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ENTERPRISE LIQUIDITY MANAGEMENT

A NEW ECOSYSTEM FOR
CORPORATE CHIEF FINANCIAL
OFFICERS

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ENTERPRISE LIQUIDITY MANAGEMENT

a new ecosystem for corporate chief financial officers

EXECUTIVE SUMMARY

Enterprise Liquidity Management (ELM) has emerged as a new practice area within the CFO's and treasury professional's remit to manage and execute the entire lifecycle of corporate liquidity—a specialized capability traditional Treasury Management Systems and ERPs are not able to deliver. The ELM concept a purpose-built, dedicated Enterprise Liquidity Platform has emerged as the software solution suite required to do so.

Key takeaways from the study include the following:

- From a corporate finance perspective, liquidity is the strategic resource necessary to deliver value and growth under any circumstance, including but not limited to maintaining solvency.
- Enterprise Liquidity Management provides diagnostic decision support intelligence on all liquidity transactions, then enables indispensable actionability and operational interconnectivity between internal and external systems.
- ELM is powered by the Enterprise Liquidity Platform, a fully integrated software suite (e.g., Treasury and Risk Management, a comprehensive Payments Hub, and Working Capital Finance solution sets) all of which are connected, integrated, and networked through Open APIs that provide indispensable, secure machine-to-machine automation between software applications.
- The result is that all cash and liquidity-related data and process workflows within the organization and its external finance ecosystem are unified into a “Golden Source” of intelligence and, then within the same system, made actionable as a strategic decision-making support system.
- Managing cash and liquidity across large enterprise ecosystems demands the support of a dedicated infrastructure engineered to overcome one of the most significant burdens to corporate finance: the proliferation of disjointed software applications.
- An ELM platform differentiates from traditional treasury management systems, extending visibility, security, and actionability across all of finance internally and externally beyond cash positioning and forecasting: the treasurer can understand multiple liquidity management scenarios and—directly from the platform—move and optimize liquidity to or from the right location at the right time.

- The goal of this paper is to inform the market that ELM has become a strategic practice area for CFOs, Treasurers, and other corporate finance leaders who understand the newfound urgency to leverage new technologies and techniques to capture opportunities and eliminate risks.

INTRODUCTION

Liquidity is the strategic resource necessary to deliver value and growth under any circumstance, including but not limited to maintaining solvency. The speed and complexities required of corporate finance leaders to manage cash and liquidity in real-time, however, and especially during market shocks such as the 2008 and Covid-19 crises, has surpassed the ability of humans to build better and better spreadsheets. Even the largest ERP and treasury management system providers struggle to deliver value in the new world where comprehensive, cross-functional liquidity management has become a board-level mandate.

Aite-Novarica Group's view is that emerging leaders in the space are thinking differently and developing new technologies to enable liquidity to be managed holistically as a new practice area within the CFOs purview.

While from a conventional liquidity management standpoint almost every global and regional bank has the technology in place in the form of a web-banking portal, enterprise users expect to consume decision support data through transaction banking cockpits and portals developed according to standard business process flows and practices. These cockpits must be interoperable and interchangeable. Finance and treasury executives and managers don't want any longer multiple web-banking user interfaces that require system experts to cut and paste highly-valuable financial data into "software soups". Fintech players must develop and present technology solutions and software applications that support their corporate clients' internal, strategic liquidity management objectives and, at the same time, allow the enterprise to meet external client needs.

This thought leadership paper introduces the concept of enterprise liquidity management as a formalized practice area for corporate finance; it further analyzes the technological, process architecture, and execution workflow capabilities required to make it happen. Following, this paper develops the concept that corporations of all sizes and complexity aim to have all their subsidiaries on a central repository for cash and liquidity-related operations rather than on individual web-banking portals. The concept is similar to the idea of a self-contained infrastructure to manage liquidity, as if it were an "ERP for liquidity management". The paper introduces Enterprise Liquidity Management as a new financial technology category.

METHODOLOGY

This thought leadership paper is based on desktop analysis and extensive examinations of various solutions used by treasurers to manage corporate liquidity. Using the life cycle steps of liquidity management operations as a benchmark, Aite-Novarica Group's groundwork also included analyzing the limitations of currently available solutions.

To validate the conclusions of the research, Aite-Novarica Group will refer to the findings of an analysis conducted on Kyriba's Enterprise Liquidity Platform and on its impact on the corporate organization culture, business processes, IT performance, and its alignment with management's goals¹.

¹ Kyriba, <https://www.kyriba.com/products/capabilities/liquidity-data-hub/> accessed august 10, 2021.

THE LIQUIDITY MANAGEMENT LIFECYCLE AND THE NEED TO UNIFY FRAGMENTED SYSTEMS

Enterprise liquidity is the lifeblood of every business of any size. Considering the numerous definitions used to describe it, liquidity confirms to be a strategic resource for corporate chief finance officers (CFOs) to deliver value and growth under any circumstances including but not limited to insolvency. Enterprise executives know that information technology permeates business operations and is the most powerful tool for change. Corporate finance business units, however, appear not to be the most technically mature in the organization, so only enlightened corporate CFOs are at the forefront of corporate finance digitization to transform the way they leverage cash and liquidity to build resiliency, earn growth, and generate strategic value to customers, shareholders, and boards.

If resiliency, growth, and value are the targets for corporate finance, the task is now for the CFO and his teams to practically meet such targets. To his/her rescue comes liquidity management: in times of crisis a proper management of the company sources and destinations of liquidity contributes to make the organization more resilient. At the same time the ability to manage corporate liquidity not only helps the company to survive but also sustains the value of the company through growth: value is generated when the company has proper funding to distribute dividends, buy back shares, and grow by investing in other avenues and controlling capital expenditures.

Liquidity is the organization's lifeblood, irrigating all internal functions and lines of business; as blood needs to be enriched with oxygen, liquidity needs to be enhanced by a complex external ecosystem, including banks, financial data suppliers and market places, and fintech players.

Liquidity is also typically managed along different time dimensions. In long-term vision, CFOs grow and protect cash availability by operating financial transactions with multiple settlements. The most iconic of such transaction is drawing down a debt for cash. This triggers the long-term need to repay the debt at the end of maturity up until the final settlement. Another transaction with long-term financial repercussion is a hedge transaction that will take the company to enter in a swap with multiple settlements, maybe for the next two or three years. On the short-term execution, the corporate treasury office generates or consumes liquidity with cash transactions. Examples of cash transactions are one-off payments to a supplier, an employee, or an FX spot transaction.

Between long-term financial transactions and short-term cash operations should stand strategic planning. Financial Planning and analysis (FP&A) that the CFO uses to understand what will be the budget for next rarely translates in terms of liquidity requirements and usually lacks critical data to ensure there is enough money: Should it be borrowed? How to hedge the risk? The budget fixed at the beginning of the year will inevitably move as time goes by. The necessary adjustments swing the pendulum from the very short-term treasury operations to the long-term forecasting of the outcoming liquidity. A bank that negotiates with a CFO will always ask the company's liquidity plan for the next year, sometimes even several years ahead depending on the market segment the company operates in. This demands the treasury department and financial manager of each subsidiary to integrate their figures, usually on a monthly basis, into the centralized corporate FP&A view that gives the CFO the most updated and reliable liquidity profile of the company.

ENTERPRISE LIQUIDITY MANAGEMENT – A NEW PRACTICE AREA IN THE CFO SUITE

Beyond closing accounts, the CFO's constant focus is- hence- to know where liquidity comes from and where it can be allocated, and, with that intelligence, ensure its protection (from fraud and over-exposure) throughout. This requires more than a mindset shift towards prioritizing the strategic value of liquidity--it requires a purpose-built layer of software to make it happen. We believe this combination constitutes the design and deployment of a new Practice Area.

