collaterals for funding as well as for KPI calculation (e.g. LCR)
- Consideration of maturity transformation result

## C

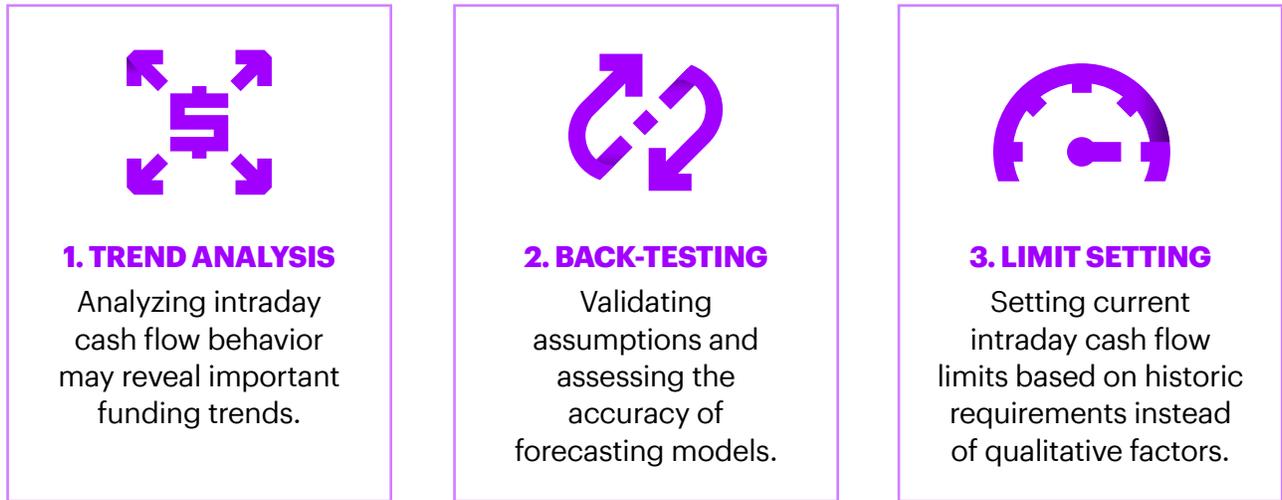
- Improvement of funding and leverage structure (e.g. leverage ratio)
- Intragroup transactions for capital and liquidity transfers
- Asset and liability management
- Alignment of capital and liquidity planning with new business assumptions and business strategy

Source: Liquidity Coverage Ratio: Implications and a Pragmatic Approach to Implementation, Accenture 2015

As seen in Figure 2 below, historical analysis creates the foundation upon which the use of machine learning can be expanded for predictive analytics and forecasting, ultimately allowing forecasting with a strong level of confidence.

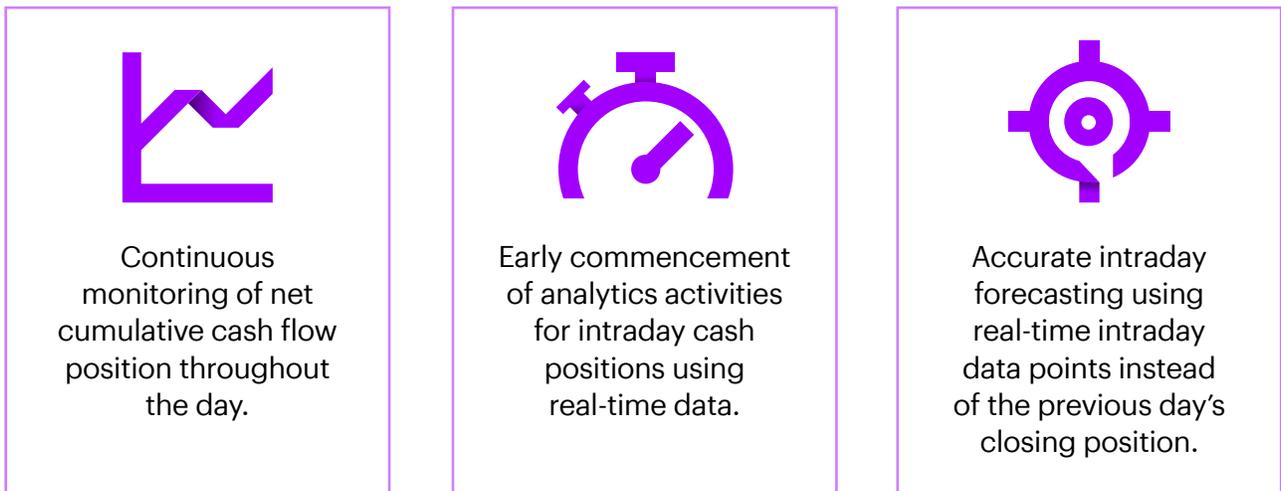
Figure 3 illustrates how real-time intraday liquidity management places banks and financial institutions in a competitive position and imparts multiple benefits.

