

Summary of Roadmap Description

in'Data Governance - Advanced Data Cleansing

As Business Intelligence solutions are becoming more popular, progressive Banking & Finance institutions such as Bank of Beirut, are realizing how vital it is to manage their data integrity and security. Data Governance offers a consistent and centralized view of data across the enterprise's systems, while preserving the "Single Version of the Truth".

Businesses are currently using various channels to gather information on their customers, their market, and their business operations. With the increasing data volume and formats we have access to, these days, challenges have emerged in data duplication, inaccurate or incomplete data... Businesses are suffering from operational and efficiency challenges (need for data consistency, accuracy, and uniqueness become crucial). VALOORES' Data Governance is designed to simplify, centralize, and clean the organization's data. It governs data residing in scattered systems, and allows users across the organization silos, to share information whilst offering a standard and integral platform. VALOORES' Data Governance synchronizes data back, downstream, to the multi-platform variation of systems.

VALOORES' in'Data Governance involves the management of people, processes, technology, and policy, within an organization. It's designed to improve users' level of trust in information, and ensure data consistency across multiple parts of the organization. Data Governance directly impacts three factors deemed as visible to an organization: Increasing Revenue Streams, Lowering Cost, and Reducing Risk. VALOORES approaches the Data Governance set up through an industrial life cycle of Business Rules, Policies, Standards, Guidelines, Data Quality Rules, Data Usage Rules, and Data Access Rules.

Data Governance's value lies in Business Intelligence and Artificial Intelligence; it's revealed in converting data to information... to knowledge.

VALOORES Information Warehouse emerges from the Data governance foundation, to institute an understandable model of Business Information, where business intelligence is no longer a luxury; it is a necessity. The underlying Data Warehouse vehicle consolidates and organizes data, then leverages efficient creation of different Data Marts from there.

The VALOORES Data Mart layer is the cherry on top; it communicates with the Data Warehouse to lay out information in a Business context.

in'Regulatory Compliance Reporting

The Financial sector is currently struggling with the ever changing Regulatory Compliance Changes. Accounting framework upgrades have become more complex, but are yet, still being handled by manual processes often with error. Huge inefficiencies are faced, as teams are manually transposing data between manual consolidation layers and submission formats. Defaulting data has become a common practice in regulatory reports because the underlying data is not available (i.e. the general ledger system often doesn't contain the required trade and customer static). Inconsistencies are all over the place across the bank as different teams operating from different systems submit conflicting information for the same positions (i.e. a single exposure is unlikely to match when viewed in a risk system versus a finance system). Greater regulatory focus is emerging, either through fines, special audits, or suspension of approvals for new business requests. Inability to upgrade current processes for regulatory changes or even internal architecture changes are leading to further layers being added to manual processes, resulting in massively increasing complexity.

VALOORES' Financial Regulatory Reporting (FRR) solution, one of VALOORES' in'Risk Compliance solution set, industrializes the End To End life cycle through our rule-based engine and in'Via Reporting engine, allowing companies to defend their numbers against regulators while meeting their regulatory requirements.

The solution secures guardrails through governance and architecture, risk data aggregation, risk reporting and supervisory review to shed light over risk exposures and profitability opportunities across business lines and legal entities. As the regulatory and supervisory authority landscape keeps on expanding, VALOORES secures an agile and firm footprint through Master Data Management and Data Governance. FRR is tailored to accommodate complex global regulatory requirements and is designed to be fast and cost effective at delivering core reporting features, with flexibility to adapt to the ever changing regulatory requirements.

VALOORES' Financial Regulatory Reporting (FRR) solution is a holistic, multi-entity, multi-channel solution made accessible to the whole organization. A Management Reporting Framework is streamlined with the Financial regulations reporting pool, to complement the potential with decision-making/subject-matter vantage points, whether with local or consolidated information levels at any point in time.

VALOORES Business Intelligence & Internal Management Reports

The Banking & Finance sector is in a significant need for "Business Intelligence" opportunities to drive profitability, leverage costs, anticipate loss prevention, and mitigate risks.

With VALOORES, the Financial Sector BI emerges from closed / dispersed platforms, into secure configurable multi-divisional models, streamlining heterogeneous scattered information into intuitive / flexible performance-aware business objects.