To start, Aite-Novarica Group suggests to measure the value of liquidity beyond the ordinary 'cash and cash equivalents' balance sheet item. This indicator may in fact be deceptive if not deperuted from the component of the uncommitted drawn facilities. There is a possible risk that the lender may ask for the repayment anytime, and this scenario will vaporize the value of the borrower's assets. On the other side, the value of cash and cash equivalents must be increased for the total value of the undrawn committed facilities the company can still access. These represent reliable and immediately accessible liquidity because the time to draw down such facilities in general is very fast, usually in the order of a couple of days.

The example of the metric to gauge the real potential value of available liquidity is yet one of the many key capabilities a CFO should have available in the ELM Practice Area, a decision support system. At the back of these capabilities the CFO and the treasurer need a system that unifies the data scattered across a landscape of IT systems totally fragmented, the more disjointed the larger and complex the organization. Historically,

the CFO suite has been an installed on-premise (almost monolithic) ERP sometimes combined with an equally monolithic treasury management system (TMS), now morphing into a composed set of a core solution (e.g., SAP, Oracle) and connected mission critical best-of-breed solutions such as payroll and benefits, budgeting and planning, order-to-cash, procure-to-pay, and risk management. The most recent trend sees companies shifting their IT infrastructure to the cloud with multiple objectives: constant innovation, business continuity for critical functions, or real-time flow of information while lowering the total cost of ownership of the underlying software and hardware infrastructure.

A NEW CATEGORY: ELM

Enterprise users expect to consume decision support data through interoperable and interchangeable cockpits and portals, developed according to standard business process flows and practices, typically provided by banks – or, through monolithic ERPs combined with an ever-increasing portfolio of specialized point solutions. Today, as we see the emergence of “composable” ERPs capable of providing value beyond simply recording transactions, there remains a major void in the marketplace.

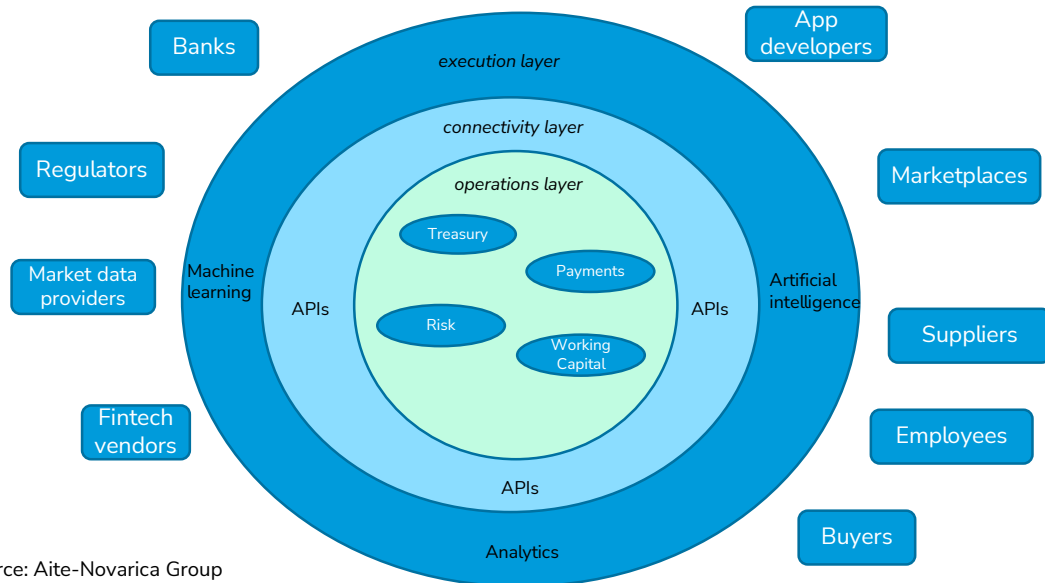
Corporations aim to have all their subsidiaries on a central repository for cash and liquidity-related operations rather than on individual and separated web-banking portals. The concept is similar to a self-contained infrastructure to manage liquidity and introduces to a new financial technology category: Enterprise Liquidity Management.

Treasury has evolved from account management staff duties (e.g., reconciling cash every morning and putting cash in the right accounts) to a more strategic, cross-functional role, so corporate finance decision makers are receptive to ELM as the suite that enables companies with long-term vision to work with multiple liquidity structures and make autonomous and simultaneous decisions across use cases, particularly treasury. The next sections will provide detailed descriptions of the modules that constitute the ELM construct. At this point is important to capture the possible ELM use cases.

As an example, the ELM construct allows the corporate user to drawdown from a credit line directly from their liquidity cockpit. Or, to recommend the corporate decision maker at what point does it make sense to go back to market and refinance. This makes it possible to look at external debt in a completely new way. Users don't want just to model cash, they want to make sure they can model all their cash flow deadlines. The ELM tools model and not just showcase. They are part of a set of open and scalable intelligent systems to come to decisions.

From a conceptual standpoint, the ELM is a platform composed of three layers (Figure 1).

FIGURE 1: THE THREE LAYERS OF THE ELM PLATFORM



The first- the operations layer- groups the application modules to run treasury, payments, risk management, and working capital optimization. The connectivity layer is the second layer- and the *raison d'être* of ELM- that takes a standalone suite of rich software features to a system open to the world, thanks to the development and use of connectivity APIs. The composed infrastructure of two or three large ERPs that most large enterprises have today generates a portfolio of point solutions that can be best connected through an API architecture. This architecture enables not just the visibility of data, but the unification of that data, enabling the user to leverage AI for decision support. The third layer- the execution layer- makes it possible to analyze and understand the data exchanged between the connected systems, take the best decision using business intelligence capabilities, and leverage machine learning and artificial intelligence (AI) to turn information into decisions and- this is key- to execute directly from the corporate treasurer's enterprise system.

WHAT IS THE ENTERPRISE LIQUIDITY PLATFORM?

Moving from the concept of ELM to practice, the enterprise liquidity platform (ELP) is a layer of software derived from a single source code from which the corporate user not only has visibility of all the company's liquidity positions- wherever they are distributed- but also the base from which action can be taken. ELM's ELP is- in essence- an actionable platform.

The first thing an ELM system brings to the corporate user is the capacity to unify the cash and liquidity processes that tend to be very specific, and sensitive because they involve money going inside and outside the company. But modern finance operators need not only to visualize the sources and destinations of liquidity they are responsible for. Most importantly, decision and action must follow and immediately executed to move that liquidity where it's most needed.

Since technology is the foremost lever to catalyze meaningful value from digital transformation and process innovation, senior finance executives must find in technology the solution to resolve these needs and a key differentiator to grow and add value to the company. The resolving technology structure must have a foundation in the software applications that run key finance practice areas (e.g., cash management, payments, risk management, hedging) and grow on top of these a set of features that evolve the software suite from a treasury workstation to an ELP that aggregates financial partners, fintech developers, suppliers, customers, and all value chain constituents that don't have the necessary skills, don't have the resources, and don't have the time to build this technology.

By connecting systems, applications and data, and unifying best-in-class treasury, risk management, payments and working capital solutions with external partners, including global banks, market data providers, trading platforms and third-party applications, the ELP strengthens an organization's capability to improve its long-term financial and short-term cash performance. The ELM platform has components to build a single store of all daily cash transactions performed on any client bank account, centralizing ERP, TMS, and bank connectivity, and building an enterprise-wide, cash-centric view that provides the corporate user with a complete visibility into global cash and liquidity assets.

CONNECTIVITY

The foundation of an ELP is its connectivity network, with strong emphasis on the API backbone that knits all the modules of the operations layer with the systems of external business partners, banks, suppliers, fintech developers, marketplace providers, and data suppliers. Corporate users can work with the most exotic banks, and this is a very important factor because companies realize that the capabilities offered by their ERP, or TMS, to connect with banks are extremely cumbersome to use, while through the ELM connectivity layer the roll-out and time-to-market are much faster.

In markets with the presence of incumbent ERP vendors that have invested heavily in their treasury suites, it is difficult for a customer to replace that component. However corporate users realize that the whole connectivity channel and conversion of formats required to link with multiple banks is very heavy to manage on the ERP, so they prefer to resort to a third party to speed up those connections.

