



INSIGHTS. INNOVATION. IMPACT



SOLUTIONS FOR ANALYTICS POWERED BANKING

Financial Industry Scenario

The world economy is slowly coming out of the last decade's global financial crisis which was ignited by the subprime mortgage crisis. However, the challenges to the world economy still remain, with uncertainties over the Greece debt, the EU debt, the Ukraine geo-political scenario, volatile crude prices, fall in quality of assets financed, slow job growth in the US and Europe, etc. Besides the political and economic factors, banks & financial institutions also face newer challenges in the form of rise in frauds and monetary losses through cyber threats, data breach, hacking & phishing activities, etc. These have risen to alarming rates owing to technological advancements and spurts in m-commerce & online transactions. Banks & financial institutions are preparing to ward-off these challenges through increased investment in technology as well as various regulatory measures or internal risk & profitability management. This has resulted in an increased cost to meet various compliance and technology upgrades. On the other hand, there is a constant emphasis on growth, balance sheet planning and optimization. The continuous challenges of the industry are to provide better customer service and prevent their attrition. One of the constant fights is also to retain, and acquire new customers.

Shift towards data driven operations

The banks & financial institutions are looking to shift towards real-time, data-driven operating and decision support models. This would enable seamless integration of functional silos and provide cross functional insights. Further, they seek to replace manual spreadsheet based metrics and redundant technology solutions. With exponentially streaming volumes of structured and unstructured data, banks & financial

institutions are overwhelmed by the wealth of information that necessitates a unified and integrated analytics solution for deriving meaningful and timely insights to take more informed, strategic and operational decisions. Accordingly, upstream banks & financial institutions need to harness new technological advances, such as digitization and Big Data Analytics, to unlock the value from the dark data and provide greater insights to business owners.

Along with the growth concerns, banks & financial institutions also need to continuously adhere to the evolving risk management practices and meet the ever growing statutory reporting requirements. This needs a new data driven approach that leverages advanced algorithms in collaboration with vast data integrating real time operating data with other business information. This further enables descriptive, diagnostic, predictive and prescriptive analytics.

Key Challenges being faced by Banks and Financial Institutions

Some of the major challenges being faced by banks & financial institutions in today's volatile and extremely competitive market are:

Customer Engagement

- Based on customer profile and withdrawal pattern, which are the best locations to open new offsite ATMs?
- Which are the regions/sectors where the bank should focus their sales activities to expect maximum deposit generation?
- How to determine based on customer profile, deposit and withdrawal pattern which customers are good targets to cross sell banking (credit cards, fixed deposits) or non-banking products (based on alliances with other vendors)?
- How to recognize the age groups which would be targeted for various types of products?
- How to reduce customer churn especially among high-value and high net-worth customers?
- How to provide advanced analytics on high-value and high net-worth customers?

Early Warning for Distressed Assets

- How to arrest ever increasing Non-Performing Advances menace?
- How to effectively manage credit risk by maintaining a good client portfolio?
- How to mitigate delinquencies by monitoring the optimum number of accounts?
- How to get an early alert for distressed assets before these become NPA?
- How to correlate internal data with unstructured external information in real time to identify distress signals and prevent potential NPAs?

Fraud and Crime Prevention

- How to recognize the suspected fraudulent transaction patterns over a huge volume of data?
- How to monitor suspicious customers / accounts?
- How to trace interconnected geographically distributed suspicious transactions?
- How to monitor internal resources to prevent fraudulent transactions and maintain the bank's reputation?
- How to react quickly to changes in regulatory reporting requirements?

Liquidity & Risk

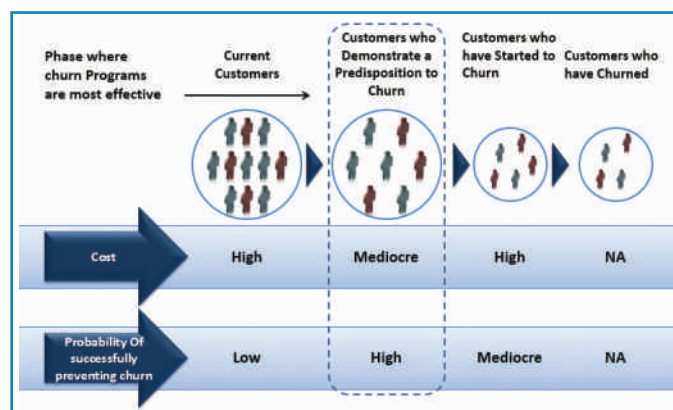
- How to find the optimum cash or balance in current accounts which has to be maintained to service clients?
- How to manage assets and liabilities across various time periods?
- How to manage balance sheet mix, pricing and maturity profiles?
- How to find the optimum rate of interest at which the profitability will be maximum?
- How to compute impact on earnings on a dynamic basis with changes in interest rates?

Rolta's Customer Engagement Analytics Solution

To succeed in today's marketplace, banks must focus on extracting more value from their data assets. Harvesting existing data sources – both internal and external – must be an immediate priority. Rolta's approach of successfully combining data from all available sources along with predictive and prescriptive analytics driven by the power of big data

technologies makes it a compelling choice. We believe banks can maximize the value of their customer data by leveraging advanced analytics across the three key areas of customer retention, market share growth and increasing customer satisfaction.

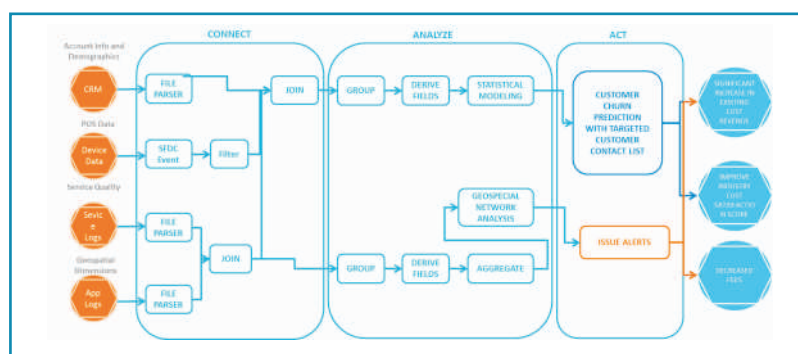
Use Case: Customer Attrition Prediction and Engagement



Acquiring new customers has become far more expensive than retaining existing ones. Customers attrite on a definite path to inactivity which can be identified and therefore managed. The transaction data is gathered and the relationship between this data and the customer profile is used to develop an advanced statistical and machine learning based churn model, to identify the propensity of the customer churning. This can also be used to calculate customer's lifetime value. By employing Rolta's attrition analysis solution, customers whose engagement levels have lowered and who are likely to attrite can

be identified with enough lead time for appropriate retention strategies.

