

A Smart Treasury Fit for the 4th Industrial Revolution

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Abstract: This paper looks at the importance of Treasury management, within a typical commercial bank and evaluates how digital technology can support this key function in the future. Since the 2008 financial crisis, the role and responsibility of Treasury has grown significantly in terms of scope and strategic importance. There are an ever-increasing number of requirements from Regulators, Senior Management and Shareholders, that Treasury must deliver on - as the guardian of the bank's balance sheet. To meet these growing demands and challenges Treasury needs to consider ways to streamline its operational activities, in order to become more strategically focussed. Leveraging digital technologies associated with the 4th Industrial Revolution can play an important part in the transition towards an intelligent Treasury of the future. However, it is imperative to have a proper and well-defined digital roadmap that can steer the evolution of the Treasury function. This paper's aim is to research and outline an approach that can guide the establishment of a next generation smart Treasury. It considers a couple of management issues common to most bank Treasuries and then demonstrates how these activities can be converted to smart processes through digitalisation.

1 INTRODUCTION

The Treasury department forms the nerve centre of most banks. It plays a crucial role, as the guardian of the balance sheet and manager of the scarce financial resources including capital and liquidity. Since the financial crisis, the role and responsibility of Treasury has grown significantly in terms of scope and strategic importance. However, it is under increasing pressure on various fronts and therefore require change and transformation. On the one side, the regulatory requirements are becoming more onerous - calling for greater granularity and precision; higher frequency of reporting; forward looking analytical capabilities and others. On the other side, the CEO/CFO increasingly looks to the Treasurer for strategic decision-making and holistic attestation that the balance sheet is efficiently optimised.

For many Treasuries there are a number of obstacles in the way of achieving this broader mandate, including the complexity of the bank's business model; fragmentation of upstream systems; legacy technology not tailored for evolving Treasury needs; and the magnitude of data that must be processed and analysed. Comprehensive digitalisation of Treasury can help address some of these challenges and can deliver a range of

commercial benefits, for example reduce operating costs; enhance Net Interest Income; improve risk management and optimise capital and liquidity buffers (BCG 2019).

This paper explores the creation of a Smart Digital Treasury Model (SDTM). The purpose of the SDTM will be to guide the creation and development of a digital Treasury that optimally leverage existing technologies and incorporates new innovations associated with the 4th Industrial Revolution. Relevant innovations refer to Artificial Intelligence, Machine Learning, Big Data analytics, Blockchain and Cloud Competing, to name but a few. The SDTM will also allow for measuring the digital maturity of an existing Treasury function, as a starting point in the transition to a smarter operating environment.

This paper is structured as follows. Section 2 will review the literature around the digitalisation of Treasury and the challenges in the way. Section 3 covers a short overview of the evolution of Treasury and the need for leveraging digital innovations, in order to support its growing role and responsibility. Section 4 looks at how a Smart Digital Treasury can be established, within the existing bank technology infrastructure. Section 5 identifies and describes three digital case studies, common to most Treasuries, to demonstrate the benefit and advantages of

implementing digital innovations. It then shows how the intelligent outputs can be used to help steer the balance sheet more optimally.

2 LITERATURE REVIEW

Researching the contemporary role of banks' Treasury functions and understanding how it can be transformed across the banking sector, is crucial for future development. (Roszkowska and Prorokowski 2017) found that the top three primary challenges to successful Treasury strategies were - delivering an integrated view of Treasury and overall balance sheet management; income volatility from interest rate changes; and fragmented IT processes.

Since the financial crisis most banks have been focussed on a diverse range of issues, namely - reinforcing their balance sheets to meet the new prudential requirements; improving their online customer front-ends; fending off the challenges coming from digital competitors; and combatting the pressure on falling margins.

One area that to a large extent has been overlooked for technology investment and digitalisation is Treasury. A survey by the Boston Consulting Group of 44 banks revealed that most Treasury functions have relatively low levels of digital maturity. The analysis shows that only 11% of bank Treasuries made widespread use of advanced technologies and use cases, while about 70% have yet to embrace digitalisation in any meaningful way (BCG 2019).