The first reason a treasurer looks for the best way to connect the enterprise systems with banks is to get bank statements and manage payments. This, inevitably, moves the attention from running the basic cash outflow (and inflow) transactions to the wider end-to-end payment process, up to evaluating the relationship with suppliers and customers and how flows- especially outbound- are managed. There are, in fact, two ways to make payments: the first way is via the ERP that generates the payment file with the format required by the receiving bank. The treasurer's role in this case is limited to managing the payment routing using the ERP connectivity module and validate the workflows of the outgoing flows. The treasurer does not intervene on the content of the file because this has been previously prepared in the ERP. The ERP, however, does not have the same agility as the ELM platform's connectivity layer to generate the format, and therefore for many banks it fails to do so, or requires a specific development with investments of resources and time. The second way to make a payment is through the ELP, capable to take any type of file and format it to make it readable to the each of the banking connected parties. Streamlined connectivity between internal systems and third parties is a prerequisite to truly digitalize , as long as monitoring through a global cockpit is a prerequisite to properly operate such sensitive digitalized operations.

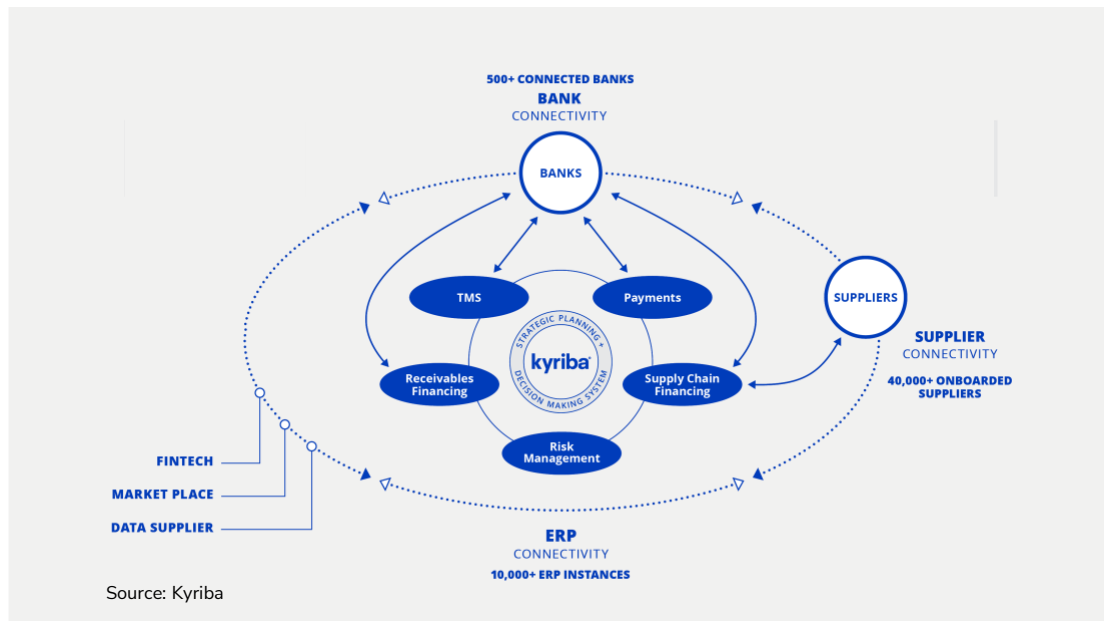
Corporate treasurers have daily interactions with their business and banking partners, and from a liquidity management perspective the ecosystem with the banks is the first that must be connected. Only with secure and robust connectivity from their functional systems (e.g. ERP, TMS, accounting package) to their financial institutions, business users access the latest and most accurate liquidity information that empowers decision making. Open banking APIs provide the technical solution. Then comes the community of the ELM provider's strategic partners, the suppliers of the connected companies, and the various ERPs and any software in the internal systems of the companies connected to the network. All these parties constitute a marketplace of producers and consumers of liquidity products and services, data suppliers, and fintech developers that increase the richness of the actionable solutions by accessing a unified data landscape and leverage this data to provide decision-support services. Corporate treasurers access the

ELM layers directly from their enterprise systems via preconfigured out-of-the-box certified connectors that accelerate implementations, while also reducing IT costs. Open APIs turn the liquidity network into an open platform for corporate users, partners, and fintech providers. Any information collected on the platform may trigger an action that the corporate decision maker executes directly from the enterprise system through the ELP to any party at the other end of the ELM ecosystem, without any further intervention.

It is up to the ELM platform provider to integrate disparate global financial businesses and systems — i.e., banks, ERPs, TMSs, payrolls and other business systems — by providing SaaS-based connectivity in the cloud. This automated connectivity is the key to enhanced visibility into cash, liquidity and financial exposures, as well as improved straight-through processing and security. API connectivity enables automatic access to data in real time, avoiding the need for IT to generate files.

Aite-Novarica Group research finds that Kyriba’s connectivity architecture validates this point, proving experience with other source systems for bank statement reporting, payments, trading portals, cloud platforms and marketing information systems (Figure 2).

FIGURE 2: EXAMPLE OF CONNECTIVITY LAYER



APIs AND THE API DEVELOPER PORTAL

Connectivity via APIs definitely supports the instant liquidity vision and the ELM structure, representing a key component of corporate liquidity management operations. Still now treasury departments capture information by accessing banking portals each one with its own user interface and experience, search on the screen for the data to work with, download the data through file-based exchanges (e.g., ftp interaction), then copy and paste to run reports and export data via other file transfers. All this now changes with APIs that enable the ELM platform to interact with external systems in real time. APIs provide the game changer ability to have real-time on-demand treasury connected to any system.

On the ELM platform banks can push balances and statements to APIs in real time and the ELM connectivity layer pushes through the operations modules down to the corporate ERPs and TMSs shortening the time to have accurate information into the enterprise systems. Treasurers don't have to wait the morning or the end of day to collect accurate data from banks to understand their balance and liquidity situation. That will allow corporate treasurers to make investment decisions much faster and potentially achieve substantial savings.

APIs allow treasurers to operate in real time and access third-party dedicated applications that consume APIs for, e.g., cash balance, and- whenever there is a positive or negative amount- they trigger some action, either manually or automatically, to invest or divest. In case of outgoing payments, the ELM's payments module² will offer a whole fraud detection feature to check and verify the partners' bank accounts before sending the payment. The ELM provider may offer a portfolio of predefined algorithms, but users can create their own rules—of course requiring a more complex approach—in case the operations or market conditions make the effort worthwhile. Aite-Novarica Group research is aware that a growing number of corporations are creating internal fintech API developer groups, so that these corporations can either themselves consume information from the platform and push data from some other enterprise systems (e.g., the e-commerce system) to treasury, or feed their finances with information coming from bank accounts into the TMS.

It is a fact that the ELM platform provider cannot (and must not) do all this in an isolated world. The ELM platform must offer a developer portal and a marketplace to allow fintech vendors to join and build new applications on the back of the offered APIs. The

² The TREASURY APPLICATIONS AND PAYMENTS section will further detail the ELM operations modules.

ELM mission is to enrich the capabilities of services through the contribution from fintech providers and even integrators that can use the APIs to build apps for their own applications catalog. A partner developing a customer-specific API on a new technology can take it through the ELM developer portal and develop an app based on that API and the others present in the ELM API catalog, making it available to other companies so they can leverage and manage liquidity through a unified set of products that span the ELM modules of treasury, risk, payments and working capital. These apps may extend AI and machine learning to use cases such as predicting cash based on the payment date of forecasted invoices. With intelligent automation, customer payments are automatically matched to invoices reducing the need for costly lockbox services, decreasing days sales outstanding, and freeing the accounts receivables team capacity to focus on value-added activities.

The developer portal must be public and the available APIs completely documented. More traditional gateways do also display APIs, but these are not always totally visible on a public catalog, they tend to be difficult to find and not well documented, often based on software developer kits that the user must integrate into its own IT system. This is not the characteristic of truly open APIs.

