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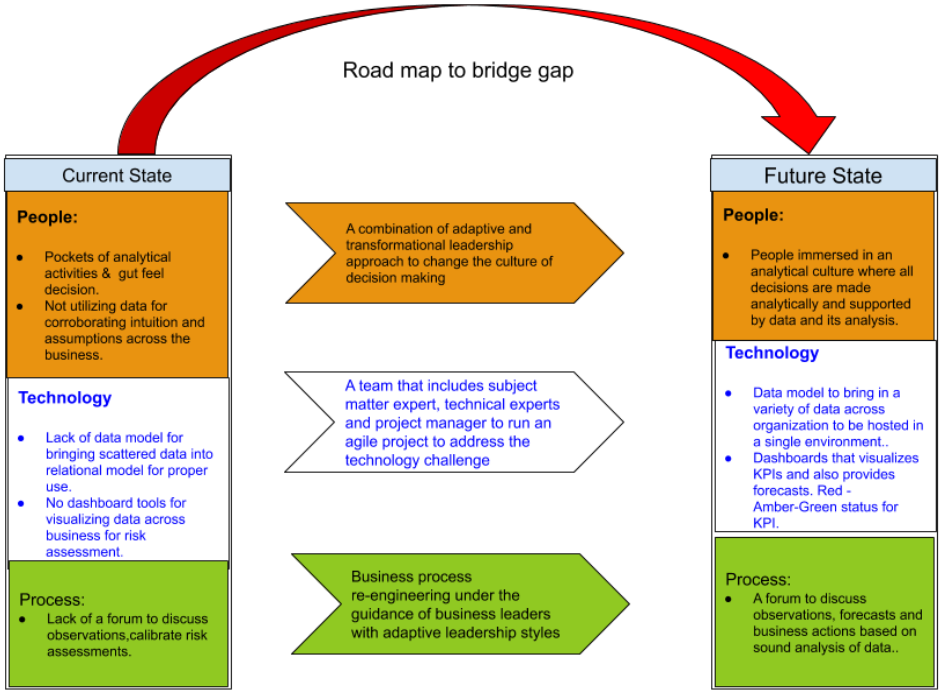
Transformation Plan

Agility has long been sought by American Bank to integrate a process by which data can be accessed and assessed across organizational boundaries. These requirements have instilled a desire to make strategic decisions based on data rather than the current human-based expectations of risk and organizational performance. The bank has some pockets of analytical activity that needs to come together that make the enterprise compete on analytics.



The expected benefit for this process is defined below, given the current expectation of benefit and the ability for the organization to meet its overall objective.

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Background

Choice of Transformation Framework

A business culture transformation calls for more leadership than management in the beginning. A strong leader is required to make the organization cope with cultural change, while strong management skills are required to cope with the complexities of the business process changes (Gray & Larson,2006). Kotter's 8 step model outlines a transformation framework that has proven to be successful for many organizations. It is a transformation model that fits most of the situation. Also, Accenture's 4As (Align, Act, Adjust, Adopt, and Adapt) model was explored; the below figures show the two transformation frameworks. They are very similar in approaches. Since the 4As build in the agile management aspect explicitly along with leadership aspect of the framework, the 4As framework is chosen for American Bank's transformation effort.

- ***Align Leaders:*** Alignment of business units' leader's vision and mission for transformation.
- ***Act (Initiation):*** Prove value at a small scale with short lead time to get quick wins and solidify leaders' alignment with proof of value.
- ***Adjust:*** Adjust the processes and technologies to be oriented for enterprise-wide scaling.
- ***Adopt:*** Adopt new operating model/processes/Technologies across the enterprise with further inputs from stakeholders. Further refinement of the "Adjust" step above.
- ***Adapt:*** Making decisions powered by analytics across the enterprise. Culture change accomplished and sustaining the cultural change.