A PWC Global Treasury benchmark survey found that the biggest roadblock for implementing digital technologies in Treasury were inter-alia - lack of digital use cases / business case studies; no mid-term strategy; and lack of people skills (PWC 2019). Other reasons for the slow uptake are driven by inter-alia - high IT costs; fragmented data and IT systems; legacy systems not tailored to meet growing Treasury demands; but also, the fact Treasury continue to be a large user of spreadsheet-based applications.

A 2018 survey by the Association for Financial Professionals found that the vast majority of finance professionals (97 percent) reported that spreadsheets are currently being used at their companies to manage risk. Despite spreadsheet use dominance, few respondents (28 percent) view them as an efficient risk management tool (AFP 2018).

Spreadsheets are a flexible tool which provides ease of use, but it is not ideally suited to support the future challenges Treasury will face. Given the changing role of Treasury over the last couple of

years, from primarily performing a cash management function to now driving holistic balance sheet management, it needs to leverage technology and especially digital smart technology more effectively going forward.

In order to become a digital Treasury of the future, it is therefore important to research and outline the key features, benefits and strategic imperatives to make this transition (Lipton A, Shrier D, Pentland A 2016). It is also critical for achieving a successful outcome, to have a proper and well-defined approach to guide the transition of the Treasury function from the current state to a more automated future state, where emphasis is placed on strategic activity rather than operational processing (Polak, Masquelier, Michalski 2018).

The next section looks at the changes that took place in bank Treasuries over the last couple of years. It is important to understand the drivers underlying these changes and the increasing demands it puts on a Treasury, before considering adoption of new digital technology.

3 EVOLUTION OF TREASURY

The history of a bank Treasury has its roots in the latter part of the previous century, with the introduction of Treasury specific management systems and software. Over the turn of the century many Treasury functions turned from a regional focus to a more global focus as banks consolidated and expanded internationally. However, since the 2008 financial crisis, Treasury's role and responsibility has changed significantly. The evolution can be divided into distinct stages, driven by the developments in regulations, new technology, monetary policy and competitor activity.

3.1 Pre-financial Crisis (Prior to 2008) - Cheap Funding and Liquidity

Prior to the financial crisis, a bank's treasury activity was often part of the Money Market Funding desk, which resided in the Markets or Trading divisions. The main responsibility was the raising of funding through the issuance of money market paper and short-term instruments, as well as the management of the daily cashflow requirements of the bank. The management focus was short term in nature and the Treasury area was often a profit centre.

Monetary policy was relatively loose and regulations self-regulating, creating a market

environment where funding was easy to obtain and relatively cheap. One of the major consequences of the cheap funding were that Cost of Funds was not accurately reflected in new asset origination, resulting in an increase in credit supply and low loan margins - with limited leeway to absorb future funding shocks (Ramskogler 2014). Therefore, when the crisis hit, banks struggled to continue financing their bulky balance sheets on a profitable basis.

3.2 Post Financial Crisis (2008 to 2015) – Strengthening the Balance Sheet

Subsequent to the global financial crisis a range of new regulations were introduced, calling for higher capital buffers, larger liquid asset portfolios, more granular and frequent reporting, stress testing etc. (Sironi 2018). In order to meet these increasing prudential demands and ensure the regulations were implemented, Treasury functions was centralised into a Group Treasury function. Treasury also became a utility function, meaning the objective was neither to make a profit or a loss.

A new Treasury structure evolved, with clearly defined disciplines. Based on the author's experience these tend to comprise of - Funding & Liquidity Management; Capital Management; Asset & Liability Management; Funding Execution; and Portfolio Management.

Many of these disciplines were expanded to ensure the balance sheet was further reinforced, for example Funds Transfer Pricing was established to ensure marginal forward-looking Cost of Funds were accurately transmitted to new product origination; off-balance sheet liquidity exposures were identified and included as contingent stress outflows in the liquidity buffer; and increased emphasis was placed on funding strategy and execution, in order to raise longer term stable sources of capital and funding.

Monetary policy became tighter with many global economies implementing quantitative easing, to inject liquidity into the markets and introduced asset repurchase programmes for bad loans, to relief the pressure on bank balance sheets.