The ELM API portal builds an ecosystem, a community of developers that communicates directly from within the portal. What becomes often in traditional API gateways a communication bottleneck with emails going back and forth concerning questions, feedback, and information, can be resolved through the ELM platform as if it were a single team of developers that visualize the same data and communicate bi-directionally.

Through this ecosystem the ELM provider opens its APIs beyond the customer, making them public and open through the developer portal so that any interested (and authorized) party can consume those APIs and build apps that can be then seamlessly integrated to the user's enterprise system.

TREASURY APPLICATIONS AND PAYMENTS

The operations layer of an ELM platform (see Figure 1) is a portfolio of built-in functions to manage cash flows, to execute payments, to manage risk, detect frauds, optimize working capital, just to name a few. Companies moving from legacy systems or accounting software packages wired with spreadsheets may consider the ELM operations layer as a resource from which to consume the basic treasury functionalities needed, without having to invest in onerous TMS suites. Corporate treasurers of

budget-rich companies may- instead- use the treasury module of their ERP, so they may initially limit the use of the ELM platform to run payment factory operations leveraging the API-based connectivity layer. The ELM aggregates into a holistic standard view the treasury data extracted from the various company subsidiaries' ERP systems and processes them.

If treasury operations are executed from the ERP's treasury module instead of the ELM's treasury components, such a restricted use of the ELM platform limits the user's real time experience. Unless the ERP system is new enough to have the capacity to integrate and consume APIs, an older ERP may use APIs to extract data but the user's real-time experience will never be the same. An enterprise user can start the ELM experience consuming the pre-built solutions of the operations layer through their own embedded user interfaces (UIs), and then use the platform features to open and build its own UI and create a more personalized experience. Instead of having pre-built functions, the user can develop personal apps and plug them to the platform that operates like an intelligent backbone that orchestrates all operations.

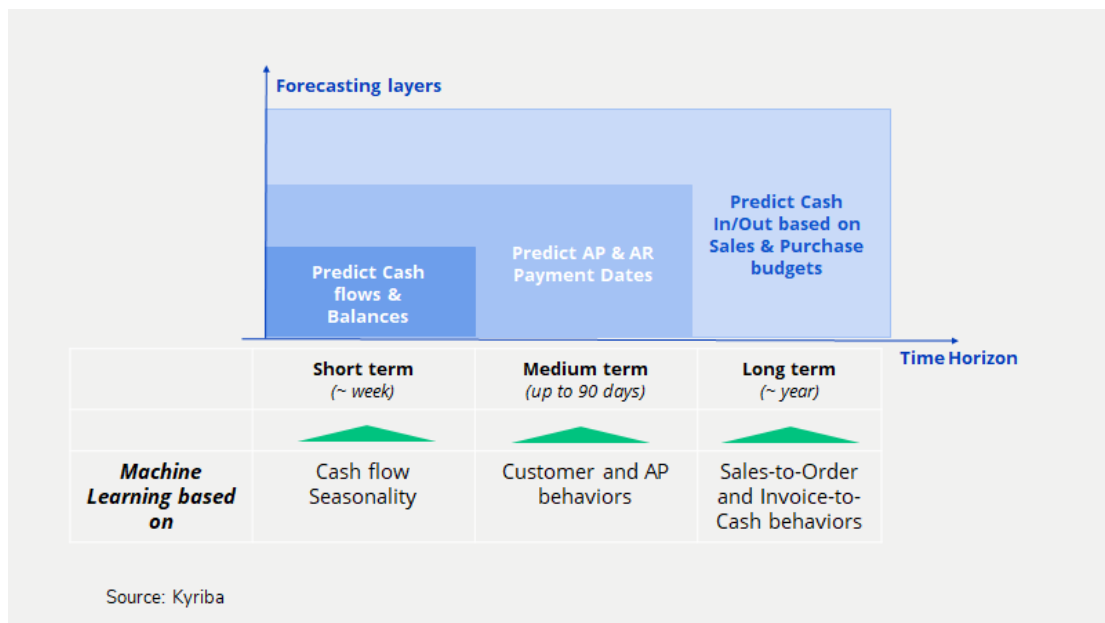
Following the platform model, users can build their own applications from the ELM developer portal and leverage the functions offered by the platform ecosystem partners. From within a single platform, financial directors can directly drill down and see the available liquidity at primary banks and anticipate the impact of inflows and outflows on the cash levels across the organization. The ELM treasury module offers the user the possibility to unlock the cash budget with weeks in advance, by providing very accurate prediction of the availabilities of the cash collected. The predictive model is using a liquidity risk approach designed to make sure the treasurer can unlock immediately most of the collected cash for spending and investment while minimizing the risk and the cost of overdraft.. The objective of an ELM cash predictor module is to give the treasurer a short-term forecast of the cash collections. The model focuses on the cash inflows prediction because that's where the company has the highest level of uncertainty. Spending flows are much more in the company treasurer's control, so the machine learning model focuses on predicting the cash inflows. To increase the treasury office's productivity, the AI-based predictive algorithm is fully integrated on the ELM platform to access data without any additional data ingestion gateway to external enterprise systems.

The ELM platform's full data-driven analytics must be designed to allow the user to control the prediction accuracy of the statistics by monitoring the stability of the cash collections. The prediction algorithm must operate on a stable pattern of cash inflows,

so there must be the possibility to back test the prediction to make sure that it stayed aligned with the effectively collected cash. The future is hard to predict and general forecasting models tend to assume that the past reflects into future trends. But that's not always the case in the occurrence of a breach of regime, an excellent example of which is the COVID-19 pandemic crisis. Beyond this recent example there are similar situations when a company faces discontinuity in the cash collection regime: for example, at the launch a new product, or in occasion of a merger that will generate a discontinuity in the collection patterns. This situation can be even more intricate when a complex organization experiences it in only one of its subsidiaries. It's not an easy task at that point for treasurers to rely on historic data when building cash flows projections.

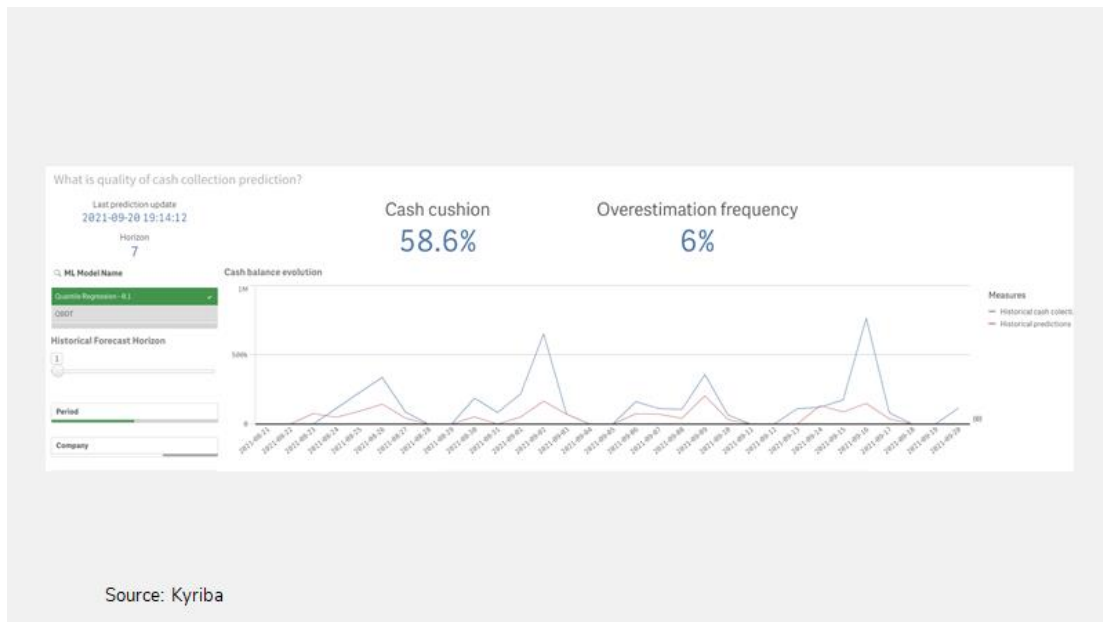
A best practice ELM cash module must detect very soon any chance of change in regime and inform the treasurer that the prediction cannot be accurate because the future will not reflect the dynamics of the past. The model's algorithms must continuously monitor the statistical pattern of cash flows and- as soon as a suspicious spike is detected- send an alert that the prediction based on past data is not reliable anymore. The model's machine learning algorithms will mitigate the high level of uncertainty of the predicted cash collection values by selecting the most appropriate corrective statistical approach (Figure 3).