VALOORES complies with the latest industry standards and uses cutting edge technology, whilst securing coexistence with existing legacy systems. VALOORES naturally embeds a set of Kernel tools, leveraging user security management, supporting multiple languages, securing EDI with peripheral systems, offering workflow process management capacity, and ensuring the reporting capacity, all built on top of a business model (referred to as an abstraction of the data model).

The Financial Services' data warehousing systems are maturing and evolving with a more demanding data governance, data volume & update frequency. VALOORES is focused around addressing data warehousing patterns, instituted with the industry's best practice design recommendations.

Banking & Finance organizations are focused around aligning their goals and strategies, by unifying the decisional processes across multiple units. This is reflected by streamlining objectives with targets. Subsequently, the Financial Sector is looking into reducing the information lifecycle, alongside the information delivery cost. They are also looking to comply with new information flows, and newly introduced processes, to anticipate business trends and metamorphosing regulations.

Financial Services need to guarantee to their executives, a secure & quick solution, to anticipate real time information. Their mindset is focused on improving the business decision precision, daily, which consequently helps increase performance and productivity levels.

VALOORES' model is focused around effectively associating its information warehouse with the bank's / Insurance's business, respecting the following guardrails.

VALOORES BI, one of the VALOORES solution set, is designed based off the following features: Centralized Data Governance, access to multi-leveled information (from the holistic consolidation to the lowest granular levels), advanced indicators (Trend-lines, Evolutions...), instant access to information, multiple views of information, multiple axes of analysis (time,

customer type, branch, account...), self-fulfilling variables to configure its engine, dynamically connect to one or several departments, then distribute forecast at lower organization levels.

VALOORES delivers pre-built KPIs (Key Performance Indicators) & KRIs (Key Risk Indicators), tied to our clients' strategies, to set goals through series of objectives defined upfront, and monitored through upstream and downstream workflow notifications. On the other hand, it allows users to customize and configure additional indicators based on their needs.

VALOORES BI is triangulated with a flexible infrastructure to sustain emerging and changing needs, Big Data best practices (manipulation and maintenance), and an accelerated project implementation practice.

VALOORES BI is equipped with a platform independent range of pre-built dashboards, reports, and alerts (compatible with the market's portability trends). Its repository covers a wide spectrum of canned business areas and data mart structures, to secure a diversified decision-aware, business intelligence.

VALOORES AI - Analytics and Artificial Intelligence

On a daily basis, banking systems generate and store massive amounts of data (e.g. customer information, transaction details, credit card details...). Accordingly, thousands of decisions are taken. With such a volume, the manual analysis of data is inefficient, if not impossible, especially if the velocity, variety, and veracity of data are taken into account.

The conventional process is limited to incident identification, avoidance detection, and surveillance. But the Analytics engine can unveil implicit relationships, trend patterns, exceptions, and anomalies, that are hidden to human analysts and expert rules.

VALOORES' embedded Analytics engine evaluates historical trends, seasonality, cycles, elasticity, confidence intervals, outliers and other environment variables, detects patterns, institutes automatic segmentation, to produce forecast, and accentuate decision making, strategies and conflicts' resolution, based on forecast-aware Business Intelligence.

The analytics engine is tailored to the bank's experience. In fact, its algorithms are trained on the Bank's historical and operational databases, and not on generic data. Thus, it allows the bank to learn its clients and employees, alongside their behavior, from its own experience with them, instead of relying on generic rules.

VALOORES' Forecasting & Optimization Analytics engine is based on the latest modeling & optimization techniques, integrated in an operational mindset. in' ANALYTICS bridges the gap between scientific results and operational requirements.

in'ANALYTICS footprint covers Data Definition and Classification, Data cleansing controls applied to integrated data at various tollgates of the process, Advanced Sampling to master the amount of data required, alongside Data Mining techniques introduced to the data classification process.