3.3 Post New Regulations - Custodian of the Holistic Balance Sheet

The majority of the new regulations came into effect by the middle of the 2010's. This meant the role of Treasury started to shift more towards becoming a guardian of the balance sheet, with responsibility for the holistic management of all assets and liabilities. One reason was that senior management needed to

ensure the balance sheet was sustainable and profitable going forward, in light of all the prudential constraints that was imposed on scarce balance sheet resources like capital and liquidity.

Treasury became the owner of the central Profit and Loss (P&L) account as well as all the banking book risks (including all impacts from leverage, capital, liquidity, Interest Rate Risk hedging, wholesale funding issuance etc). This central balance sheet ownership gave Treasury an important seat at the table on strategic decision-making and guiding future business activity.

The challenge for most Treasuries was that the development of their technology infrastructure, processes and tools did not keep track with the change in the management responsibilities. A proportionally large amount of time is still spent on operational activities (often Excel based) and data analysis, with limited capacity for strategic activity. The biggest obstacles Treasury face on this front include fragmented data systems, visibility gaps across the full banking book and out dated modelling tools (BCG 2019).

Given the changing Treasury landscape and the increasing importance of the strategic Treasury mandate, it is therefore essential to better harness the capabilities digital technology and innovations can offer. In order to achieve this a well-defined roadmap is required within Treasury.

4 SMART DIGITAL TREASURY MODEL (SDTM)

The Smart Digital Treasury Model (SDTM) was developed to guide the creation and development of a digital Treasury that optimally deploy existing technologies and incorporates new digital innovations associated with the 4th Industrial Revolution. Relevant digital technology refers to Artificial Intelligence, Machine Learning, and Big Data analytics etc (Von Solms 2020). Most bank Treasuries already operate in an existing technology environment, it is therefore important to first understand the present infrastructure and constraints before considering the adoption of digital technologies.

4.1 Existing Treasury Technology Environment

A Treasury function normally comprises of a wide range of relative diverse activities, which differ greatly in terms of output and system requirements.

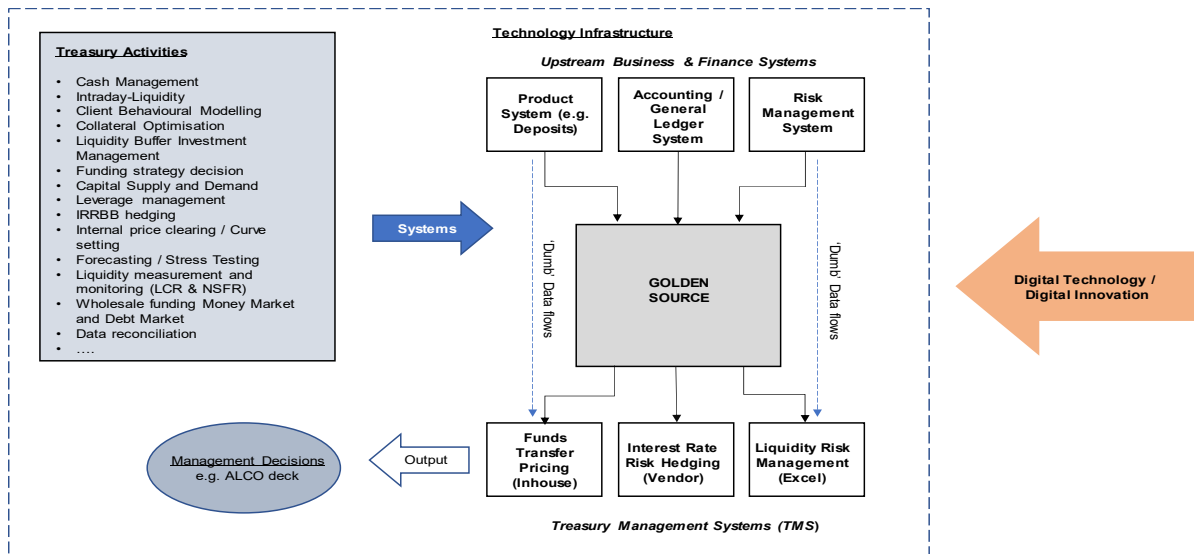


Figure 1: Overview of typical Treasury data flows and dependencies.