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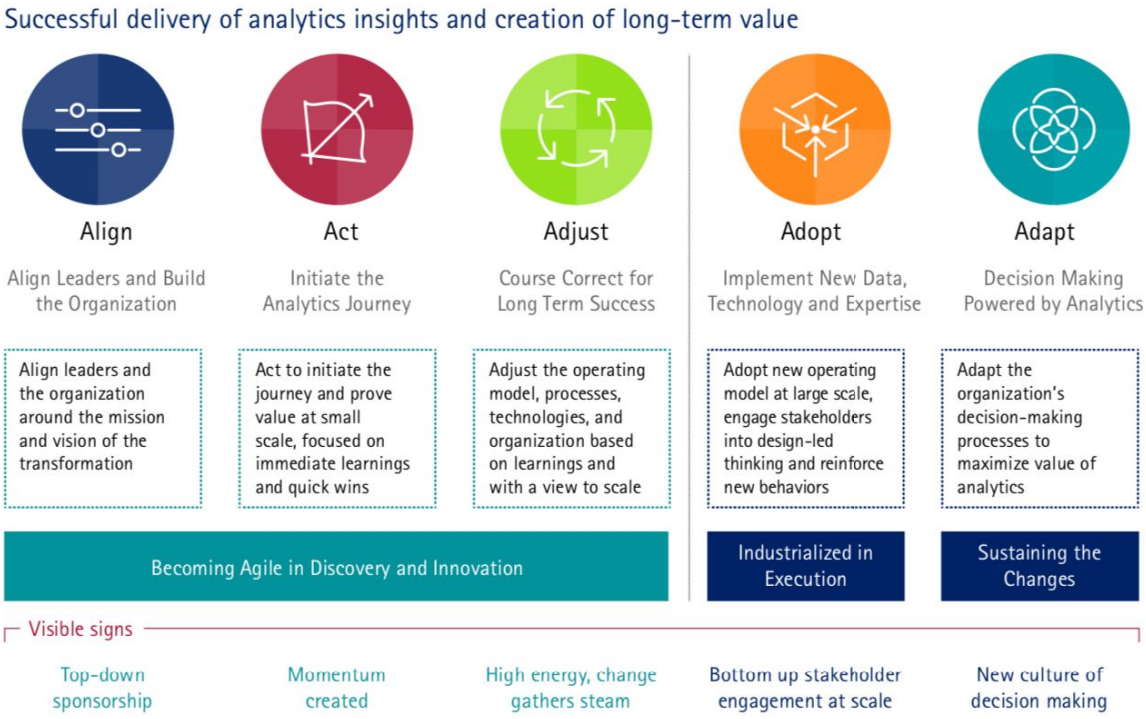
(Source: Adapted from Kotter 1996)



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Analytics Gap and Strategy

The gap between the current state and the expected future state is categorized into three categories - People (culture), Technology and Process (decision-making process). The strategy to approach each of these categories is discussed in this section.

People/Cultural gap: Business managers have relied on their intuition and their perception of risks. Some managers have used data at their disposal to make reports to prove their point of view, but lack the use of enterprise wide data to calibrate risk assessment across business or forecasts to tailor business decisions.
Strategy to address people gap: Use an adaptive and transformational leadership approach by viewing the organization from a 50K foot level to highlight prior missed opportunities and current potential risk exposure. Incite the sense of urgency of how detrimental it is to the business and drive home the point that the business would be at the risk of being acquired by competition if decision making culture doesn't change. Transformational leadership approach to align managers' mission towards the common goal.

Technology gap: Different business units collect data differently and report differently and use similar data for a variety of purposes. They are sometimes resulting in several sources of truths. There is a gap of enterprise-wide data models and a single pipeline of data workflow to bring in data as a single source of truth for enterprise-wide use (A data lake or single environment for all data).

Strategy to address tech gap: Initiate action (Act) by forming a team of subject matter experts, technical experts and a project manager to put in place the necessary infrastructure to a pipe and collate data. The team would manage the project in an agile manner to "Act" on requirements in sprints and loop back to "Adjust" for long term-enterprise wide adoption and success.

Process gap: The bank does not have a forum to make collective decisions, showcase success stories that could be adopted by other teams in the organization. A business process to ensure successes are replicated across the organization and analytical behaviors are rewarded.

Strategy to address process gap: Situational leadership and transformational leadership approaches to coach good behaviors to followers and sustain the cultural change for

continuous improvements. And prevent entropy effects that would result in slide back to old behaviors and practices.

The approach is to align the transformational goals with a value proposition that integrates the forecasting and predictive approach to utilize data formatted as a dashboard. The transformation targets both a real-time inference of the current position, standard risk metrics, and key risks facing the bank. The stakeholders in this transformation are executives such that the value is to better understand how the bank is positioned and to make more data focused strategic decisions about where and how to allocate resources. Typically, such a review is done on a quarterly basis and requires significant work by various staff to pull multiple information sources together. Thus, the transformation value is moving from reporting to predictive and real-time metrics.

Another facet of this project is to provide an overview for cross-bank risks. Any individual portfolio or part of the balance sheet might seem to be in a favorable financial position to any of the individual portfolio managers, but the bank could be exposed to similar risks across all of its operations. In this case, the holistic decision might want to pursue less profitable business lines or trades for a time if they are not well-insulated from the cross-bank risk.