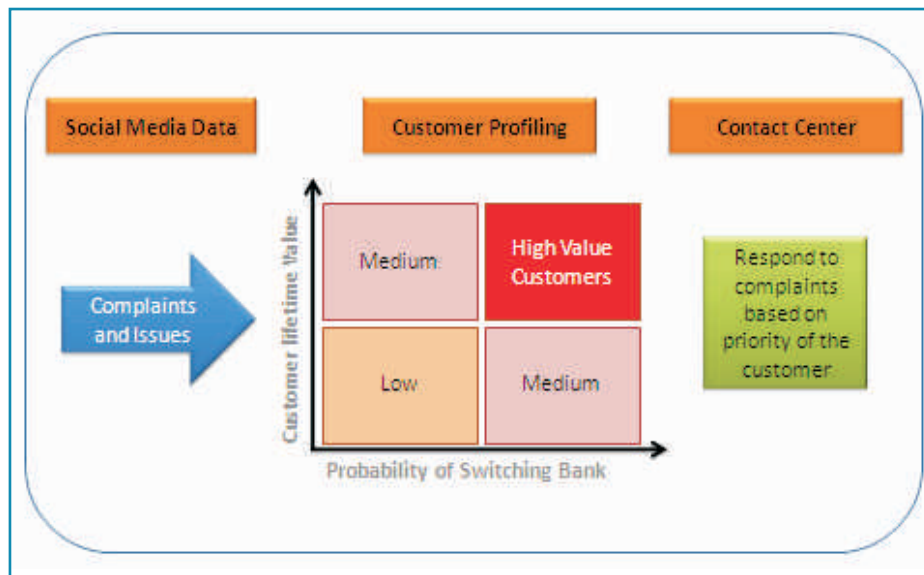
Our enriched approach to churn analysis, as illustrated below, leverages insightful data from across the customer account information and demographics, mobile device usage data, call data record logs at the contact center, and geospatial information available with telecom partners or home grown applications. Real time big data based approaches are in built with Rolta's solutions and form the bedrock for prescribing the best action to be taken for each customer.



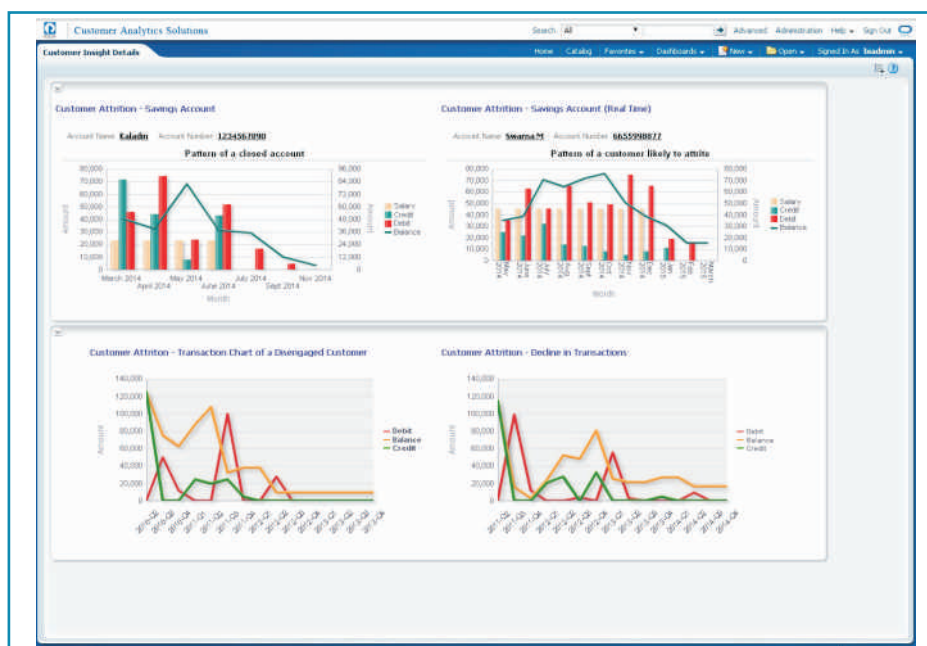
Gaining Insights from Social Media

Social networks have established themselves as an important channel of customer engagement. It is now accepted that banks stand to benefit from these networks if they engage with them in the right way. However, not many banks have reached a comfort level with social media interactions. This is an area that can no longer be ignored. The number of bank customers who spend their time on social networks has increased dramatically, and these customers generate huge amounts of chatter that can be distilled using social

media analytics to gain specific insights. Banks that have taken the leap into this arena are already reaping the benefits. Using various social media analytics, banks can track customer sentiment and gain a better appreciation of what they think about a new product, leading to possible product enhancements. Or, they could stumble upon a particular aspect of what customers dislike about the bank. Used effectively, this channel will serve as an ideal medium for launching new products, as well.