Therefore, a typical Treasury is very dependent on upstream IT and data systems (e.g. Product and Pricing, Accounting, Risk Management etc.) for data inputs to run its different Treasury Management Systems (see Figure 1).

These legacy bank systems often operate in silos and are very fragmented, making it difficult for Treasury to construct a holistic view of say the balance sheet. In the absence of integrated data and IT systems the historical bridge solution was often that Treasury had to build tactical data feeds between upstream systems and its own Treasury Management Systems (TMS). These data pipes are often ‘dumb’ in nature, since it contains limited amounts of intelligent information and data insights, to drive management decisions and support strategic management committees like the Asset and Liability Committee (ALCO).

Many banks have realised these inherent limitations and have initiated strategic long-term technology infrastructure and data projects to improve this environment, for example establishing a central data depository, often called the ‘Golden Source’. The objective is to provide an integrated and standardised data platform to feed Treasury Management Systems (TMS) and analytical tools in a more automated and consistent manner.

While banks continue to run these long-term and large-scale technology projects to establish a Golden Data source platform, it is often difficult for a Treasurer to identify where digital technology solutions, can or should fit into this complex picture (Figure 1).

It is therefore imperative to have a well-defined approach and digital plan that can guide effective

implementation of Treasury digitalisation, while the longer-term strategic infrastructure projects continue to be delivered.

4.2 Digital Adoption Roadmap for a Treasury

The Smart Digital Treasury Model (SDTM) provides a coherent roadmap that can guide the establishment of a next generation smart Treasury function and support the successful adoption of digital technology and innovations, within an existing Treasury environment. The following is the key steps in the process: -

1. **Diagnostic** – identify and evaluate all the key activities within the Treasury function. This will differ based on a bank’s business model and the set-up of Treasury within the organisation.
2. **Gap analysis** – assess the current digital maturity and define the optimal future digital state. Then evaluate the improvements required to close the identified gaps.
3. **Categorise improvements** – group together similar improvements with common features e.g.
 - Streamline a process – integrating, standardising and automating certain processes.
 - Client Insight - understand client behaviour better.
 - Optimise prudential buffers – reduce overly conservative risk mitigants.

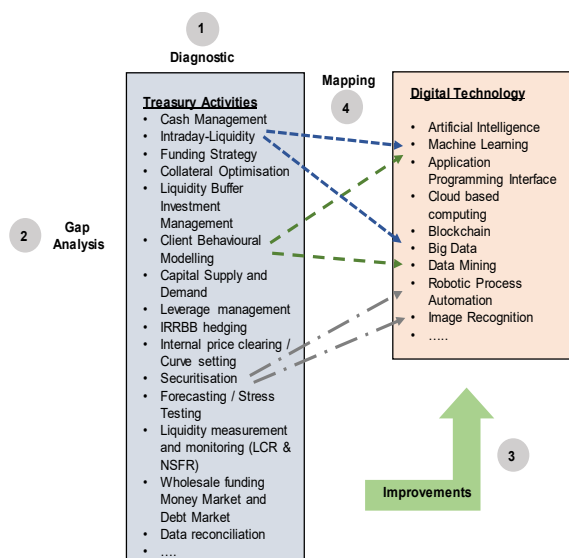


Figure 2: Roadmap towards a Smart Digital Treasury.

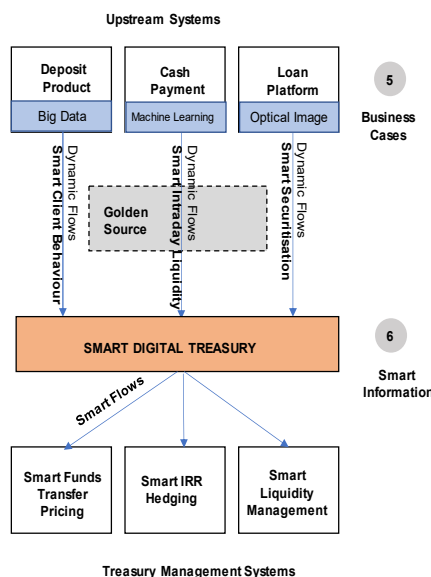


Figure 3: Transformed Smart Treasury.