The output of the transformation process is a measure of data utilization and value generation, coupled with an approach to satisfy the internal stakeholders through an approach the incorporates satisfaction, derived value from real-time decision making and exposure of risk elements as a process of predictive response rather than response. Each element contributes to the underlying return on investment for such a process.

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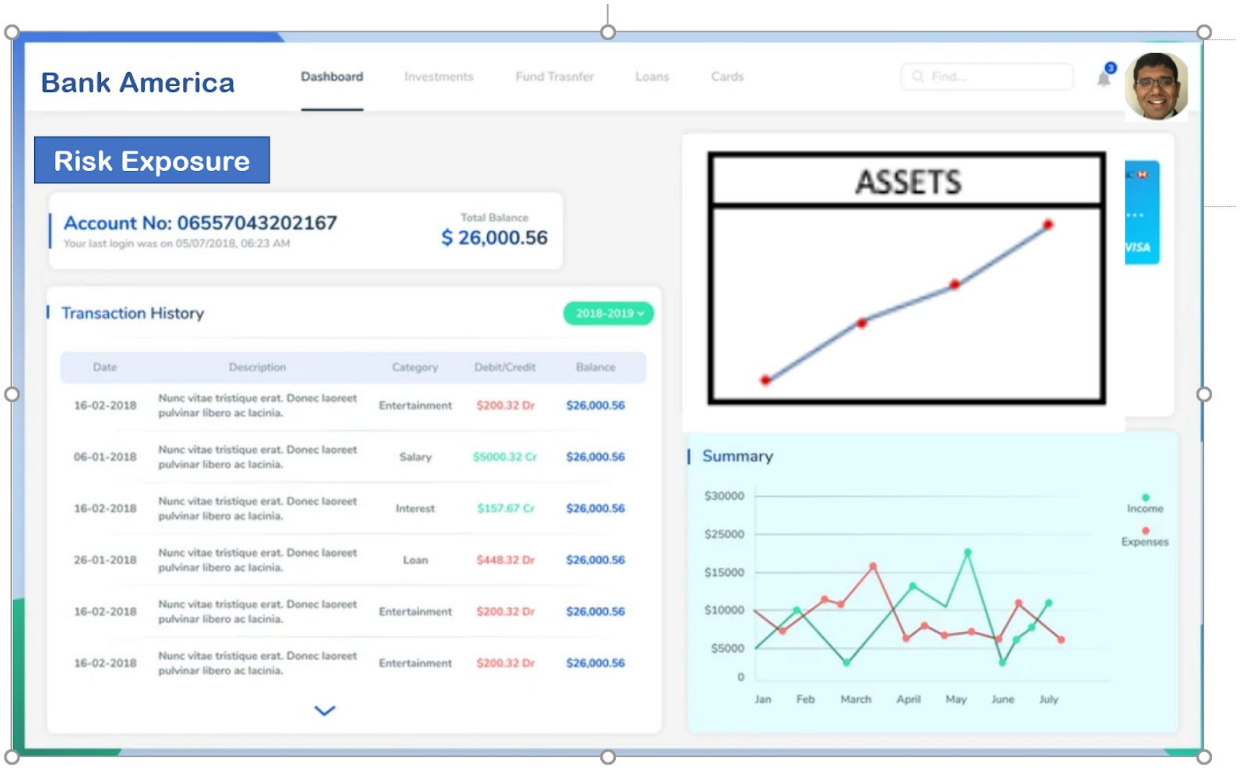

The analytics maturity model below defines the process improvements made and the integration of bridging the gap from the current reporting strategy to a level of monitoring and forecasting. The future state puts the transformation into the predictive level of maturity as to goal for the project and the organizational requirements.

- **Reporting:** Reporting is currently done largely in order to satisfy accounting and reporting requirements and data for doing this is well-maintained in an analytical warehouse. However, these sorts of reports are not sufficient for thinking strategically about decisions the bank needs to make. They are a current snapshot of how things are and how they have been over the prior quarter and year. Going forward, reporting should be expanded to include key changes in the bank's assets and liabilities and how strategic decisions are being implemented. This requires tracking counterfactual bank balance sheet compositions (i.e., to measure how successful the strategy has been) and forecasts of how the balance sheet is likely to play out across likely paths of interest rates, funding costs, currency prices, and so forth.
- **Analysis:** Analysis in American Bank has so far been confined to evaluating the firm's profitability over time. This is a relatively limited analysis because it is incapable of highlighting either how some older strategy would have performed now (i.e., bank profitability naturally shifts with financial market conditions and so the comparison to a year ago is not necessarily a good comparison) or how the strategy is likely to perform

going forward.