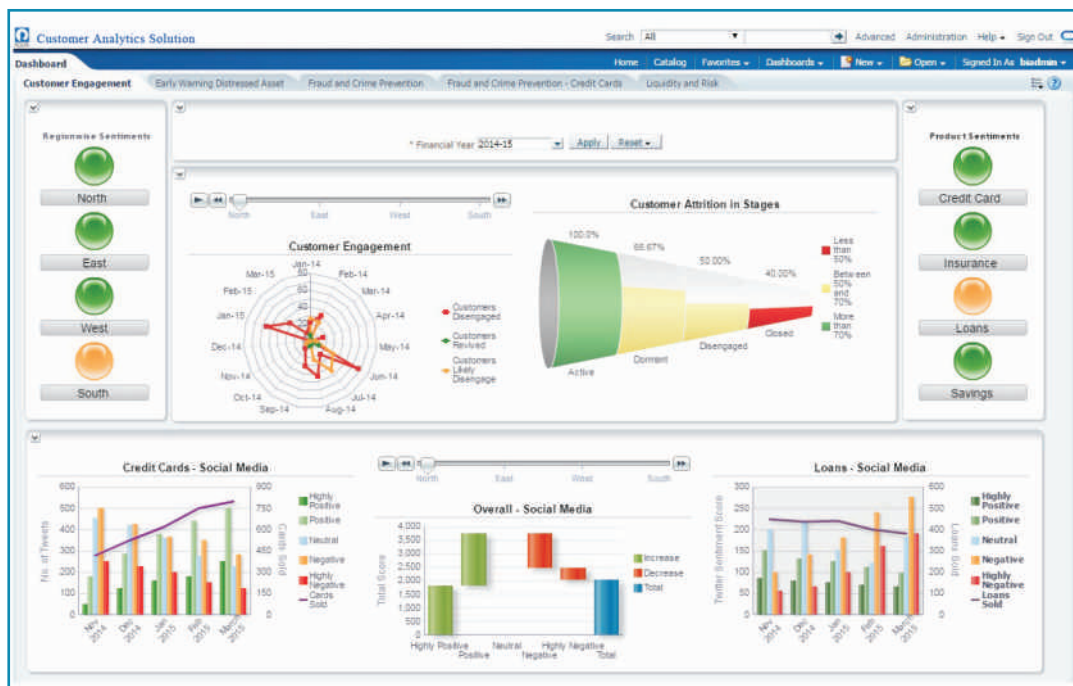


Customer Retention Model



Rolta's pre-built big data based solutions can automatically alert potential customer churn by integrating social media activity. As shown in the dashboard, the activity levels are monitored and corroborated through social media feeds. This can then trigger engagement interventions by the customer's relationship managers in the bank. This is done via the following:

- Develop advanced statistical models that predict the customers who are likely to attrite within 30 to 60 days on an ongoing basis
- Identify the characteristics of the most profitable/desirable customer segments in order to develop policies to ensure their continued support, engage this group, and to acquire more customers with similar characteristics



Benefits of Rolta's Customer Engagement Analytics Solution:

- In today's extremely competitive market get real time analytics on the customer behavior by linking internal data with social media information and be ahead of the competition
- Informed decision making and proactive action
- Customer differentiation based on the transactional behavior coupled with business potential directly leading to a bigger share of customer wallet
- Improved customer service by tracking social media feedback back to the root cause of customer dissatisfaction. A more satisfied customer is a more profitable customer
- Improved customer service will assist the bank with enhanced brand recognition and better marketability resulting in influx of new customers

Rolta's Early Warning System for NPAs

- The impact of the financial crisis can still be felt in the form of a rise in the number of insolvency cases, business downturn and lowered investor confidence
- Rise in insolvency and business downturn has directly impacted bank's profitability because of the rise in requirement of a higher level of provisioning and write-offs on more credit facilities turning bad
- This in turn has led to increase in banking supervision. Regulators the world over have started focussing on effective Risk Data Aggregation (RDA) and Risk Reporting with a focus on early detection of stress on loans
- Bank management have also started looking into this with more focus on arresting a decline in shareholder equity & profitability
- In such a scenario, a system which can automatically identify assets at the nascent stage of distress, i.e. well in advance; can give banks the crucial time advantage to take measures and prevent such assets and accounts from turning into NPAs by evaluating various options like restricting or reducing exposure, exploring debt restructuring, infuse capital options, etc. – in short, take proactive action!
- Rolta's Early Warning System does this and more!



What is it?

- An automated system to identify assets at the incipient stage of stress, categorize the assets/customers into various risk levels and raise alerts to the relevant business owners for appropriate action

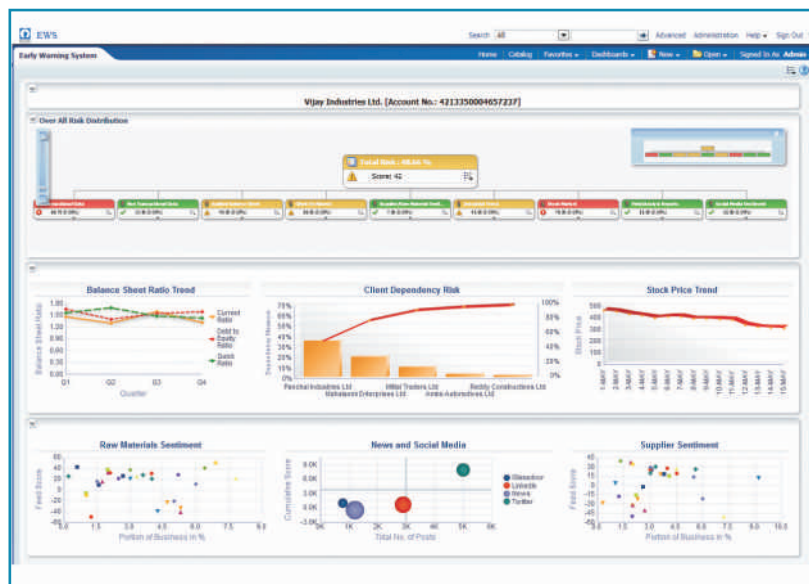
How?