**Figure 2. Benefits of historic intraday liquidity analysis and reporting**



Source: Accenture, January 2019

**Figure 3. Benefits of real-time intraday liquidity reporting**



Source: Accenture, January 2019

# THE ILM TRANSFORMATION JOURNEY

The expected timescale of the journey to fully functional ILM is heavily dependent on the maturity level of a bank's current functions and processes. In broad terms, the end-to-end transformation process can be broken down into three steps.

## 1. Current State Liquidity Management Assessment and Volatility Root Cause Identification

The first step in this process is a gap analysis to identify and define the different maturity levels of the ILM applicable functions and business processes. As shown in Figure 4, this would identify what processes are currently performed by the bank and what new processes and functionality should be included as part of the target state.

The ability to identify the upstream sources of intraday liquidity volatility is inherently reliant on clarity and quality of data. We recommend that banks start with data analysis before beginning work to implement an ILM target operating model and framework. An upfront understanding of the data and architecture applicable to ILM can deliver benefits including:

1. Facilitating the identification and understanding of the drivers of liquidity usage today.
2. Permitting an understanding and comprehensive view of the data and information architecture for ILM in current state.
3. Providing insight into current underlying drivers of liquidity usage, supporting the development of a suitable pricing and charging methodology, including identifying the root causes of intraday liquidity volatility across all entities. For example, the analysis could help identify that the issue might be operational due to the inability to throttle payments.
4. Contributing to the design of an ILM target operating model.

**Figure 4. Conventional target ILM functional model**

Business Units	Payments	Cash Management	Treasury Trading		Treasury		Treasury Control	Risk and Compliance
<b>1.1</b> Deterministic Cash Flow Projections	<b>2.1</b> Identify, Release Time Critical Payments	<b>3.1</b> Actual vs Expected Analysis	<b>4.1</b> Plan Intraday Funding Between Entities	<b>4.2</b> Execution of Funding Transactions	<b>5.1</b> Operational Buffer Requirements	<b>5.2</b> Monitor, Approve Intraday Liquidity Requirements	<b>6.1</b> Cash Ladder Verification	<b>7.1</b> Internal Credit Lines Monitoring
<b>1.2</b> Non-Deterministic Cash Flow Projections	<b>2.2</b> Payments Scheduling	<b>3.2</b> Identify Start of Day Positions	<b>4.3</b> Manage Cash Buffers	<b>4.4</b> Manage Collateral Pools	<b>5.3</b> Regulatory Buffer Requirements	<b>5.4</b> ILM Framework	<b>6.2</b> Model Governance	<b>7.2</b> Counterparty Risk Monitoring
<b>1.3</b> EOD Cash Projections	<b>2.3</b> Payments Netting & Un-netting	<b>3.3</b> Monitor Credit Line Usage at Nostros	<b>4.5</b> Monitor Limits & Targets	<b>4.6</b> Monitor Credit Lines and Financial Market Utility (FMU)	<b>5.5</b> ILM Pricing	<b>5.6</b> ILM Limits & Targets	<b>6.3</b> Approvals, Limits, Framework Governance	<b>7.3</b> Compliance Oversight
	<b>2.4</b> Payments Matching	<b>3.4</b> Monitor Self-Clearing Positions	<b>4.7</b> EOD Funding & Squaring	<b>4.8</b> Cash Ladder Monitoring	<b>5.7</b> ILM Stress Testing	<b>5.8</b> ILM Behavior Assumptions		
	<b>2.5</b> Payments Throttling	<b>3.5</b> Monitor Nostro Clearing Positions			<b>5.9</b> ILM Code of Federal Regulations & Recovery & Resolution Planning			
	<b>2.6</b> Process Self-Clearing Throughput	<b>3.6</b> Actual vs. Expected Variance						
	<b>2.7</b> Process External Clearing Throughput							
Data								
Internal and External Reporting								
External Nostro Management								