Used Methods include known and adapted non-parametric, statistical, and panel techniques, to calculate required forecasting and optimization indicators; such as seasonality, trend, and elasticity.

in'ANALYTICS is designed to offer Coherent forecasting strategy and objectives across all departments & activities. Its forecast-based Business Intelligence model has been calibrated to cater to a wide spectrum of stakeholders across the board. VALOORES' forecasting model is equipped with the capacity of funneling decomposed information through outlier detection, defining confidence intervals and guardrails, identifying seasonality and variations, with a self-adjusting accuracy mechanism. All is governed by a progressive GUI engine, extrapolating the models' results to visual and actionable information.

in'ANALYTICS, Stress Testing, Forecasting, Trending, Variance, Ratios, Confidence Intervals and other techniques, accentuate the Financial regulations reporting Solution to institute what-if simulations and refine strategies, with a validation cycle backbone, going forward.

Enterprise Risk Management - IFRS 9 and ECL

VALOORES' Enterprise Risk Management platform is equipped with an out of the box IFRS 9 model simulator, to address the following implementation challenges.

Macro-Economic Scenarios: Incorporate forward-looking scenarios into the measurement of Expected Credit Loss (ECL). Introduce Industry's best practice and supervisory guidelines around transferring criteria, Internal versus External forecast sources, Bottom Up versus Portfolio / Sub-Portfolio level macro-economic linkages, alongside Regression based models for conditional PD, LGD, EAD based on macro-economic scenarios.

Transferring Criteria - Significant Deterioration of Credit Risk: Assess each loan to determine whether there has been a significant increase in credit risk. Introduce Industry's best practice and supervisory guidelines around both quantitative and qualitative assessments, use of 12 month PD versus Lifetime PD, external/internal ratings alongside impact analysis.

Expected Credit Loss Calculations - Process Governance: Calculation Process Flow of ECL requires further insights and guidelines by industry and supervisors. Calculate the lifetime PD under each of the multiple scenarios, combine the multiple lifetime PDs to get a probability weighted lifetime PD, perform stage allocation based on lifetime PD, calculate 12 month ECL if Stage 1 or Lifetime ECL for Stage 2 and 3.

Expected Credit Loss Calculations - Model Governance: Calculating Lifetime ECL (PD, LGD, EAD) requires adjustments to existing models or the deployment of new models. Convert through-the-cycle PD/rating from Basel capital models to an IFRS 9 compliant Lifetime PD term structure, support scenario-based analysis for IFRS 9 impairment calculations and stage allocation logic, introduction of robust data tools to challenge and benchmark ECL estimates, best Estimate and Point in Time Lifetime PD measures with data consistent with other prudential requirements, such as capital planning and stress testing.

Common integrated transparent infrastructure & disclosures: Short implementation timeframe with challenges around performance and adoption of a new Credit Impairment Analysis standard. Design towards IFRS9 Variance analysis, platform built on top of our Credit risk and regulatory expertise, a standard offering to meet regulatory deadlines, a software platform offering services for compliance.

Adjusting Lifetime PD curve for future, based on economic and other conditions; set in place by developing correlation between the loss parameters and macro-economic parameters. Position in economic cycle, macro-economic indicators projections, stress test to minimize inconsistency of methodology.

Customer Behavioral Analytics: Perform continuous profiling of customers according to their credit risk and detect deviations, monitor their credit behavior, and run dynamic peer-to-peer analysis across industries and geographies.

Profitability: Customer, Internal (FTP), Global, Profitability vs. Budgeting

VALOORES' Enterprise Wide Risk and Performance Management life cycle, covers the Profitability footprint.

Profitability challenges span Funding & Liquidity (costly & complex LCR requirements / Basel III, multiple local liquidity requirements, shifting liquidity management across the group & entities, LCR requirements' impact on each segment & product, LCR requirements impact on cost of doing business), Cost of Capital (reviewing capital management priorities across, change capital allocation across business units, LCR's significant effect on costs), Operational Risk, Internal transparency (extracting and aggregating appropriate data, fragmented information on degree

of risk, no visible Enterprise Strategy to address Security Risks / threats (Uncontained Risk), regulatory regime driving investment in data and IT, Cybersecurity / Geopolitical risks' oversight, Economic & Market's Short / Long-Term Risks, accentuating Risk Culture, coping with Regulatory Changes, and Stress Testing.