- The system gathers and integrates data from both, banks' internal systems as well as a variety of external sources - like the web, social media sites, external credit rating agencies, regulatory & legal bodies, industry associations, news sites, etc.
- It uses this data to derive useful information to monitor and analyze customer behavior, near real time
- Triggers are defined within the system (e.g. return of cheques (outward/inward), delay in submission of stock statement, FFRs, delay in implementation/commencement of project, change in internal/external ratings, sale / pledge of shares by promoters, etc.) Different user customizable weightages are assigned to these triggers as per different customer segments or profiles and using statistics on past data of the bank as well as business experience & knowledge
- For each customer, a composite score is arrived at based on the number of triggers hit, criticality of triggers and type of triggers using advanced analytics algorithms
- The customers are categorized into low risk, medium risk, high risk and very high risk based on such calculated scores
- Alerts are sent to the relevant business owners as soon as a customer's score crosses a predefined threshold level, for appropriate action

Salient features of the Early Warning System developed by Rolta include:

- Robust, scalable, configurable Distress Identification Algorithm
- Big Data analytics to correlate and supplement structured data with unstructured data
- Takes into account financial as well as non-financial signals of stress
- Leveraging Big Data technologies to maximize the type and amount of relevant information collected, thereby enabling accurate early prediction
- Rich analysis of internal and external distress signals
- Near real time detection and alerts generation
- Illustrative reporting to view gradual deterioration and transition
- Easily customizable solution as per the bank's needs
- Correlated triggers combined using advanced analytics and statistics as well as functional experts' knowledge.
- The triggers and weightages are configurable and can be modified by the bank

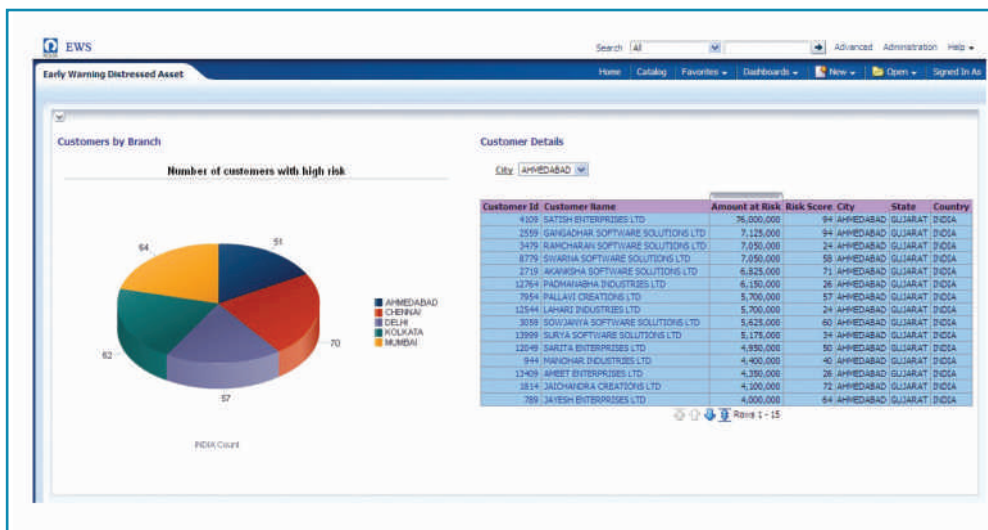
Illustrative Automated Reporting Dashboards



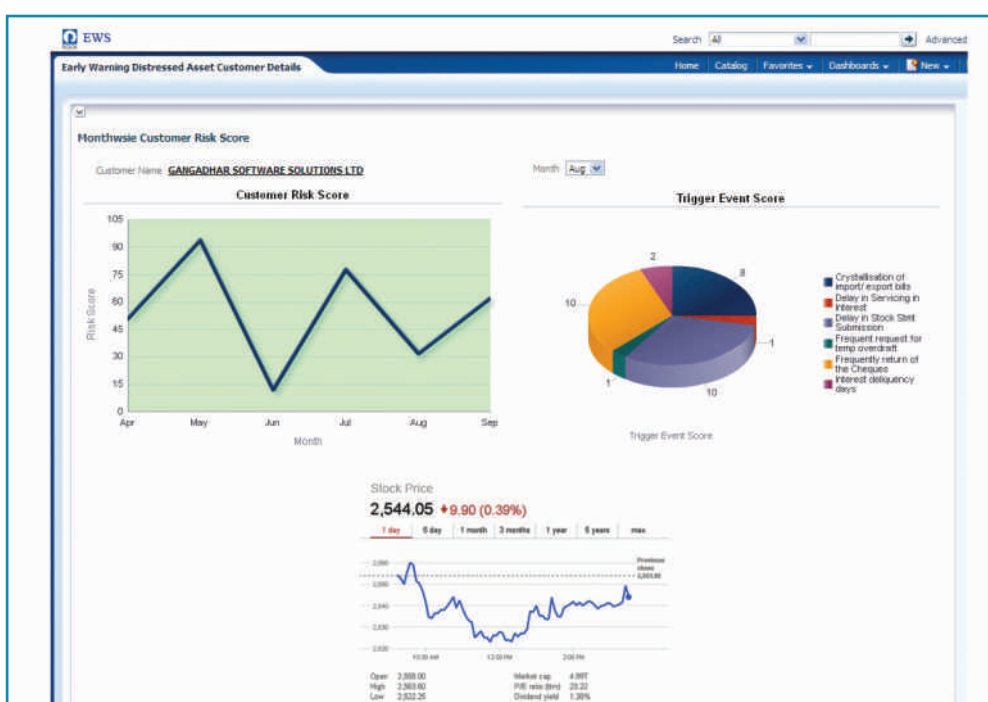
Customer NPA risk assessment dashboard



Summary Dashboards with counts and volumes under distress at an organization level - across geographies, branches, customers and time period



Detailed Dashboard - Branch-wise High Risk Customer Analysis



Detailed Dashboard – Customer level Risk Score Transition over selected time period with a RCA (Root Cause Analysis) on trigger events contributing to the Risk Score.