To facilitate better strategic decisions, which will help increase American Bank's profitability, analysis should be forward looking. That is, it should present scenario based analysis of how various bank strategies would perform given some set of financial market outcomes. This set of outcomes should include both Monte-Carlo generated a set of consistent outcomes and selected scenarios that feature key, idiosyncratic risks. This will allow for strategic bank funding and lending decisions around both the highest expected profitability, but also protecting against downside risk.

- **Monitoring:** American Bank's current monitoring largely involves mark-to-market profitability measures on the asset side and daily cost measures on the funding side. Each sub-portfolio is managed separately and consideration of cross-portfolio risks are limited to quarterly reports which take a considerable amount of time to produce. Going forward, executives should be able to monitor how American Bank's entire portfolio aggregates both in terms of profitability but also risk. This should inform strategic decisions around investment decisions and funding choices.
- **Forecasting:** Forecasting is currently done in order to forecast simple evaluative metrics of how the bank's balance sheet will perform over time. Going forward, these forecasts should allow for automated variation in American Bank's strategies in order to account for likely responses to changes in financial market conditions. Further, more effort should be put into forecasting known risks (e.g. Brexit, Impeachment, Trade) and how those would affect American Bank's clients and American Bank's own financial positions. This more robust analysis will allow American Bank to position to mitigate against downside risk.
- **Prescriptive:** Currently, there is no prescriptive analysis produced at American Bank on a regular basis. Models and analysis are done in order to present and understand a state-of-affairs and then interpreted by analysts and executives.

Going forward, American Bank will agree to key risk measures and, using the forecasting tools described above, produce automated daily reports that will note which metrics are low and propose the most straightforward strategy for addressing the concern. For example, if funding is consistently coming from only two money funds, the report might suggest acquiring more counterparties or entering into some other lending agreement with another bank or institution. Forecasting will be used in order to consider when these constraints might bind in the future or how a certain strategy will play out. For example, over quarter-ends, American Bank often finds its funding quite limited. In order to be able to fund itself relatively cheaply over quarter- and year-ends, American

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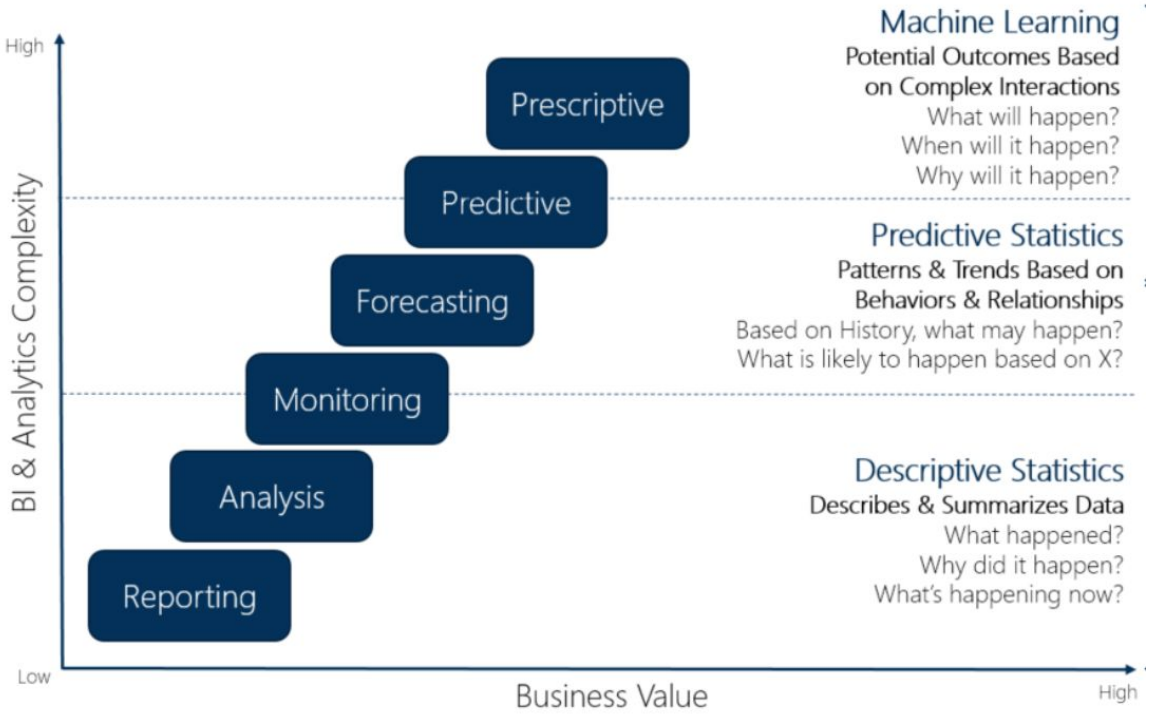
Bank should produce reports estimating funding costs based on negotiating position (more counterparties -> more funding sources -> better negotiating position).