FIGURE 3: FORECASTING USE CASES WHERE ARTIFICIAL INTELLIGENCE BRINGS VALUE



Kyriba, for instance, applies in its cash predictor the quantile regression which offers a highly trustable cash collection projection based on the fact that the model controls the trade-offs between the cost to secure committed credit facility and the “haircut” applied to the cash the user will unlock. The model uses machine learning algorithms to statistically underestimate the prediction in order to have a very high confidence level, with the result that, effectively, the cash collected will be above the predicted value (Figure 4).

FIGURE 4: MODEL THAT LEARNS FROM THE HISTORY AND SEASONALITY OF CASH FLOWS



Kyriba’s Cash Predictor solution delivers short term cash collection and cash balance predictive decision-making intelligence. Leveraging advance business intelligence and AI, the module automatically learns from historical and seasonal receivables cash flows, then aggregates this foundational data with scheduled payables and current cash balances. Projections can be filtered by cash flow codes and aggregated across key group entities and across multiple currencies to reflect rules-based cash sweeping and in-house banking policies.

A state-of-the-art quantile regression machine learning model is used to predict the cash flows and the optimum cash cushion in order to unlock maximum cash while minimizing the commitment fees and the draw down cost of credit facilities.. The system

is continuously checking the validity and depth of the historical data used, as such it trains the machine learning algorithm. An alert is automatically generated in case of breach in cash flow statistical regularity (ex: Covid19 lockdown effect). The performance of the model can be back-tested anytime against actual cash flow.

As a result, the likelihood of overdraft situation stays within budget if the spending is limited to the predicted amount. This makes it possible for the treasurer to maximize the cash that can be unlocked for investments. By associating the cash cushion to a confidence level covered by a statistical guarantee of its accuracy that can always be back tested to refine the level of precision, the model offers the user the means to allocate cash very precisely.

The ELM treasury module offers the treasurer the possibility to overlay the predicted cash collection values with the scheduled spending already fed into the module from the company's ERP. At the same time, the ELM treasury module knows the cash balances from the connected bank statements, so it becomes possible for the user to assemble all this information and predict the likely cash balance for the incoming days. With this visibility, the corporate user is empowered to predict the cash budget necessary for managing the company's spending. For this purpose, the ELM payments module must be capable to filter the cash outflows by spending type so that the user can decide whether to include payroll or supplier invoices to check the cash balance. The best practice is to define a period that corresponds to the pace of a company's supplier payments. So, if the treasurer decides to pay a supplier on a weekly basis, it is advisable to select one week ahead to further the accuracy of the prediction. The model then retrieves the historical as well as the predicted cash collection.

With the spending now scheduled, the user can predict how much cash will remain available for a treasury investment, while filtering by company unit, or by currency, in order to reflect the company's cash sweeping and in-house banking policy. This solution fits with any treasurer's objective to first ensure the solvency of the company, minimize the overdraft costs, and only then to optimize the return of investment of available cash. Payment matching is another key feature of the ELM payment module and it matches the outgoing payables with incoming collections in real time. This represents a highly valuable use case for a CFO and treasurer the more the business moves to real-time execution. A real-time collection may represent a problem to treasurers because they are still subject to cut off times. Treasury departments are well known for being poorly staffed, even in multinational corporations. The follow-the-sun capability is not for everyone, so there will likely be nobody in the office to manage collections during the

night, leaving this money idle for too long and a loss of opportunity for their company. The payment matching capability of the ELM platform paves the way to real-time investment capabilities.

Treasurers are constantly presented with a vast number of investment opportunities to select from bank deposits with various type of offerings, money market funds and, recently, dynamic discounting programs that represent a higher return, which also benefits supply chain management.³ Each of these treasury instruments has its own return, its own fees and constraints (e.g., liquidity horizon and minimum investable amount), so it's not feasible for the treasurer to select manually the optimum set of instruments to maximize the return of the available cash. The ELM must offer a systematic optimizer that takes as input both the predicted daily cash budget available for investments and the set of treasury instruments accessible- through the ELM platform network- to banks, fintech providers, and asset management companies (see Figure 1). Organizations and service providers bring together millions of cashflows every hour, all in real time, in order to ensure they have a reliable, highly accurate, and up-to-date view of cash balances across various settlement accounts. They can compare projections to the actual external balances, as well as being able to control liquidity requirements and usage in real time. Real-time investment management from the ELM treasury module helps treasurers to systematize and, ultimately the case may be, automate the decision making process. From the current daily frequency- at best- the ELM real-time investment capabilities make it possible to run investment decisions every half an hour if not even more frequently.

The model can adapt the predictions to the cash sweeping and the in-house banking structures of the company. Cash sweeping mechanisms can also have more complex in-house banking with a group structure and some intergroup lending possibilities, so it's very important to give the treasurer the possibility to select the granularity of the prediction to move money around within the group. The objective of an ELM platform provider is to ease the lives of the treasurer and of the CFO by accessing enterprise and banking data and supporting decisions on how to use at best that data. So, for instance, when looking at the invoice collection forecast, collections experts know that very seldom invoices get cashed in at the stipulated date. If the number of such occurrences is low, the adjustment can be made manually by guessing the habits of the customer and estimating the date of the expected payment, maybe on the 15th of the following month. But in a large company such manual operations cannot be afforded, and only by

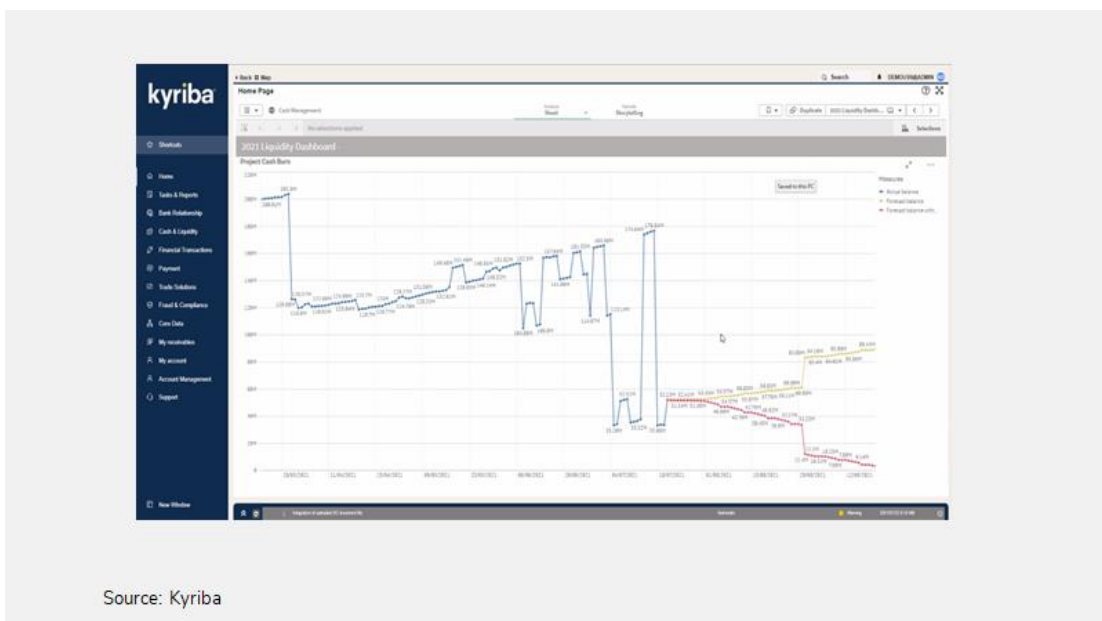
³ See Aite-Novarica Group's report [The Liquidity Management Needs of Corporate Treasury](#), May 2021

applying machine learning algorithms and looking at past habits of customers the treasurer can reliably adjust the date when the company effectively is going to receive the payment.