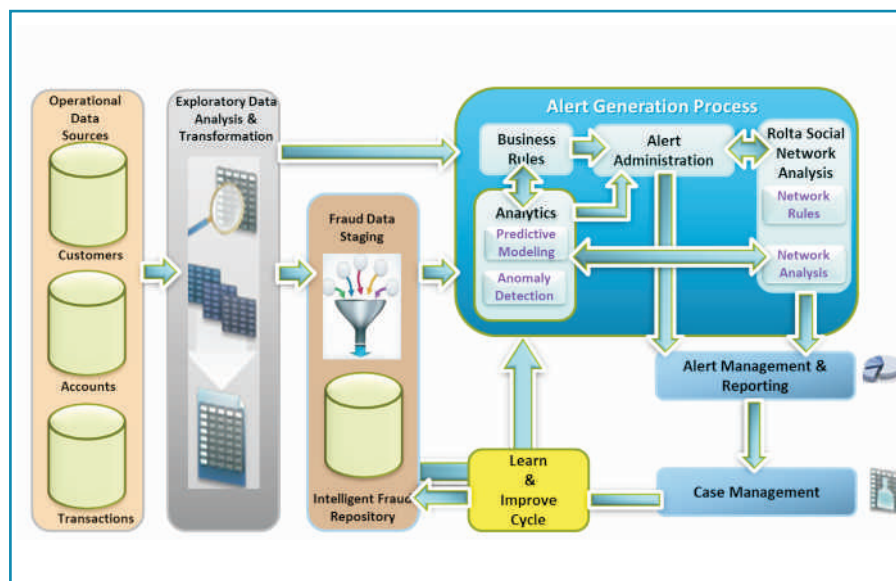
Benefits which will accrue out of Rolta's Early Warning Solution are:

- Taking appropriate action early-on, would result in higher cash recoveries of stressed assets and lower additions of NPAs
- Control NPAs, restrict exposure, thereby directly improving profitability as a result of lower provisioning & write-offs requirements
- Facilitate informed decision making and proactive action
- Caters to regulatory management reporting requirements and facilitates effective, actionable RDA (Risk Data Aggregation) requirements
- A powerful risk data repository to assist and support credit policy formulation and policy back testing

Rolta's Fraud and Crime Prevention Analytics Solution

Rolta's Fraud and Crime Prevention Analytics is a complete enterprise fraud detection solution to manage risk across a financial institution's business lines and customer accounts. There is added value through expertise in predictive modeling, strategic

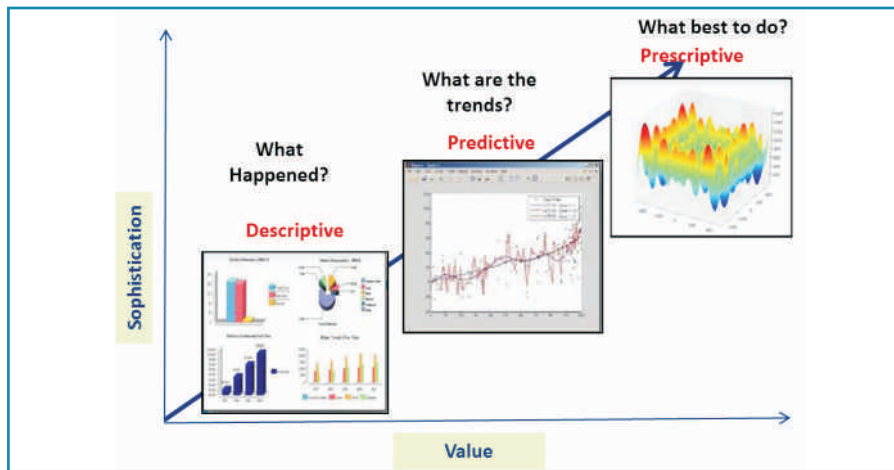
analysis, neural network technology and an understanding of complex fraud behavior. The system can operate in real time or in near-real time so that financial institutions can prevent cross-channel fraud as it is attempted.



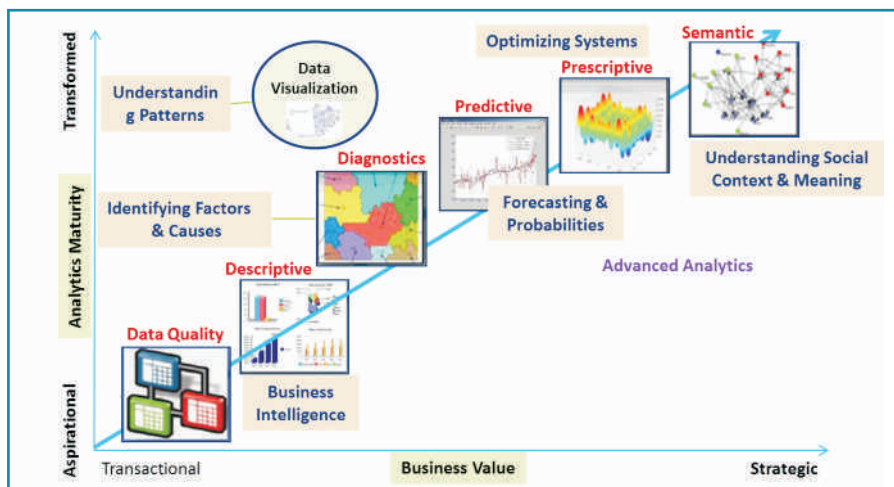
Fraud Management Solution Architecture



Analytics Solutions



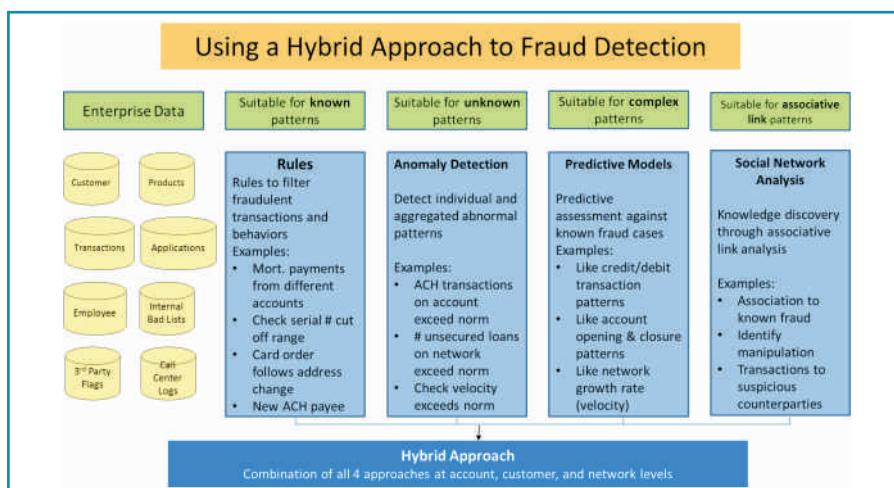
Traditional Analytics



Rolta's Advanced Analytics

Compared to industry standard approaches, Rolta's solution enables the identifying of the factors and causes for fraud, identifying and understanding the fraud signatures, estimating the probability of a particular type of fraud affecting business, as well as interfacing with social media data to yield

rich insights on customers and fraud perpetrators. This information then fuels a prescriptive analytics engine for recommending the best course of action in the event of a fraud striking the operations of various businesses of the bank.