Implementing changes along these lines will allow American Bank to harvest more value from analytics. It will do this by allowing analytics to inform specific decisions that the firm is interested in making (e.g., portfolio composition, risk mitigation) in a quantitatively supported and repeatable way. This will happen by moving up the analytical chain from analysis and monitoring (where the bank currently stands) and into forecasting and prescriptive approaches.

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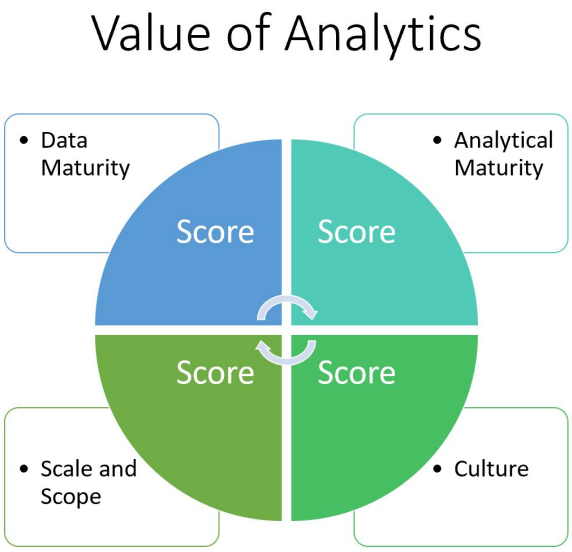

- This will be done by improving the **data maturity** of the firm. Data maturity is measured by how easy necessary data is to access both in terms of it being all in one place and well organized but also in speed. As new challenges are revealed, the data should be easy to reorganize.
- In terms of **analytical maturity**, Bank America is moving toward a world where analysis is designed to move beyond understanding how the world has been and into a paradigm where the analysis should produce specific recommendations in a way that is automatable and able to be disseminated to the staff.
- The **scale and scope** of the analytical transformation are to expand analytical decisions throughout the firm and into specific trade/loan-level prescriptions across business lines.
- The **culture** of Bank America will have to change in order to get people to interact with the modeling and prescriptive forecasting in order to improve them. This will require people in the 'front-office' (i.e., traders and decision-makers) to change their current processes. Further, the front-office will also have to be willing to act on the algorithms' advice.

Pipeline of Demonstration Projects

As the exposure of analytical transformation starts to grow within the American Bank, the process is to refine the underlying intake of data elements and the processes by which we can create value and inference. As we have seen with a conglomeration of banking data, we have exposed issues in the performance and identification of specific indicators of risk and exposure within the asset management function. The issues to address next are across multiple business

units. The impetus for such a transformation of both the internal culture and the requirement for data-driven success is this initial project. As a flagship project, the aim is to encourage change for values sake.

What follows is a description of a sequence of projects that will be implemented in order to meet American Bank's goals of utilizing cross-business unit forecasts in order to inform strategic decisions. This order was chosen in order to facilitate progressively more cross-asset, in-depth, forward-looking information in a report format in order to facilitate strategic decision making by the business. Each of these projects might conceivably be broken into smaller projects in order to implement them. The organization presented below preserves the contribution to the bank's strategic data and analytical goals.

First, American Bank will work on coalescing all of the relevant data into a Big Data platform and then using that data to create daily snapshots of the bank's balance sheet and daily profitability. This will require the bank to begin shifting resources (both technological and person-wise) to a new data environment in order to best utilize the new project. This will require shifting money and attention from the current SQL database and creating employee buy in from both technology and end-users in order to make sure that the project succeeds and the bank's strategic goals are met.

Second, market rates and other asset prices will be added to the Big Data platform. These will be used to generate Monte Carlo asset price forecasts going out of the next two years. These Monte Carlo paths will be consistent (i.e., Treasury prices and Agency MBS prices and the US Dollar will covary according to their historical relationship) and used to inform projections of American Bank's portfolio over that time. This will require moving more data into the big data environment and collecting in a systematic way new data. Collecting this data will require shifts in both people and technology (and the bank's strategy itself might need to shift in order to accommodate the realities of this shift).