■ "EOD" Component      ■ "Intraday" Component

Source: Accenture, January 2019

## 2. Business and Data Architecture Operating Model Design

The outcomes derived from this first step can support the formation of the target ILM operating model and the data architecture design. The objective, as seen in Figure 5 below, is to incorporate these outcomes into the existing liquidity management framework.

## 3. Group-wide Implementation

The final step is to implement systems and processes across functions and entities. New roles and responsibilities across functions may take time to deploy due to the need to train and hire new resources. In the long term, the introduction of new tools to manage intraday liquidity risk, such as the ability to throttle payments and acknowledge early warning indicators for potential liquidity usage, can limit breaches and should result in material benefits for a bank.

Figure 5. The six operational elements of intraday liquidity management



Source: Principles for Sound Liquidity Risk Management and Supervision, Basel Committee on Banking Supervision, September 2008.

# THE ROLE OF DATA IN ILM

The principal challenge of ILM is the development and implementation of a data and IT architecture to facilitate the necessary reporting and operational capabilities.

As shown in Figure 6, fragmented systems across functions and businesses contribute to the difficulty that banks often have in sourcing the appropriate data and information that is ultimately required.

## The Increasing Importance of Data

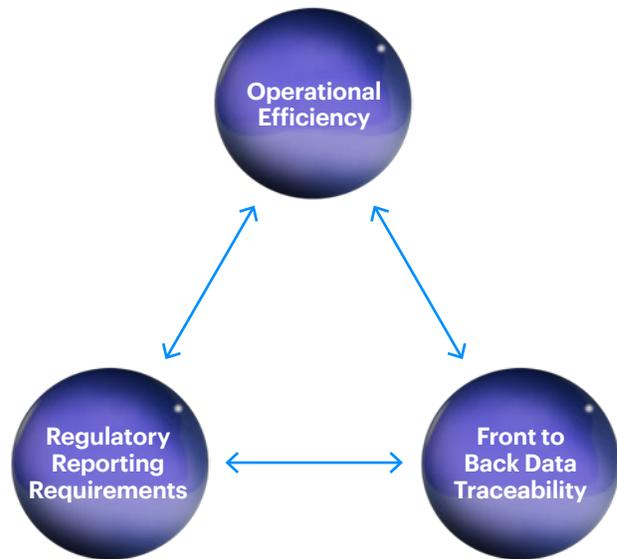
To operate effectively in the digital era, a bank should be able to consume both structured and unstructured data from multiple sources to depict liquidity usage across businesses, across regional entities, or across a combination of the two. This functionality should be obtained while adhering to the compliance requirements of local regulators.

## Data and IT Challenges

Along with the broad data, IT and architectural challenges summarized in Figure 7, there are additional elements to be considered. For example, many banks and financial entities are split across legal entities and regions, with each legal entity or region subject to separate internal policies and external compliance requirements set by local regulators. In this context, banks may be prohibited from sending data located