By applying real time big data analytics and predictive analytics to extract actionable intelligent insights and quantifiable predictions, banks can gain insights that encompass all types of customer behavior, including channel transactions, account opening and closing, default, fraud and customer departure.

For example - **non-monetary account** activity is a significant indicator of potentially fraudulent action, and yet, many solutions either ignore or are unable to capture and react to these indicators. Over time, disparate and seemingly unconnected events, or nonevents, associated with an address change

request, a password change request or PIN change request can be strong indicators of account takeover or identity theft. Rolta's powerful advanced analytics technology and complex event processing for transactional fraud detection assesses a sequence of events or nonevents and assign a risk or a threat level to that combination of activities at the front end. Rolta's expertise in deploying this mix of technology, analytics and human-centric knowledge can provide significant operational efficiencies, enhanced detection rates and an improved customer experience.



Fraud Dashboard – Covering Counts and Values of Transactions Under Threat



Benefits of Rolta's Fraud and Crime Prevention solution :

- Real-time fraud models and analytics based on data science and big data analytics
- Analysis of fraud scenarios on big data technology platform
- Fraud statistics and insightful reporting
- Monitoring exceptions, tracking models, and periodically refreshing models
- Integration with GIS to do a geographical profiling

Rolta's Integrated Asset Liability & Liquidity Management Analytics Solution

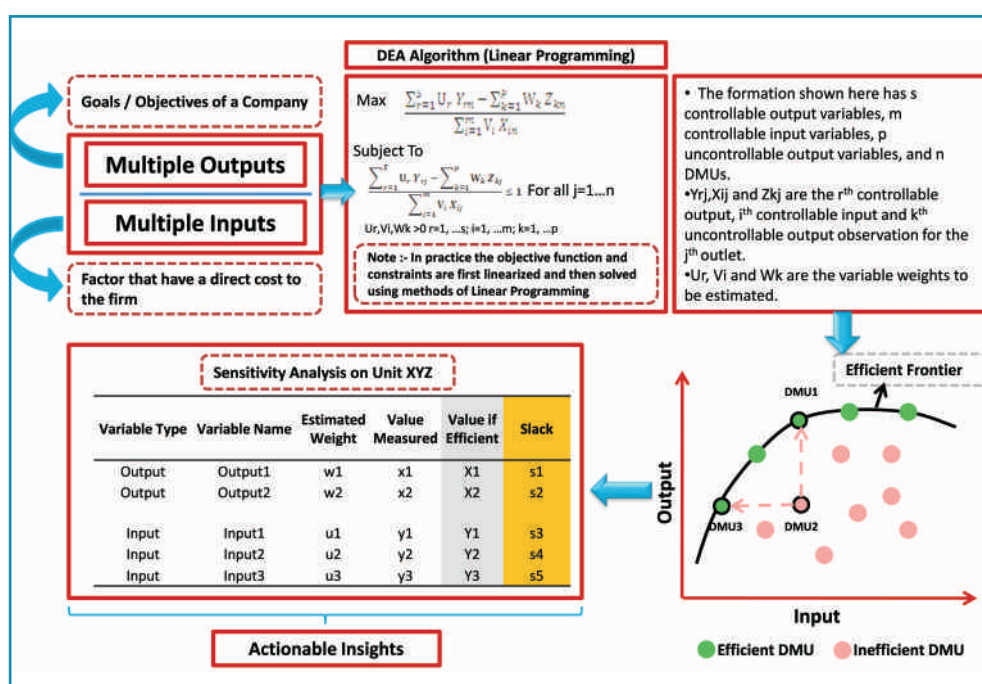
- Asset Liability management has always been a prime concern of banks and financial institutions and is the backbone of the entire strategic business planning exercise
- Banks and financial institutions constantly need to monitor their asset liability mismatches to manage mix, pricing and maturity of the entire balance sheet ensuring high returns on investments
- Liquidity management has come into the forefront as an important risk mitigation practice - an important learning out of the US mortgage crisis and the subsequent runs on the banks and financial institutions
- With the exponential increase in the number and volume of transactions and commitments, the need is to have a real-time or near real-time solution which can provide the required inputs to business owners
- Managing and deriving meaningful conclusions from the huge volumes of data