Third, models will be built to allow American Bank's strategies to dynamically respond to the current expected path of interest rates from the Monte Carlo model. This will enable the bank to test out different portfolio strategies against the likely path of outcomes to see which ones perform best. Further, other factors that the bank might believe are correlated with asset prices (i.e., financial market data, funding and bank relation data that the bank has private information about) can be incorporated into these forecasts. This provides American Bank to leverage its position in the market to make strategic decisions. This shift will require American Bank to invest more in modeling and the people capable of doing this modeling. This will require integrating new staff members into the bank's culture.

Fourth, specific scenarios around known risks will be implemented by altering key modeling assumptions around relevant financial market instruments (e.g., for a Brexit analysis altering the expected path and variance of the British pound, gilt yields, and the euro). This should allow daily dashboards to be updated that would capture how the bank's strategies are likely to perform against known but not historically observed risks (i.e., the type unlikely to be captured in the Monte Carlo analysis). This shift will require the analysts added in the previous stage to come into contact with bank subject matter experts in order to provide reasonable forecasts of specific financial market outcomes in a robust way--as this process happens the more modeling focussed staff should become more tightly integrated into specific teams.

Fifth, given the results from the modeling above and the most recent set of investment decisions made by business area managers. For example, if the models suggest that the current set of investment decisions (if carried out over time) would lead to a meaningfully worse set of outcomes against the expected path of financial market conditions, then the report could suggest some trades that are likely to be more profitable or stable over various time horizons. This is perhaps the most crucial person-level change that the current plan requires, which should have been prepared by the intervening stages. Staff will have to accept recommendations based on the inputs of the algorithm, or else the analysis will not have actually affected specific investment decisions. Staff might feel like they're being phased out or made less prominent. Staff should be trained on how to best interact with the models and the model outcomes and how to raise concerns about the recommendation to the modellers and their superiors in the organization.

In order to implement these changes, the team will need governance in order to make sure that the project is on-task and that new teams and bridges between teams are being implemented. To this end, there will need to be supported by the executive office (in the form of the CTO) to empower a project accountability officer to lead the project.

This accountability officer will be required to put together specific timelines, budgets, and to hold people accountable for meeting deadlines. This can include managing the technology (i.e., choosing the proper Big Data environment) and positioning and hiring staff in order to make sure that the firm is able to support these projects going forward. In addition, accountability should also include ensuring that people are working with their counterparts across business lines.

People and Technology Infrastructure Investments

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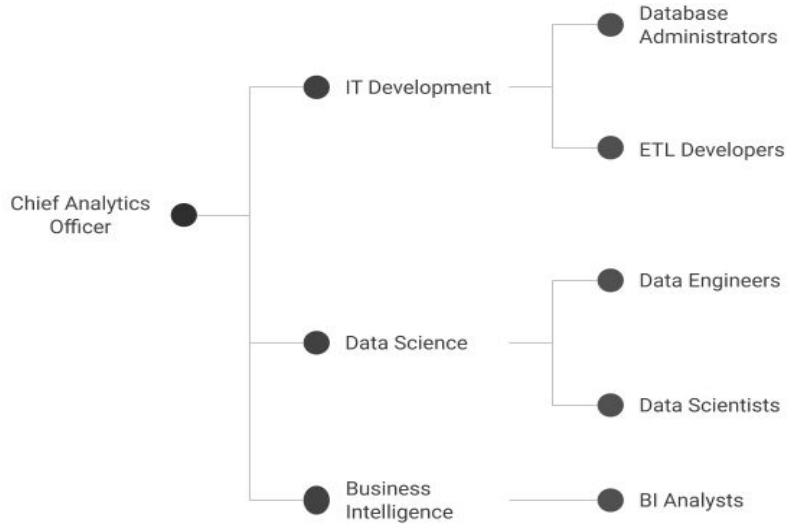
In order to accomplish the established goals, American Bank will have to implement several measures to ensure that we can advance in our analytics maturity level and are able to leverage data driven decision making within our business processes.

The first step that we will need to take is to establish a clear vision of the bank's data strategy, and this process involves coordinating efforts within the bank's key business and operational support units in defining a strategy, capabilities and the value add that data and analytics can bring to the organization. Once the strategy has been defined, we will develop key deliverables such as key performance indicators, measurements, and long and short term goals and milestones to achieve.