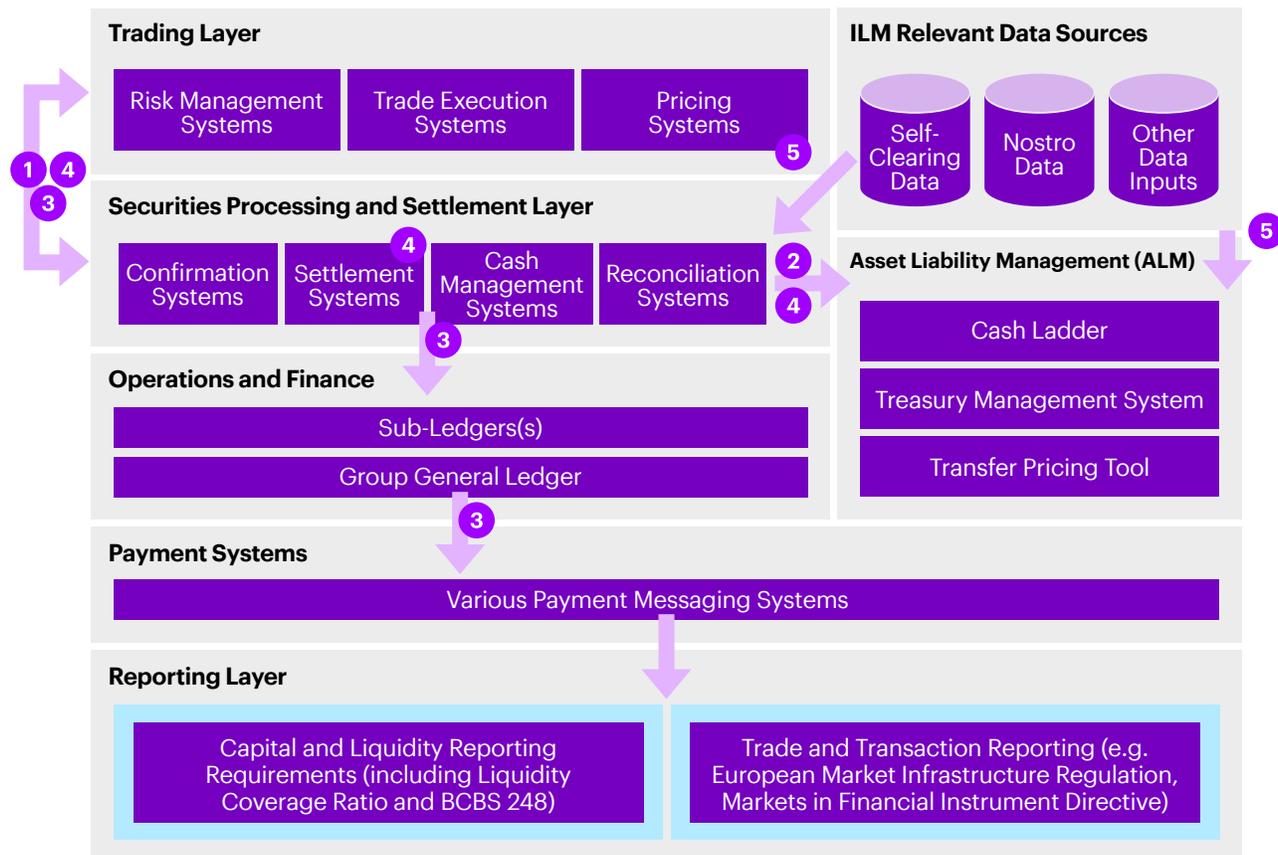
in one region to another region, or from consuming data from one region in another region. Another factor is the consumption of confidential data—specifically, data that clearly identifies a customer—and thus prevents its usage by operational functions within a bank.

Figure 6. Key data characteristics within an ILM capability



Source: Accenture, January 2019

**Figure 7. Example of a simplified front to back data architecture and IT, data challenges and choke points**



## IT and Data: Challenges and Choke Points

- 1 Multiple upstream systems, with multiple formats, significant volumes of data, and varying levels of data quality make it difficult to determine drivers of intraday liquidity volatility at a group or business area level.
- 2 Poor flow of settlement information, including up to date notification of failed settlements, can lead to reduced certainty of funding requirements.
- 3 Difficulty mapping internal cash accounts to upstream/incoming flow from trade capture and risk management systems. In some instances, internal cash accounts can contain transactions from multiple business areas.
- 4 Straight through processing throughout the front to back flow can conflict with ILM requirements. For example, usage of real-time gross settlements (RTGS) and delivery versus payment (DVP) systems do not allow for throttling, netting and scheduling capabilities for managing liquidity intraday.
- 5 Poor information flow to self-clearing and nostro accounts can reduce the efficiency of ILM and affect the reliability of funding requirements.

Source: Accenture, January 2019

# TECHNOLOGY DRIVERS FOR ILM

The business case for the development of proper real-time information and forecasting capabilities can be strengthened when presented alongside the opportunity to leverage new technologies such artificial intelligence (AI), big data and blockchain.