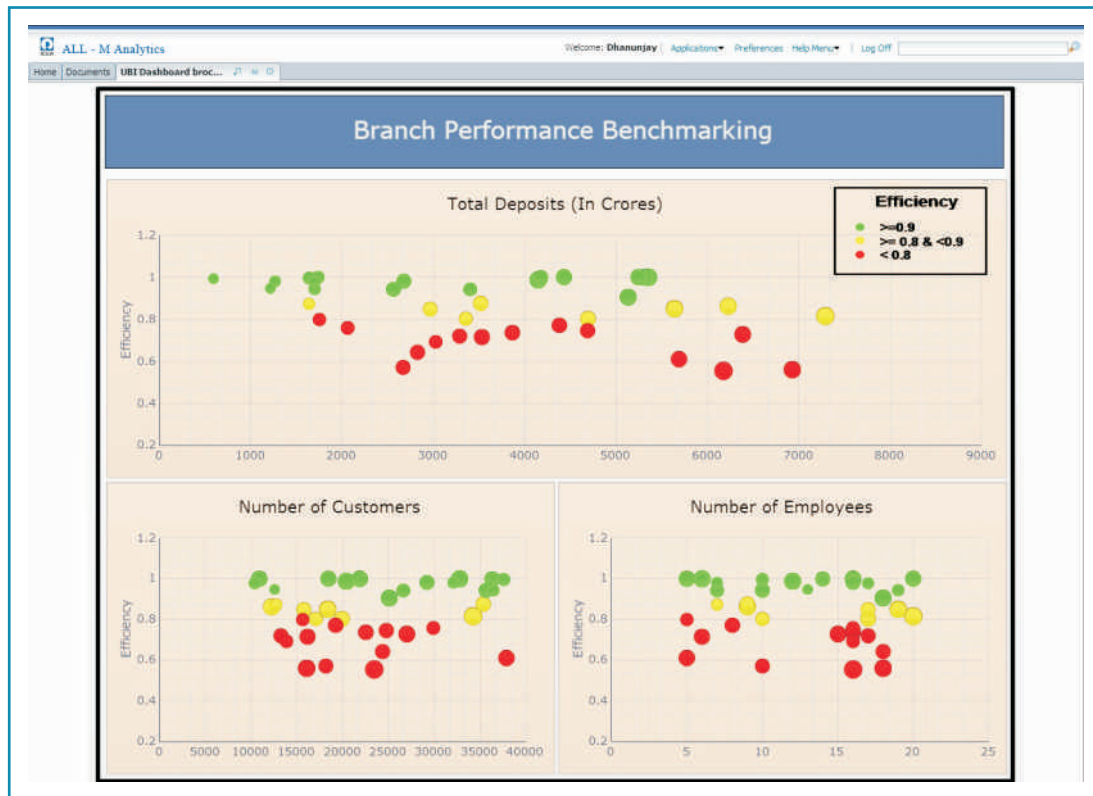
Rolta's ALL-M is a comprehensive solution that brings unique business value through integrated asset liability and liquidity management insights and correlated operational & business intelligence. This helps drive organizational strategy across the value chain, through informed decisions resulting in desired business transformation.

Rolta's ALL-M enables **Liquidity Gap Management** through current position inflows & outflows gap per maturity and Amortization bucketing. **Interest Rate Risk Management** is achieved by providing Earnings Perspective, Traditional Gap Analysis and Economic Value Perspective Duration Gap Analysis. The solution assists in **Liquidity Management** by calculating Liquidity Coverage Ratio (LCR) to compute Short Term Liquidity Position and Net Stable Funding Ratio (NSFR) to compute Long Term Liquidity Position. The solution is designed with a capability to enhance it to manage Intra Day Liquidity as and when the need arises. The solution has been engineered to leverage a single cash flow engine for Liquidity Gap / Interest Rate Risk Gap and Liquidity Risk Management to ensure correlation / correctness of all the ALM and Liquidity measures thereby ensuring a uniformity at all stages of data, calculations and reporting.

The solution is designed to facilitate cash flow modeling at GL, Exposure, Account, Commitment and Transaction Level using the robust calculation engine to handle various type of Amortization / Reprising behaviors across entire portfolio. The solution provides the ability to define product-wise behavioral characteristics for non-standard cash flows or maturities. The solution maintains reconciled and cleansed data to ensure accurate analysis supported with a robust logging mechanism to monitor and capture failures and exceptions during processing. For easier understanding, user access and security maintenance of the solution provides workflow based dimensions and assumption management capabilities.

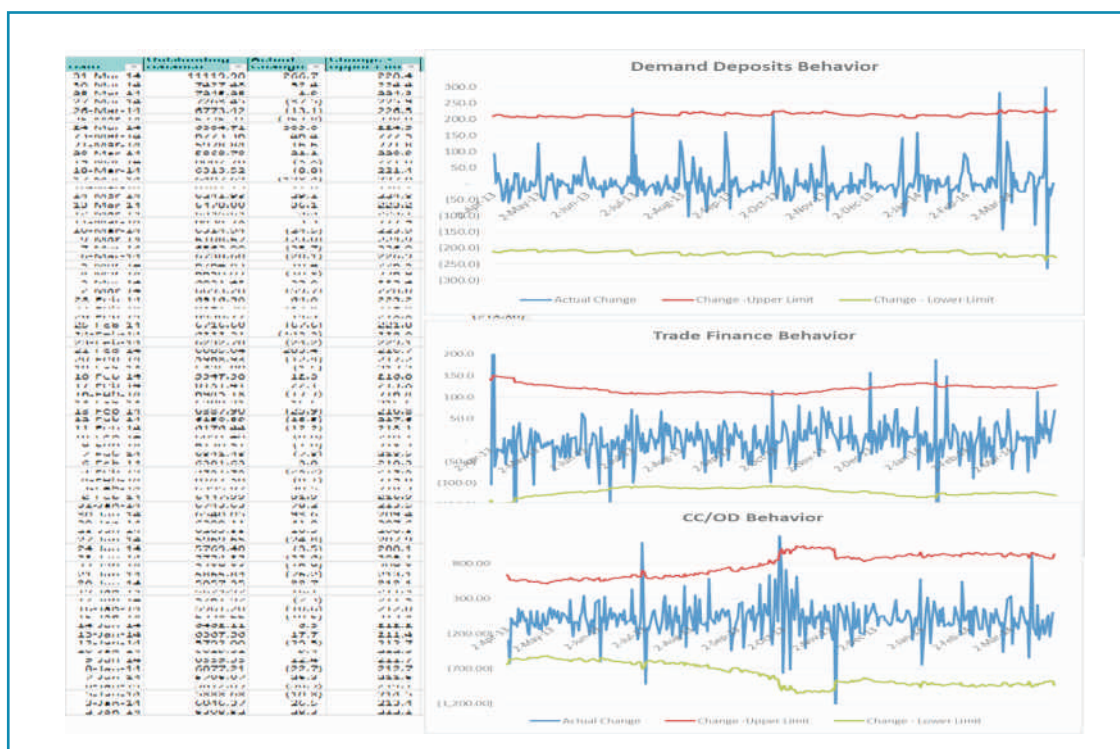
Rolta's ALL-M calculation engine is comprised of an integrated cash-flow engine to generate analyses for static position, situational analysis engine to do what-if scenario analysis taking into account the business vagaries and a predictive analysis engine which can do a look-back and project dynamic analyses. All these calculations are built on top of a unified rich knowledge model and provides enterprise wide multi-dimensional asset liability and liquidity management analytics.