VALOORES tackles those challenges by instituting Data Governance to secure information integrity (infrastructure that makes data available across the enterprise, Multi-Directional Information Flow, Unique interface / platform for Business Units across all stakeholders & categories), introducing Risk & Compliance at the heart of operations (Enterprise Insight on Risk & Compliance Assessment), cascading Risk Appetite throughout the organization, embedding Risk Appetite into decision making, accentuating Risk Roles & Responsibilities, safeguarding regulatory requirements, reinforcing accountability, socializing Qualitative metrics, Strategic Testing (Risk appetite development and management, Capital planning, Business Unit planning, LOB Planning, Recovery and resolution planning), Stress Testing (Liquidity, Credit, Market, Counterparty, Operational, Regulatory, Reputational, Scenario across countries and business units, calculating effect for each portfolio / line of business, Ownership and link to Decision Making), Alternate what-if scenarios across simulations, Scenario Management, and Leadership controls (Performance Management, Key Performance Indicators, Key Risk Indicators, Review Processes., Unify indicators & objectives across divisions and stakeholders, and Exchange best practices across the organization).

ALM: Static, Dynamic (Simulation & Stress Testing)

Managing the risk on the balance sheet today requires diligence and flexible, scalable tools to meet your needs - now and in the future.

VALOORES' Asset Liability Management (ALM) is a vehicle to address the risk faced by a bank due to a mismatch between assets and liabilities, either due to liquidity or changes in interest rates.

VALOORES' ALM policy framework focuses on bank profitability and long term viability by targeting the net interest margin (NIM) ratio and Net Economic Value (NEV), subject to balance sheet constraints. Significant among these constraints are maintaining credit quality, meeting liquidity needs and obtaining sufficient capital. It simply combines portfolio management techniques (that is, asset, liability and spread management) into a coordinated process. Thus, the central theme of VALOORES ALM is the coordinated, and not piecemeal, management of a bank's entire balance sheet.

VALOORES includes sophisticated concepts such as duration matching, variable rate pricing, and the use of static and dynamic simulation. It provides complete multidimensional analysis of the balance sheet, incorporating interest rate risk, income simulation and market valuation using

deterministic and stochastic modeling. It measures and models every loan, deposit, investment, and portfolio individually, using both deterministic and stochastic methods. VALOORES ALM is a consistent framework for gathering data, measuring risks, monitoring changes, and acting on decisions.

VALOORES ALM covers sophisticated, dynamic modeling and net interest income simulation, using the latest financial techniques. It manages risk effectively, model customer behavior, economic valuation, interest rate scenarios and a wide range of other variables quickly, easily and accurately. It measures and manages interest rate, foreign exchange and liquidity risk more precisely and efficiently. It models customer behavior and market movements to more effectively stabilize and increase earnings, precisely forecast future earnings, measure profitability, and comply with regulatory requirements including IFRS 9 and Basel III.

It supports a wide variety of balance and off-balance-sheet products, including non-maturing accounts, amortizing loans (various amortization types), and derivatives (interest rates/FX swaps, quanto swaps, trigger Swaps, FRA, futures, swaptions, binary options, digital options, etc.).

It provides a repository for capturing the true financial characteristics of each customer relationship. Behavioral models and prepayment assumptions are stored independently to separate today's risks from tomorrow's actions. It entails the capacity to simulate future activity, over hundreds of financial measures for every item on the balance sheet.

VALOORES ALM spans a What-If Analysis & Stress Testing Analytics component, necessary to meet risk management goals, including Value-at-risk (VaR), earnings-at-risk (EaR), market value, duration/convexity, income simulation, liquidity and interest rate gap.

VALOORES ALM operates on transaction-level data; each account, as well as all forecasted new-business activity, is modeled independently on a daily cash flow basis. It identifies the margin contributions with Funds Transfer Pricing, complies with the IFRS 9 accounting requirements, and manages earnings volatility through the Dynamic ALM vehicle, to improve the risk/return profile.

VALOORES ALM spans an Enterprise-Wide Reporting, with predefined standard reports, pre-built risk measures, capacity to customize reports, auditing capabilities, build algorithms and apply equations, calculation engine, cash flow engine used to produce income simulation and gap results, and also used during Monte Carlo simulation, cash flow transfer pricing for Funds Transfer Pricing, Valuations, Hedge Management and IFRS Valuations, and budgeted cash flows for Balance Sheet Planning. With VALOORES ALM, managers can better understand the impact of market changes on the balance sheet, and make more informed business decisions.