The ELM platform's API-based connectivity and its operations layer modules make it possible to see cash positions in real time and execute payments in real time, which means the possibility to do real-time investments with any surplus cash. The pace corporate treasurers will have to take decisions in the near future is going to accelerate and what they do today manually- very often by copying and pasting data from convoluted treasury applications into spreadsheets- will become in the near future absolutely impossible.

The next component of the ELM treasury management module is a fully integrated optimizer that provides the user with decision making analytics and simulation tools powered by artificial intelligence (Figure 5) that eventually turn the prescribed action into a one-click executable transaction on the ELM's payment module. Everything is available on the platform. There is no interface to run the use case. An ELM platform is far more than a control tower to view the corporate liquidity. It guides the user to take action and get the cash into the right place, at the right time, and in the right quantity, at the least possible cost.

FIGURE 5: PROJECTED CASH BURN SIMULATION



WORKING CAPITAL OPTIMIZATION

A feature of the ELM platform is the uniqueness and totality of the finance processes managed on the platform. Aite-Novarica Group analysts are aware that companies are launching request for proposals to change their TMS that include not only questions on the traditional cash and payments part. They are also asking information about the vendor's supply chain finance (SCF) capabilities.

A sign of this trend is offered by the push to migrating ERPs to the cloud (e.g., SAP will close on 2027 the maintenance of their on-premise ERP early versions⁴) which allows a greater depth of the forecasting application that draws more data from the ERP systems connected on the ELM platform. This makes it possible for greater openness on the liquidity optimization part because once corporate users have all the information on the flows of liquidity, they can activate a program of payables (or receivables) finance to better manage the use or destination of cash through the working capital optimization module of the ELM platform. In case of excess of liquidity automatic investments can be issued from the platform, based on criteria that the ELM engine uses- having all the necessary information- to suggest whether to allocate the liquidity to offer invoice discounts or make investments. The ELM working capital optimization module must be capable to incorporate traditional corporate treasury metrics with the values of days sales and payables outstanding, combine payables and receivables data with treasury data and elaborate invoice data into the platform to measure the impacts on free cash flow- and on supplier relationship- if payment days are pushed further out.

An ELM platform must leverage the connectivity features to the ecosystem partners to offer onboarding workflows that ensure the enrollment of suppliers into the working capital optimization programs. The platform provider must also have established very strong and comprehensive agreements for SCF funding arrangements with network partners. Enabling customers with receivables and payables finance applications will allow them to handle directly from the ELP the whole data for the receivables, payables, credit and debit notes and to use forecasting capabilities, AI and machine learning forecasting engines to predict the cash flows on top of what is already in the ERP. From a single sign-on on the ELM platform the corporate user can mobilize the balance sheet to set up a receivable finance program and sell receivables to fill any

⁴ SAP, ' Innovation Commitment for SAP S/4HANA until 2040 Clarity and Choice on SAP Business Suite 7', accessed August 16, 2021, <https://support.sap.com/en/offerings-programs/strategy.html#section>

liquidity gap. Using the SCF module from within the ELM platform the treasurer can trigger directly from within the platform the SCF levers to turn on or off, to change or alter the funding structures directly with the funders. All is directly managed from within the platform to access the SCF program and change early payment rules of the discounting structure in case the liquidity planning decision requires to take early payments off. It becomes possible for the platform user to change the days of early payables financing directly from within the setup. That setup is going to directly impact the invoices coming through the platform and reestablish the invoices that the company is going to accept and process for early payment.

The ELM platform capability to combine accounts receivables and accounts payables with receivable and payables finance programs for possible funding arrangements as inputs of cash inflows and outflows is truly innovative. Other cash forecasting systems don't present such predictive future outlook. An example of the possibilities to extend SCF schemes by leveraging the ELM platform model is offered by Kyriba's Purchase Order (PO) Finance. PO finance is an instrument that banks have been using for years, though almost completely manually and without any visibility into what happens after the PO's been created. The consequence of this is that banks that finance POs do it on the sole basis of the actual orders received into the corporate client's ERP and projecting those values into the future. They totally lack the opportunity to analyze how the advance is used by their client, as they cannot track through the completion of the PO that converts into an invoice and then into a payment their client cashes in. An invoice carries information of a disbursement that can be used to better forecast future cash flows and enables buyers to optimize their working capital. The PO carries information of a long-term future disbursement. Another element differentiates a PO from the invoice. The invoice has two perspectives: the working capital perspective that shows the buyer when it will pay the supplier; and the supplier's perspective on how quickly it will receive the money. A PO is- instead- squarely and solely on the supplier side because there is no physical cash outflow for the buyer. A PO is a promise of the buyer to purchase goods or services and- only later- to pay the supplier against an invoice.

The journey of the PO in Kyriba's ELM platform starts with the buyer providing the PO order information. This apparently simple step makes the whole difference because from the perspective of the banker the information received from a buyer of a purchase order is significantly more valuable than that received from a seller. Even though there is no payment undertaking, there is a kind of soft confirmation from the buyer that

actually there is a real business ongoing and it's not just paper that has been forged by a seller. Purchase orders follow industry standards that have existed in the market, so with the use of APIs the connectivity component of the ELM platform will map the PO outputs into Kyriba's TMS module (see Figure 2). Against the invoice there is a commitment from the buyer to pay, but there is no commitment on the PO. That's really a credit point. Most banks will do this purely on the supplier's credit. They will do their advance payment to the supplier purely and solely on seller credit. Under the ELM model, the bank that accepts to finance the POs can afford to work on the seller's credit by having the ability to link the PO on the ELM platform and later converting it into an invoice. That's the real value, because the ELM moves from a standalone instrument with no tracking of whether the PO is converting to an actual invoice, and then a payment, to a platform that is tracking and making sure that the PO will eventually convert into an invoice. This is hugely valuable because the PO becomes more of a self-liquidating facility.

Financial institutions usually run a soft assessment on the basis that the advance is backed by a PO, and the reason is rather simple: banks' credit models have to be approved by the regulator, and-unless they can show empirical evidence that there is lesser losses and therefore less capital to be allocated against it- banks don't get any benefit for showing that the funding is based on a PO. Most banks will just do it cleanly against the seller credit, and Aite-Novarica Group analysts are seeing increasing cases of banks willing to lend on POs even if it takes a higher capital for the simple reason that their corporate customers are pushing to do it. For a bank it's a sort of cost-for-doing-business. PO finance unifies the physical and financial supply chains of the trading parties, as the buyer is actually managing liquidity not only for itself directly but for its entire supply chain by helping suppliers to get advanced payments by virtue of the POs received. The real value of the ELM platform is that it makes it possible to see POs actually converting to invoices and seeing the liquidation of those facilities from invoices rather than from seller feedback.

In terms of cash flow forecasting, the information of a PO's lifecycle extends that of the invoice, making it possible to start earlier the forecasting process and use the information to enable clients to inject liquidity in their own company. The purchase order, just like a sales order, anticipates future cash flows. PO finance is not only SCF related, it's integral part of liquidity management. In fact, PO finance supports the management of the liquidity of the entire supply chain more than the buyer's own liquidity, because in the pre-shipment stages most of the pull on liquidity is actually for

the supply chain partners (e.g., seller, logistics providers) and the buyer does not have to pull liquidity for the issued POs.