Rollta's ALL-M provides a rich reporting experience through pre-configured regulatory reporting templates, detailed metadata layer encompassing hundreds of cashflow measures, pre-configured MIS

reports, user friendly customizable reporting framework with aggregation / rollup / drill-to-detail capabilities and reusable reporting configurations.





Benefits of Rolta's Asset Liability & Liquidity Management (ALL-M) Analytics Solution:

- Avoid liquidity gap surprises and plan proactively to manage liquidity gaps or invest surplus funds
- Do a what-if analysis to measure impact of interest rate movements to assist business owners in better decision making
- Single solution to manage both Asset Liability Gap, Liquidity Risk Management coupled with interest rate risk management
- Caters to regulatory, management reporting requirements and facilitates effective risk / liquidity management at a lower TCO
- Alignment with budgeting exercise to dynamically measure impact on liquidity and NII
- Use of predictive analytics or data science to fine tune forecasts and their impact

Driver Based Planning Solution for a Large Bank in USA

Location: USA

Industry: BFSI

The organization is an American financial services corporation with assets of over \$300Billion. It is the fifth largest bank in the United States by total branches, the sixth largest bank by deposits and sixth largest by total assets.

Business Objective

Automate and integrate Budgeting/Forecasting and Balance Sheet Management with the ability to do detailed LOB level forecasting at a granular level.

Solution Details

- Integrated ALM (Asset Liability Management) & FTP (Funds Transfer Pricing) Solutions with Planning Solution
- Leverage ALM Hierarchies using DRM for Planning Solution at LOB / Segment level
- Enable driver based planning capabilities allowing LOBs to leverage key matrices to plan financials
- Flexible end user reporting and analysis

Benefits

- Reduce risk and improve efficiency by automating manual planning process
- Common repository for budget, forecast and base stress test financials
- Ability to plan multi-year rolling time period and scenarios
- Enable intra-day segment consolidations and easy to use functionality
- Focus on producing future results rather than just measuring past performance
- Provides components necessary for capital adequacy planning
- Improved process efficiency allowing for improved line of business client service

Multi-Dimensional Profitability Analysis for a Large Bank in Vietnam

Location: Vietnam

Industry: BFSI

The Bank is Vietnam's number one bank in net income and the second biggest bank in assets (>\$20 billion USD). The Bank has been a leader in the region in following advanced risk practices and developing new products like Energy Derivatives Hedges.

Business Need

As a part of the financial transformation program, it was mandated to build a solution for multi-dimensional profitability management integrated with funds transfer pricing and activity based costing to measure and manage profitability at the lowest level of detail.

Solution Details

Rolta implemented Oracle Financial Services Profitability Management Solution, integrating with the banks' transactional, treasury and financials system. By developing a complex data integration architecture and using OBIEE (Oracle Business Intelligence Enterprise Edition) as a flexible and user intuitive reporting system, the bank was able to analyze performance across various dimensions with a budgetary variance analysis and DRM (Data Relationship Management) to maintain uniform data / dimension relationship management.

Benefits

- Single source of truth by developing a common data store for profitability and other DSS applications
- User editable cost & income allocation rules following top-down or bottom-up approaches with activity based costing benefits
- Automation of the manual process of performance measurement and analysis
- Focus on top performing products / branches / customers to enable better planning and deployment of resources
- Enabled customer differentiation to ensure higher purse share

Credit Card Analytics for a Large Bank in India

Location: India

Industry: BFSI

The Bank is the fifth largest Bank in India by assets and a leading player in credit card business. The Bank has been innovative in launching various Credit Card schemes resulting into an exponential growth in the cards business. The Bank has been largest issuer of credit cards in India with a base of over 5 million cards and market share of more than 30%.

Business Need

The bank had witnessed an exponential growth in credit card business. Post economic recession and increased defaults, the bank struggled to effectively manage its delinquencies which negatively impacted its otherwise profitable credit card business.

Solution Details

Rohta implemented a Credit Card & Delinquencies Analytics solution built on OBIEE (Oracle Business Intelligence Enterprise Edition) to address this issue of the bank. The solution involved interfacing credit card data starting from card origination, to invoicing and payments, thereby touching upon all data points on the card life cycle. This data was correlated and analyzed using advanced algorithms to mine through for distress signals, payment behavior, usage behavior, recovery efficiency etc., and further integrated with core transaction systems to generate cross sell opportunities.

Benefits

- Single source for entire credit card business analytics enabling advanced liquidity analysis, funds flow planning etc.
- Enabled vigilance on prospective defaults and improved recovery efficiency resulting into direct monetary gains for the bank
- Enabled product performance measurement and tracking and simulation of new product models.
- Assisted in identification of cross sell opportunities

ABOUT ROLTA

Rolta is a leading provider of innovative IT solutions for many vertical segments, including Utilities, Oil & Gas, Manufacturing, Federal and State Governments, Defense, Homeland Security, Financial Services, Retail, and Healthcare. By uniquely combining its expertise in the IT, Engineering and Geospatial domains Rolta develops exceptional solutions for these segments. The Company leverages its industry-specific know-how, rich repository of field-proven intellectual property that spans photogrammetry, image processing, geospatial applications, Business Intelligence, Big Data analytics and Cloud computing for providing sophisticated enterprise-level integrated solutions. Rolta OneView™ Enterprise Suite is one such innovative Big Data Analytics solution for asset-intensive industries with field-proven benefits. It brings unique value through its IT-OT integration and Predictive Analytics capabilities using Rolta's patented technology. Rolta is a multinational organization headquartered in India with revenues exceeding US\$ 600M and over 3500 people operating from 40 locations worldwide and has successfully executed projects in over 45 countries.

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