- Dynamic Forecasting – improve forward looking analytical abilities.
 - Digitise Documents – scanning of paper-based loan documentation.
 - Visualisation capability – ability to view complex data in a simplified manner.
4. **Mapping** - map Treasury activities and required improvements into the range of digital technology available e.g. Smart workflow; Machine Learning; Natural Language Processing; Big Data; Blockchain; Cloud computing etc.
 5. **Digital Use Cases** - identify feasible Treasury activities, which can be targeted for smart transformation. Then size and prioritise which of these challenges are most critical to resolve.
 6. **Smart Treasury Information** - Consider how the new insights / outputs, can be integrated into a strategic tool e.g. a real-time dashboard to help the Treasurer make a more informed decision.

Figures 2 and 3 provides an overview of how these steps (numbers align with the overview above) can be followed, to develop a Smart Digital Treasury. To illustrate the concept further, three digital use cases were identified namely -

- modelling client behaviour,
- intra-day liquidity management, and
- securitisation of loans.

Section 5 will show how digital technology can be embedded into the bank’s existing deposit / loan / cash management systems, with the objective to make the data flows ‘smarter’ and more useful for Treasury.

These additional insights and smarter information flows can then be used to drive more strategic decision-making e.g. enhance the Funds Transfer Pricing process used to steer the balance sheet (see next section).

5 DIGITALISATION OF A TREASURY FUNCTION

An important element to recognise is that digital technology is not a panacea for all Treasury problems. It can be expensive and ineffective if implemented incorrectly or applied in areas where it has no natural application. An important step is to identify feasible cases studies, which will yield the most benefit with the least amount of effort. Described below is a small sample of common Treasury issues, to illustrate the concept (shown in Figure 3). As the Treasury function becomes digitally more mature and the benefits are realised, the number of digital use cases can be expanded.

5.1 Digital Use Cases

5.1.1 Customer Deposit Behaviour

One of the primary sources of bank funding are Demand Deposits (e.g. Current Accounts) - on which the bank pays a relatively low interest rate. These depositors have the contractual right to withdraw their funds within a day. However, in reality the money remains with the bank for extended periods because it

is used as a working capital account by the customers. It is therefore a cost-effective funding source for banks and a big competitive advantage.

It is therefore crucial to better understand the behaviour of these customers, in order to assign the correct value proposition to the product. Over-valuing the stability of funding may result in future liquidity risk (money leaves when it is difficult / expensive to replace), while undervaluing it may lead to the customer switching the account to a competitor to receive a higher interest rate. The problem is that the behaviour of customers is often analysed and projected, using statistical models that rely on static historical data and do not incorporate forward looking factors that can influence future client behaviour.

This is a good example of where a predictive technology, like Artificial Intelligence, combined with Big Data Analytics can play a key role to identify patterns and trends in client behaviour. These technologies can be implemented relatively easily by limiting it to a couple of deposit products to start with. Banks tend to have fairly good Product systems, which would allow for easier adoption of these technologies. If successful it can then be scaled to a wider product set.

The benefit of digital adoption is that it will more accurately reflect and value a bank's deposit funding franchise, but also guide future product design that is more tailored to the need of a specific set of clients, based on their unique behaviour.

5.1.2 Intraday Liquidity Risk Management

Intraday Liquidity Management (ILM) involves the bank's ability to meet its payment and settlement commitments throughout the course of a business day. Emphasis on ILM has significantly increased since the global financial crisis.

The lack of good visibility of intraday flows often have the result that banks are overly conservative and hold more High-Quality Liquid Assets (HQLA) than needed, in order to mitigate any unexpected funding shortfalls. HQLA is a very expensive commodity to deploy uncommercially.