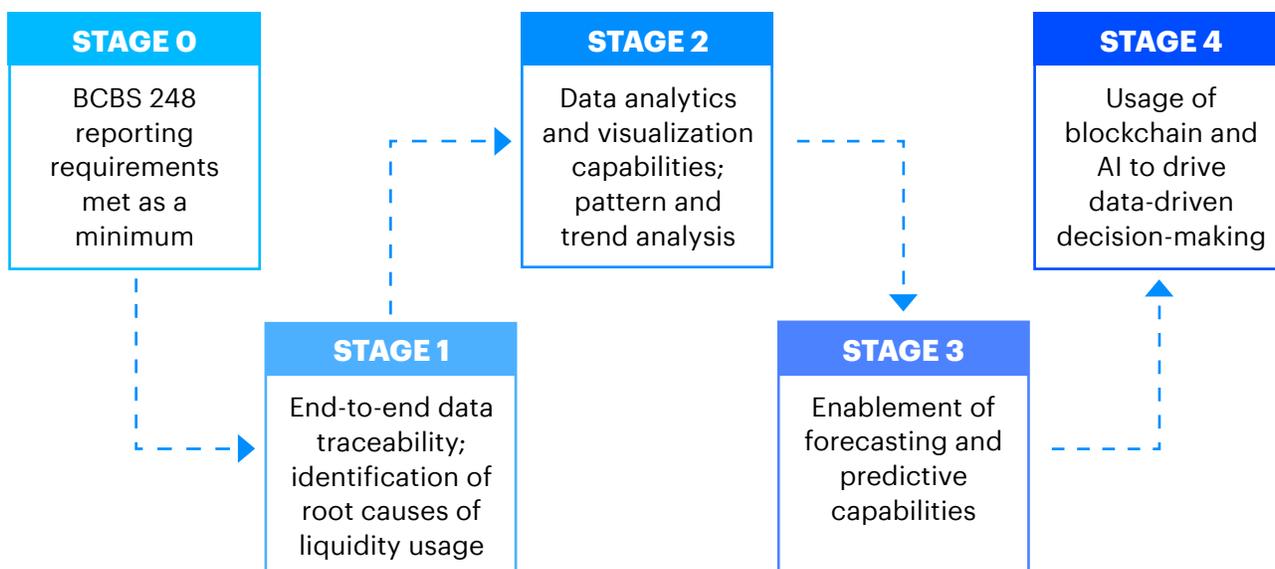
A staged approach (such as that illustrated in Figure 8) that is agile, iterative and scalable is essential to an effective ILM effort.

Data storage and repository capabilities facilitate both internal and external reporting, supporting decision-making and key functional processes. At a high level, BCBS reporting requirements can

be achieved through the aggregation of cash inflows and outflows stored in a data warehouse at the enterprise level.

It is important to consider the underlying drivers of intraday liquidity for a bank. Understanding these drivers serves to support the business case for ILM. The objective here is to facilitate the analysis of historical liquidity usage for the bank,

Figure 8. Staged approach to leveraging new technologies in ILM



Source: Accenture, January 2019

where the aggregation of data on a centralized platform from risk management, settlement, payment and other applicable systems allows traceability of transactions from execution through settlement.