AN ELM PLATFORM TO MOVE FROM VISIBILITY TO ACTION

The shocks of the 2008 credit crunch and- most recently-the COVID-19 pandemic have brought liquidity management to the top of CFO and heads of priority lists not just for corporate finance leadership but to their operating boards and key shareholders.

The usual method for finance managers to build cash flow projections is to adopt an indirect forecasting model that combines net income and balance sheet data. Multinational corporations that have complex liquidity structures must not only see where those balances are across the organization, but- most importantly- they must be able to mobilize that cash in an intelligent way. That is, based on future trends and prior events, which poses quite an innovative approach.

Corporate treasury systems historically are good at capturing data; but taking that data and turning it into actionable results is where the big difference lies. The point is to look at the budgeting process with a longer-term strategic forecasting view, aligning the predicted results into a tool that models the lines of liquidity the company has access to, detects the cash availabilities across the organization, and determines the best and most efficient way to access that cash through the company activities. And, finally, to support the decisions the treasurer should make, suggest the actions that ensure the optimal amount of liquidity in the right accounts, at the right time in the future, and with the right level of risk and control.

This is the perspective of the ELM platform's execution layer (see Figure 1): to implement decision making tools that automate some of the operations performed manually today. The ELM vision is to build an intelligent enterprise liquidity management platform that accesses data, analyzes it, predicts from the analyzed data likely (and risk-averse) outcomes, and from the user-accepted prediction prescribes optimized actions that become seamlessly executable without leaving the platform.

To exemplify this process, at some point all the banks dealing with the company will push new balances information to the ELM treasury module in real time. The ELM treasury module will get this information, will aggregate all of existing and new balance data, and display to the CFO and treasurer the new, updated end-of-day balance while showing at the same time the instant current balance with a projection that the balance will go close to zero in the next two days. In that case, the treasurer can decide to invest the available current liquidity into overnight investment or any

other form of liquidity allocation to make it efficient and retrieve the money after a few days to make sure that all positions are squared.

The on-demand visibility of the available liquidity makes it possible to directly allocate that to an investment program and issue orders to the company's investment partners (e.g., Fidelity, Blackrock) directly from within the treasurer's enterprise system. Corporate finance managers can operate their investment portfolio directly from within the investment partner's API-connected portal to execute any sort of transaction, sweep cash and manage investments. Similarly, a treasurer looking at currency levels can actually deal with the trading platforms (e.g., FX All, 360T, Bloomberg) from directly within the enterprise application that's part of the ecosystem, thanks to the direct integrations built through the ELM connectivity layer.

That's just an example of an action-driven facility made possible on the ELM platform for its capability to run on-demand treasury in real time. At the beginning of the ELM journey this entire process may be still manually controlled at each step, but the faster the execution switches to automatic, the more accelerated the decision making in real time. The shift from manual control to decision making, and then from decision making to automated execution is something already seen in capital markets at investment banks, asset managers, and hedge funds. Aite-Novarica Group expects something similar will likely come to treasury in the near future. By knowing the cash budget available for payables the treasurer must then move from predicting cash balances to execution, taking advantage of the ELM's predictive and prescriptive strategic long term as well as short term capabilities that make decision making actionable.

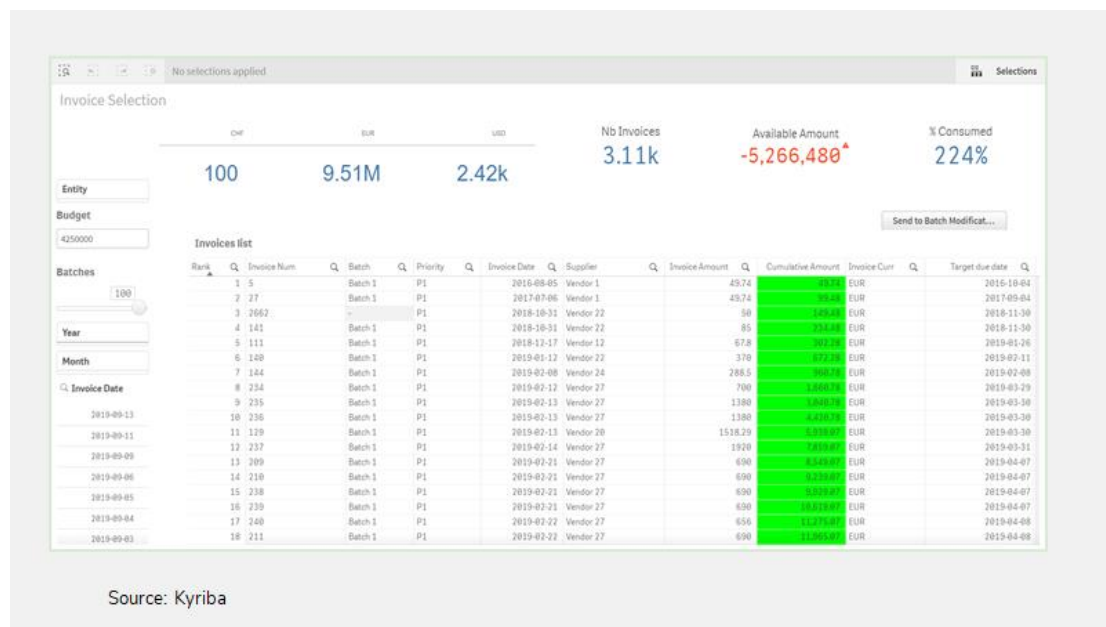
Traditionally, technologies to manage liquidity have been almost exclusively focused on operational efficiencies and process automation. What has been really lacking to ease the treasurers' experience is the ability to turn decisions into executable actions in real time. To avoid that the concept of the executional layer of the ELM platform remains too vague and- potentially- only a wishful thought, Aite-Novarica Group analysts have found a good proxy of the ELM's actionable real time features in Kyriba's Smart Invoice mechanism.

The Smart Invoice is designed to help the treasurer manage the spending from the available cash budget that has been either entered manually or received automatically from the cash predictor module. Invoices are automatically stacked and ranked according to the company's supplier payment policy, with the recommended payments displayed with the corresponding amount so that the treasurer can verify if the total due

fits within the predicated cash budget. With such wealth of information the treasurer can decide to confirm or adjust the invoices to pay, and see dynamically the cash budget consumption and the remaining balance. Finally, the confirmed invoices are sent to the ELM payment module⁵.

The forecasting period can be adjusted to reflect the pace of the payable process as well as the liquidity horizon of the treasury investment. The treasurer can automatically optimize at the most granular level the payment of the invoices with the predicted cash budget (Figure 6).

FIGURE 6: SELECTION OF INVOICES TO PAY BASED ON CASH CONSTRAINTS



This feature reveals to be very important for the treasurer in a crisis situation during which the caution to handle the cash budget is very high and decisions on whom to pay and when must be taken extremely carefully. Within the ELM execution layer the payment order is processed starting directly from the invoice. So, the ERP no longer sends the formatted payment file, but it is the ELM treasury module that presents the treasurer with the single invoice to create the payment order, no longer in the ERP but directly from within the ELM platform. The first advantage for the corporate user is the ability to directly manage the company cash and directly decide on which accounts to

⁵ The 'Smart Invoice' term refers to the intelligence of the system that suggests the invoices to pay first.

charge the payment up to the single invoice—should that be needed. In practice, finance takes control of the creation of the payment and the management of the payment itself, and no longer suffers from the fact that the ERP prepares the payment files with predefined accounts to be debited. This leaves the treasurer free to operate and not limited to follow the tasks already established by the ERP. The Smart Invoice feature makes it possible to operate at the ledger level throughout the enterprise and banking systems. There is an appropriate definition that reflects the capabilities of the Smart Invoice: it makes it possible to work directly from the "raw material" of the payment transaction. That is, the invoice.