The problem with ILM is that traditional liquidity management techniques like - trend analysis; back testing; limit setting; and end of day monitoring, do not work well in this idiosyncratic and real-time environment. It requires a forward-looking approach, continuous calculation of the cumulative position, forecasting using real time data points, and intelligent monitoring of limits etc.

Leveraging machine learning can help to make ILM a more efficient and effective management process. Machine learning can be used to identify expected

payment occurrences vs unexpected flows and the timing of these during the day. Visualization of these predicated cashflows can then help ascertain the criticality of the payment and if it can be moved to later in the day, when there is less stress on liquidity (Accenture 2018).

5.1.3 Securitisation of Assets

One of the benefits of securitisation is that it allows banks to pre-package heterogeneous loans into standardised capital market instruments, which is more acceptable for counterparties. This provides the option to quickly liquidate assets, i.e. sell illiquid term assets in a contingent liquidity event or the ability to deploy it as collateral for future funding needs.

Treasury plays a key part in working with the different stakeholders across the business units (i.e. mortgages, commercial loans, vehicle financing etc.) to identify, scrub and package these underlying assets into a Special Purpose Vehicle (SPV) for securitisation.

However, there are two main hurdles that slow down or even prevent the establishment of a new securitisation transaction namely, the ongoing use of paper-based documentation which needs to get uploaded into systems, and business originators not being aware of all the securitisation requirements when originating new assets (i.e. what features would make a new loan more liquidity friendly).

Digital technology like optical imaging and Robotic Process Automation can play a big part in addressing the problem and streamlining this process. It is relatively easy to bolt these technologies onto the underlying loan systems. Optical imaging can reduce the time required to manually upload the necessary documents and Robotic Process Automation can speed up the process to collate loans with similar characteristics into a common cohort for securitisation.

This smart automation will significantly enhance a bank's ability to convert illiquid loans into liquid instruments. This kind of asset is a more valuable commodity, in that it can be used to raise secured funding, which is a far cheaper option than unsecured funding sources (e.g. term debt).

5.2 Using Smart Treasury Information for Balance Sheet Steering

The three digital use cases described above illustrate how smart digital technology can practically address some of the challenges faced by Treasury i.e. understand client behaviour better; improve the predictive ability around payment instructions; and

speed up the generation of new collateral. The real strategic power lies in integrating these individual outputs into a unified picture. One solution is to feed these into an intelligent management dashboard. Another is to use them in Funds Transfer Pricing, which is responsible to charge out costs to the users of funds and incentivise the generators of funding.

With the smarter insights generated in these case studies, Treasury can for example - pay a higher rate if the deposit funding is deemed to be long dated and stable in nature; charge out the Intraday Liquidity costs to the specific business units that controls their client payments ineffectively; and provide a lower funding cost to loan originators who write assets that is securitisation friendly.

It is this kind of integration that can deliver true efficiencies and can underpin proper strategic balance sheet steering and help optimise the commercial margin of the bank.

6 CONCLUSIONS

The role and responsibility of a bank's Treasury department has changed significantly over the last couple of decades, but especially since the 2008 financial crisis. During this time, Treasury's role and responsibility has evolved significantly to become the custodian of the balance sheet.

Comprehensive digitalisation of Treasury can help support this expanding management mandate, provide a competitive advantage, and deliver a range of commercial advantages. The reasons are that digital innovations provide a range of benefits that can help stream-line operational intensive Treasury activities. Leveraging these digital functionalities will allow Treasury to focus more on strategic activities, namely advising senior bank leaders and becoming instrumental in helping them to protect and advance the bank's interest.

The problem is that Treasury tends to be a slow adopter of digital technology and often do not have a well-articulated digital strategy in place. The Smart Digital Treasury Model (SDTM) was therefore developed, with the objective to provide a bank Treasury, a proper framework to transition towards more intelligent management function (Von Solms 2020).

This paper has identified a number of digital use cases to illustrate how implementation of digital technology can take place for key Treasury activities.

Digital technologies can also bring challenges in terms of new Risks and Threats and the sourcing of relevant expertise and skills, but banks that invest in

these next generation technologies will be rewarded by an improved ability to make the right Treasury management decision at the right time.

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