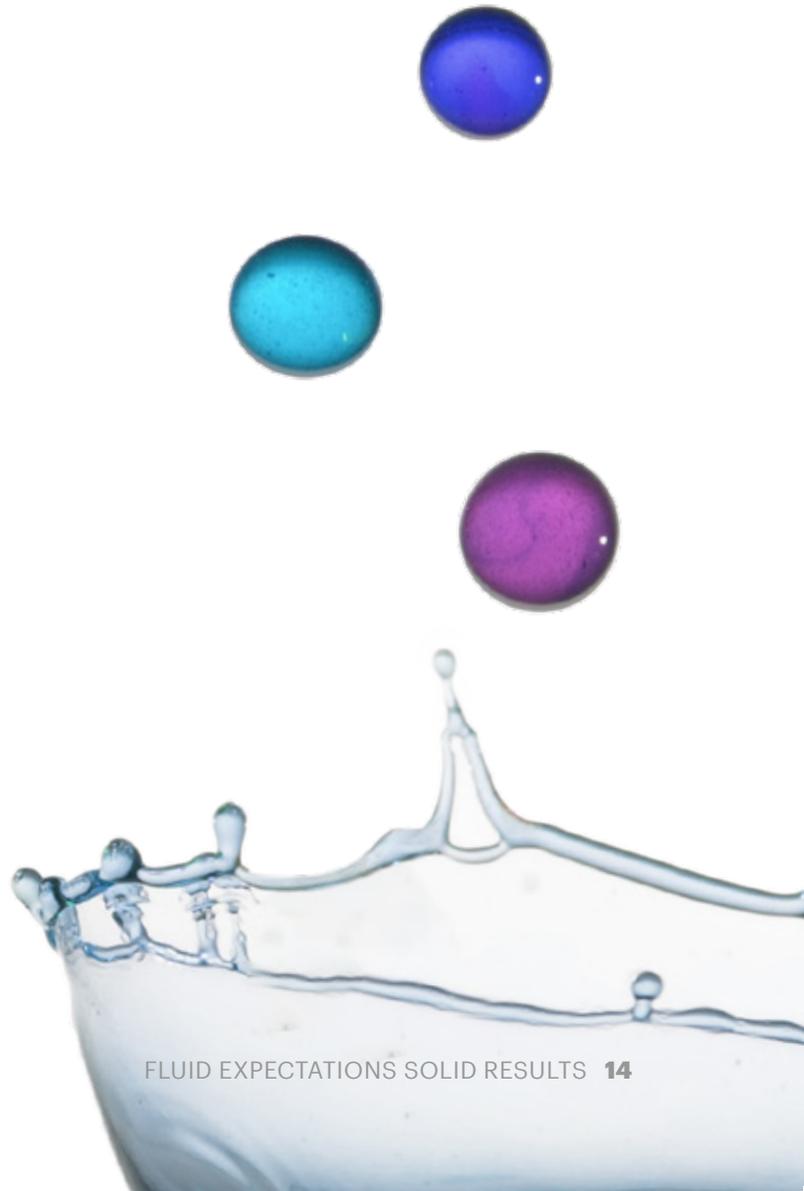
New technologies, such as big data coupled with machine learning, can facilitate the pattern and trend analysis needed to accomplish this. Not all settlement messages are of the same type or contain the same information, but deployment of big data technologies can transform, merge, normalize and process internal and external trade and settlement data. This data can then be streamed through data streaming tools to provide a real-time dashboard as shown in Figures 9 and 10.

In combination with analytics tools to support data-driven decision-making, new technologies should help bring the standard of intraday management into the overarching framework of liquidity risk management for the firm. Visibility of payment flows allows limit setting through upper or lower bound indicators.

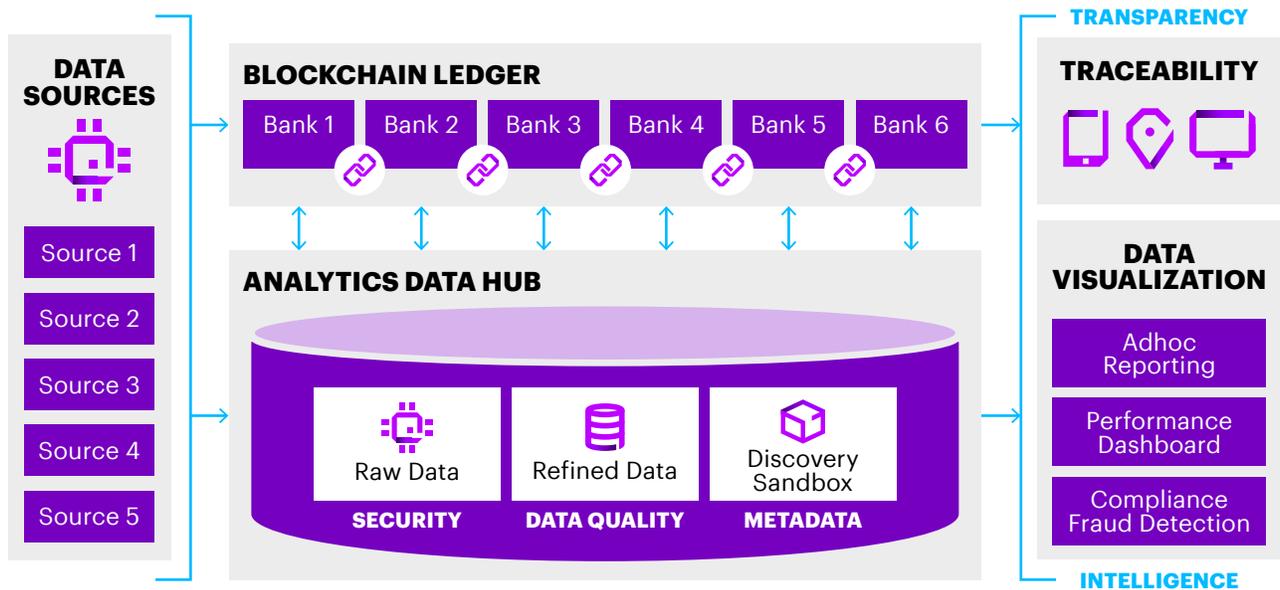
**A staged approach that is agile, iterative and scalable is essential to an effective ILM effort.**