Corporate treasury is empowered to be more proactive because it remains in control of its own disbursements. The role of ELM platform is to support decision-makers by means of a set of algorithms that optimize payments management based on the decision of which suppliers should be paid first. The APIs fetch the invoices directly from the ERP instead of the ready-made ERP payment file. There is a new type of transaction centered on the invoice to be paid that has been validated in the ERP and is integrated into the ELM processing engine via APIs. The treasurer indicates on the ELM application which invoices are to be paid, the ELM groups the invoices, and the treasurer creates the payment orders deciding the list of receiving suppliers. APIs make it possible to operate in real time, so as soon as the invoice is validated in the ERP (e.g., there are no discrepancies with the goods ordered, the items have been delivered) it passes to the ELM where the treasurer finds it positioned among the projected disbursements with the status of validated invoice.

The next step is the creation of the payment order. Before the user processes the invoices into the payment order, suppliers offered the possibility to view these validated invoices on the ELM platform and to request- if needed- an advanced payment against one or more of those invoices. The buyer can, thus, optimize the cash output by deciding on which account to pass the payment of the single invoice, which supplier to pay, and which invoices to process on the ELM's SCF module for advanced payments. Since there are invoices available and visible to all, one thing to propose to suppliers is for them to go and select which invoices they want to have paid (or discounted) first.

The element of distinction of the ELM platform compared to other more traditional systems is that the latter optimize payment instructions that are pre-processed by the enterprise system. In the ELM execution layer everything starts from the "raw" invoice that can be put into payment or discounted upon the supplier's decision. Furthermore, the buyer can decide which invoices to pay on one account and which to pay on another,

and which suppliers to pay and to which to propose alternative solutions. This is done based on criteria that the user applies to weigh suppliers based on selective evaluations. With the “raw” invoice in the ELM, the treasurer has all the invoices in control that can be input into the forecast module to carry out liquidity projections in a more precise way and with a longer time horizon than usual. In fact, if the raw item is the payment order processed by the ERP through the aggregation of several invoices, the forecast of the outgoing flow is based on the payment order already processed and- therefore- with a rather limited time limit. In practice, the treasurer gets to manage the payment at the end of the invoice-to-payment file transformation process. If, on the other hand, the treasurer can already work at the invoice level, balances can be projected with a longer time horizon (e.g., 60, 90 days) because the “raw material” is projected throughout the disbursement process.

At this point the treasurer can integrate the ELM payments module with payables finance solutions to support suppliers with greater liquidity needs in case they cannot be met by the company's current cash availability. In the same way, the buyer will be able to propose receivables finance tools on the basis of the invoices to be collected (available as raw material in the tool) on which to project the balances and propose factoring loans.

In summary, an investment in ELM platform technology must focus on three main drivers: the first is connectivity, getting access to data via APIs in real time to make the information immediately accessible for decision making. The second driver is AI engineering and data management to enable real-time data driven decision support. The third driver to invest in an ELM platform is the actionability of such decision support through and extensive liquidity ecosystem. And the last key driver is the ability to deliver prescriptive and predictive intelligence (not just data) to downstream decision makers across the organization which is now critical for the CFO as business partner.

With the caveat that the systems must not make decisions for the user, but give guidance to understand if the company has cash, at what levels, what are the days of survival before new action is needed to recover. With this information the ELM platform becomes a prescriptive and decision-support tool into what action the treasurer should take based on established parameters (e.g., interest terms, preference for high yield returns, apply payables finance versus dynamic discounting.)

ELM systems are perfect candidates to be central repositories of enterprise cash and liquidity data as they provide the tools and applications to generate the specific

granularity and attributes necessary to manage this data. In summary, by unifying data, unifying processes, and unifying governance and systems an ELM platform empowers users with applications for strategic planning and actionable data-driven decision support using AI and machine learning on the historical data of bank accounts and customers' cash profiles, to predict the balance for the short and long term period. For example, when the ELM treasury application becomes aware that the company is going to collect money in the next seven days and there will be some cash in advance, the same application presents the user with the option to invest that liquidity in money market funds of various horizons or in an early payment program to secure the supply chain and increase the cash return through dynamic discounting facilities. The system calculates the return on those investments as it knows the maturity and the tenor of the cash available. While at the beginning of the ELM journey some activities are still performed manually to keep a certain level of control, once the system is capable to determine the return of the various utilization options users may accept to automate the execution based on predefined parameters.

THE LIKELY FUTURE FOR ELM: EMBEDDED FINANCE

On top of the pre-built workflows that support the treasury, payments, and working capital optimization operations, an ELM platform must offer the user a personal workflow setup that leverages the openness of the system and the events captured or sent through the connectivity layer. The platform applications are also capable to publish events that make the ELM platform not only a reacting mechanism but an engine that receives an event and then acts upon this event by automating the execution of actions within the context of the process. Physical and financial supply chains are inextricably linked and becoming ever more integrated, automated and characterized by collaboration. Trigger points along the physical supply chain create opportunities for bank and non-bank providers to offer financial supply chain solutions that support and facilitate the physical supply chain.

Under these premises, ELM opens to the notion of *embedded finance*. As an example, during a typical procure-to-pay process at the event of opening a purchase order the system recognizes that the event will generate a future cash outflow, as the company will have to pay the supplier at some point. Or, still during the procure-to-pay process, when the procurement department is negotiating with a possible vendor, the ELM treasury component detects through the API connector this event in the company's ERP and this triggers the application to check whether the company has sufficient liquidity to pay the supplies or, based on the treasurer's decision, to prepare the workflow to submit a request for some SCF facility.

Another use case of the extension of the ELM platform capabilities to embedded finance is the possibility to send real time transactions from any of the ELM applications and have them check the bank balances in real time, decide which transactions can be pushed forward based on the available levels of liquidity and company policy rules, and update back the ELM application in real time. A practical example may be represented by an ERP-generated disbursement transaction that uses the ELM connectivity layer to check balances in specific accounts- based on the nature of the payment- and then issues the disbursement by calling the appropriate API and get back the results in real time into the ERP. That instant liquidity triggered by APIs is a representation of embedding transactions initiated from the ERP procure-to-pay process (e.g., open a purchase order) that trigger contextual financial supply transactions in the ELM platform components: once the PO is launched, without leaving the enterprise system a message is sent to the treasury ELM component that checks the balance and presents it back to the user. Once availability of funds is confirmed, the PO is automatically

approved and the ELM applications will send the PO information back to the ERP, while the treasury component of the ELM will take into account that transaction into cash management and liquidity projections. When the payment is then executed, all related applications will be updated.

CONCLUSION

Corporations:

- Any transaction happening in the CFO suite will have strategically meaningful liquidity consequences.
- CFOs and treasurers must have available a decision support system to plan and manage a strategic corporate resource such as liquidity.
- Investment in ELM platform technology that focuses on three main drivers:
 - Connectivity, to access data via APIs in real time and immediately accessible for decision making.
 - Embedded visualizations powered by AI engineering and data management to provide real-time data driven decision support.
 - Actionability of such decision support throughout and extensive liquidity ecosystem
 - and the ability to deliver prescriptive and predictive intelligence (not just data) to downstream decision makers across the organization.

Banks:

- Offer enterprise users the tools to consume decision support data through transaction banking interoperable and interchangeable cockpits and portals.
- Improve corporate treasurers' experience to turn decisions into executable actions in real time.

Vendors

- Secure a robust connectivity framework from enterprise systems (e.g. ERP, TMS, accounting package) to financial institutions, to enable business users access the latest and most accurate liquidity information that empowers decision making.
- The ELM platform provider must offer a developer portal and a marketplace to allow fintech vendors to join and build new applications on the back of the offered APIs.

ABOUT AITE-NOVARICA GROUP

Aite-Novarica Group is an advisory firm providing mission-critical insights on technology, regulations, markets, and operations to hundreds of banks, payments providers, insurers, and securities firms as well as the technology and service providers supporting them. Our core values are independence, objectivity, curiosity, and a desire to help all participants in financial services create better, more effective strategies based on data, well-researched opinions, and proven best practices. Our experts provide actionable advice and prescriptive business guidance to our global client base.

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