Secondly, we will assess current personnel capabilities and requirements in order to determine whether we have the proper skills, training, adequate staffing and most importantly that the right roles and structures are defined and in place. The roles assessment will ensure that we have the proper distribution of skill sets within the organization to accomplish the goals, this includes the implementation and acquisition of big data engineers, database administrators, ETL developers, data engineers, data scientists and BI analysts.



Along with the second step, simultaneously, we will be assessing our current data structure and availability of information to ensure that we have identified all sources of relevant information

and the existence of silos within the organization that will need to be addressed during the restructuring process.

A natural progression to the previous point and third is the establishment of a Data Governance program. The data governance area will be tasked with establishing a proper framework for the handling, classification, access, and storage of the information. Part of the governance task will be to ensure adequate inventory and cataloging of data assets across the enterprise, which will enable the organization to properly mitigate risks associated with sensitive information floating across the company without proper controls and security measures. Additionally, it will serve as a centralized hub of metadata for all data across the bank, which will allow for more efficient visibility by developers and modelers alike in finding the information they need from a trusted source.

Once all the steps have been completed and the groundwork has been laid out for the analytics process, we can begin to look at the final piece which involves technology and infrastructure investments. When making assessments about the technological needs, we make sure we take into account the business requirements, size and scope of the data, as well as the processing needs and costs associated with the necessary platforms. Decisions at this stage are aligned with short-term and long-term strategies for growth and analytics maturity. We may begin with an on-premise solution in the interim where we can experiment and develop the necessary processes and data solutions for the analytics teams while simultaneously monitoring resource and technology usage to gauge whether additional investments are required within the existing architecture, or whether the pace and volume of the information organically call for strategic shifts towards cloud architectures and big data platforms such as hadoop, spark and snowflake for warehousing.

Risks and Mitigation Strategies

In the process of managing the approach to transformational analytical leadership, the project incurred and identified some major risks to the overall success of the program but also that of a sustained approach to continuous analytical leadership. The development of the underlying migration strategies are to provide assurances of success in applying analytical methods to the business as demonstrated in this project.

1. **Decision governance -** Failure of impacting decision-making and reverting back to ‘old habits’
2. **Culture -** we don’t use models and data to make decisions now
3. **Change management -** Changes are unmanaged and are not aligned with the process of generating value and cause conflicting issues

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Initial Risk	Frequency	Intensity
Decision Governance	High	High
Cultural shift	High	Medium
Change Management	Medium	Medium

Risk Mitigation

Applying the following strategies has enabled the organization to understand the root cause and align an approach that meets the strategic and operational requirements to implement a stronger risk tolerance to the transformation through the following approaches.

Decision Governance & Cultural shift Mitigation: Sustained transformational leadership and adaptive leadership approach to ensure problems that threaten the sustainability of the new analytical culture. Good analytical behaviors should be reinforced and rewarded.

Change Management Mitigation: The changes without stakeholder involvement usually fails, hence to start the change on a good footing, stakeholder involvement in the "Adopt" stage of the transformational process is very critical. Adaptive leaders within stakeholder community (who solve critical adoption problems) need to be developed to ensure the team continues to stay motivated to adopt the change across the enterprise. The upper management should reward teams that excel in the adoption of new methods and bring success to the organization.

The resulting residual risk review has provided the following chart as an indication of the continuous improvement requirements needed to address the frequency of issues arising and the intensity of a risk being actualized in the organization. Monitoring controls are in place to provide feedback if any risk were to increase beyond the current appetite American Bank has set for these risks see in the table below:

Residual Risk	Frequency	Intensity
Decision Governance	Medium	Low
Cultural shift	Low	Medium
Change Management	Low	Low

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Root cause analysis has provided insight into the underlying casualty of the risk effects. Using the five whys method, we as a unit have identified the following:

WHY: The approach has established some levels of leadership that are not prepared for this transformation

WHY: The understanding of the potential value has not been articulated in a manner that they understand

WHY: The approach has been strongly defined in terms of a 'data language' and not translated into terms and use cases that are easily understood by those outside of the project

WHY: The focus has been on developing value at the operational and tactical levels, a strategic adoption was thought to be shown as a value demonstration once the project was concluded and the value was being derived.

WHY: A communication and demonstration strategy with a learning curve at the highest levels of the organization should have been implemented as part of the project, once the project started the narrative should have engaged those who are not directly impacted by the project but who are now feeling the effects of a cultural change as the organization becomes data-driven.

The root cause analysis brings to light the cultural and change needs as the transformation has a ripple effect for the whole organization. The focus on reducing waste and generating value as quickly as possible has the unintended consequence of affecting secondary or tertiary stakeholders as they become aware of the transformation.