However, greater opportunities lie in moving away from a backward-looking limit, instead adopting more real-time and forward-looking indicators.

Machine learning, for example, can be used to allow the business to understand common occurrences versus anomalies as seen in the data and business areas' contributions to the overall liquidity profile of a bank. Alternatively, as shown in Figure 10, understanding typical patterns of payment flows, and the sources of these flows, can allow operations to determine the criticality of the payment and subsequently move it to later in the day, when perhaps there is less stress on liquidity.



**Figure 9. Example of the interplay of an analytic data hub and data visualization capability**



Source: Accenture, January 2019

**Figure 10. ILM analytics dashboard stream**

- 1** Actual balances, expected EOD balances, and expected T+1 balances against the preset limits and thresholds. This allows the treasury function to take funding actions and move funds across regions, legal entities and venues.
- 2** Cash ladder or scheduled payments such that either through machine learning, manual intervention or robots, certain types of payments can be stopped and released later in the day (i.e. throttled).

Source: Accenture, January 2019

Further out on the technology horizon, blockchain has the potential to add substantial value and reduce risk in liquidity management, especially ILM. Given regulatory requirements, the setup of a private blockchain on top of legacy internal data storage applications could accelerate reporting, reduce complexity and remove the need for internal reconciliations.

In the scenario shown in Figure 11, Distributed Ledger Technology (DLT) removes the need for a central operator in an interbank RTGS scenario, where the settlement process and the ledger are distributed across multiple banks. DLT could also be used to overcome

front to back traceability internally, allowing the use of the same data across different internal functions. In a recent project (called “UBIN”) with the Money Authority of Singapore, Accenture has shown how liquidity gridlocks can be solved and mutual transfers of liquidity among participants of an ecosystem (in this case 15 banks and the regulator) can be improved via blockchain technology over different platforms.<sup>10</sup>

**Figure 11. Transition from RTGS with a central operator to a decentralized RTGS**



Source: Accenture, January 2019

# CONCLUSION

**The journey to integrating intraday liquidity management capabilities into a bank's existing risk management function remains a challenge for banks globally. Fully realizing the benefits of ILM requires significant effort, including the development of a robust business case.**

A major consequence of intraday liquidity risk exposure is the reduced capacity to meet intraday outflows. Therefore, the need to maintain a high-quality liquid assets (HQLA) reserve commensurate to the intraday liquidity risk exposures in both business as usual (BAU) and times of stress allows payment obligations to be met efficiently. Through understanding historical liquidity patterns, the amount of HQLA required to cover BAU and stress intraday risk exposure can be deduced, and the appropriate volume of buffer can be held for this risk. Banks that can fully utilize their data across all appropriate sources in real-time will be well positioned to ultimately reduce the opportunity cost of holding large cash and collateral buffers for both BAU and stress pools.

Mastery of data can bring clarity to the current and future state of technology architecture underpinning the ILM capabilities.

Overall, leveraging new technologies, such as big data, AI, and even blockchain in the long term is the key to building and capturing the full value of the ILM capability and creating real and tangible benefits for the business.



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