Initial Demonstration Project to Transformation

Through the process of defining an initial starting point to the transformation process, the evolution of two major contributors to success have been reevaluated:

Business Understanding

A need for visibility is lacking with regards to a time-based dashboard with access to assets, liabilities and capital structure, the assets' P&L and the funding cost of the balance sheet. The business objective is to manage these data sources with the aim of providing an overview of the bank's asset position in real-time and making prescriptive decisions based on.

- **Resources:** Resources will be utilized in order to make cross-portfolio decisions to implement more profitable decisions. This will require a large resource dedication both in terms of people (hiring new staff to build out big data environment), process

(changing how different business lines and technology interact), and technology (investing in a Big Data environment, investing in predictive models).

- **Risks:** Given the scope of the transformation, there is a risk that if the change is not well-implemented, it will have been a major cost (see outline below) without any real benefit. To avoid this outcome requires leadership in order to guarantee that the goals of the company are met--in large part this will require making sure that the people involved implementing the proper changes at the level of people, process, and technology.
- **Costs:** The costs of the transformation project are large: hiring new staff, changing business processes, investing in new technology. Given the size of the firm and the scope of the transformation, this will likely represent a large share of the firms operating and technology budgets for the years that it is being implemented.
- **Benefit:** The benefits of the analytical transformation are that it will put American Bank on the proper footing to ensure that the firm is resilient and competitive in years to come. Banking seems to be a stable industry--there is still a sizeable social demand to intermediate risk provisioning (i.e., making loans) and providing liquidity (i.e., deposits) and relatively large barriers to entry (i.e., new entrants would need considerable capital and build out a client base). On the other hand, firms are very competitive and less successful firms are likely to be bought out.

Data Understanding

- **Initial Data Understanding**: Initially, data was essentially understood to be balance sheet and positioning data, along with key financial market risk metrics. This is in line with the historical bank understanding of its position and decisions.
- **Describe the data**: The initial understanding of the data was largely correct insofar as it was constructed. However, the data expanded to include other sources including other externally provided data, internal data that wasn't used in required financial reporting, and constructed metrics from the existing analysis.
- **Exploration and interconnection of data and data repo's:** Data needed to be all stored on a common, analytical Big Data environment in order for it be best utilized for the bank. This is because novel analyses required the quick creation of new views and combinations of large amounts of data (financial data largely consists of very large, frequent (microsecond) time series). This has required sourcing data from a variety of separate data sources. Bank balance sheet data still needs to be kept in a separate, SQL database for the production of regulatory reports. Other data (market depth, other financial instrument prices) needed to be aggregated from other external sources while some data needed to be encoded from internal processes (e.g., indicative quotes).

- **Data Quality:** The quality of the data is paramount to Bank America's usages. If historical data is wrong in a consistent way, it could lead to very poor recommendations from the prescriptive analytical models. As with most Big Data environments, the data is very large and an exhaustive check of each piece of data is impossible. The data is managed by a team who will provide consistent, systematic checks of new data (both internal and external) to ensure that they make sense in relation to each other (e.g., given new data from various sources that prices are quoted consistently between sources).

Personal Philosophy of Analytical Leadership

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PROFILE

The experience to understand and apply situational awareness with the empowerment and motivational requirements to reduce waste, maximize value, and develop world class analytical products.

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HOBBIES

Cultural warrior
Banking guru
Data wrangling

Philosophy of Analytical Leadership

"As a financial institution in a highly competitive market, our true differentiator is the management and utilization of data. The true mark of the transformational process is to encourage and require the maximum value extraction to position our services as the most accurate and profitable."

Analytical Leader

EDUCATION

Northwestern MSc Data Science
Jul 2012 – Oct 2014

Northwestern BSc Finance
Sep 2007 - Jan 2010

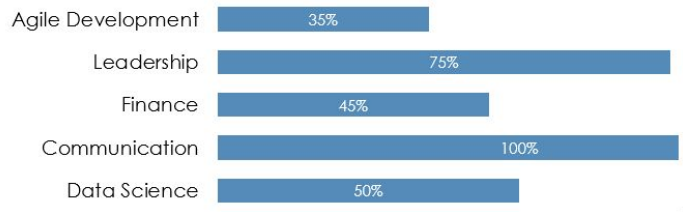
WORK EXPERIENCE

Bank America: Chief Analytics Officer
Jan 2017–Current

Bank America Data Scientist
Oct 2014–Jan-2017

Bank America Quantitative Analysts and Risk Modelling Lead
Feb 2010 – Oct 2014

SKILLS



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