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Enterprise Telesales Opportunity Pipelines Performance Management

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Abstract

Enterprise telesales is most different from consumer sales by having a prolonged sales cycle, in weeks or months, in order to integrate various internal supports to validate and satisfy complex client demands and needs. Managers of such telesales centers are often challenged by the elaborate tasks of tracking the subtle progress of these pipelines of sales opportunities. Thus, an on-demand dashboard for the managers as well as the telesales representatives is a critical IT tool to address this unique problem. This paper provides insights into the Business Performance Management (BPM), a technology used in business intelligence to enable users to observe, analyze, and act upon the information at the right time. To describe a sales cycle and the tracking needs, we start with a set of Key Performance Indicators (KPIs) for a staged pipeline progression model. Based on business rules and threshold conditions for these KPIs, sets of business situations and alerts are generated for presentation. Finally, a hierarchical design is explained with drill-down capabilities for a typical reporting structure of a telesales center. The productivity of an IBM telesales center under such proactive management has been found to be six to seven times more cost effective than traditional field sales.

1. Introduction

To succeed in today's challenging business environment, decision making occurs more often and at all levels of the organization to respond to changing customer needs. This places a premium on maximizing the organization's investment in information technology infrastructures and rewards those organizations that successfully integrate information in direct support of management initiatives. A potentially complicating factor is the need to extract not just raw data but business knowledge to provide insight into the various on-going management activities within the organization.

Business Performance Management (BPM) [1-5] has emerged as a critical discipline that enables organization to manage their business solutions in a dynamic fashion. BPM is essentially an adaptive information integration technology to allow monitoring and controlling both business processes and IT events. BPM system takes monitored data from target business applications, invokes BPM services and renders action back to target business applications in order to optimize business performance related to business goals. The business performance can be measured by Key Performance Indicators (KPIs) to reflect the outcomes of business activities in the underneath IT layer. A KPI is usually defined from high-level business perspective and is extracted and calculated from raw information in data sources of the IT layers. Transaction activities within the IT layer that potentially affect the resulting KPI must be extracted and propagated to the BPM system for analysis. Business situations and alerts may be generated based on the analysis of these transaction activities.

At the IBM telesales centers, the telesales representatives and managers used to depend on weekly or monthly batch analyses to assess the executions of sales opportunities. The delayed responses have been found costly to both the rapidly changing business environment and the productivity of the sales executions. The need to deploy a dashboard that integrates information from multiple sources and presents speedily the essential information to business users upon demand is crucial to the management of the telesales centers.

In this paper, we describe the data integration and presentation technologies used to create a BPM solution for the IBM telesales centers. The architecture and framework of processing historical data from data warehouses and integrating real-time event data from back-end applications will be presented. To elucidate our solution, we exploit a set

of KPIs for the computer hardware sales and opportunity data in both time and geography dimensions with a customer segmentation model and a sales-stage pipeline progression model. We also detail the structure and drill-down capabilities of a personalized dashboard for the graphical views of KPIs together with the generated business situations and alerts.

2. Business Scenario

2.1. Enterprise Telesales Center

Telesales centers have been a fast growing operational department in many large enterprises and are a key part of their sales strategy, due to their cost-effectiveness compared to traditional field sales. At IBM telesales center, telesales representatives typically handle enterprise buyer customers. Starting with a sales lead, an opportunity can take weeks or even months to mature into an order placement. On the floor of such a telesales center, one rarely sees a sales representative constantly on the phone busily answering phone calls, as one would expect of a consumer telesales representative. Rather, an enterprise telesales representative serves as a single point of contact for the various internal sales and support teams to validate and satisfy the complex client questions and needs. Moreover, instead of relying on the telephone, an enterprise telesales representative may use a number of different computer applications for the daily complex work. Managing an enterprise telesales team by monitoring telephone conversations would easily miss out the big picture.

To assess and track the subtle progress of the pipelines of sales opportunities in the telesales center, managers and telesales reps usually depend on extracting and assembling report information manually from silos of back-end data sources, thus imposing long delays in response to the rapidly changing business environment. The deployment of an on-demand BPM dashboard that integrates information from multiple sources and presents the timely information to the business users is found to be critical for the success of the business center.

Figure 1 shows a BPM solution with a web-based dashboard that provides an integrated and dynamic environment to allow both telesales representatives and managers to monitor and to react timely to changing business situations. In order to obtain both historical and real-time information, the BPM operating environment deals with both data extracted from back-end databases and data warehouses, and with event data provided by business applications through event adaptors. An example of such an enterprise telesales center in our solution, the IBM telesales center, covers sales of computer hardware for a large geography that consists of multiple regions. Each region is managed by a regional manager and includes a number of reporting telesales representatives; each handles a given set of enterprise customer accounts.

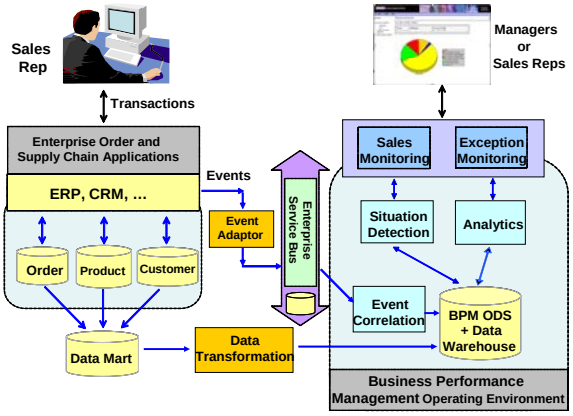

Figure 1. BPM System for Enterprise Telesales Center

2.2. Metric Models

In the telesales center, a sales representative focuses on a number of enterprise customer accounts. These customer accounts are grouped into different segments to offer uniform or similar treatment, often because they have similar interests in products or services, judging from their demographic and buying behavior. For example, clients can be organized into three segments: Acquisition, Development and Retention (ADR), referring to new, established and well-established customers. The goal is to develop a common management and measurement system that enables strategic planning with a single enterprise-wide customer view across different brands, regional sales teams, and telesales operations. A data-mining solution that provides an analytical model to predict customer movements among these segments has been given in details elsewhere [5].

The most important measurement system for telesales is in the opportunity management. The opportunity management strategy implemented at the IBM telesales center consists of an opportunity pipeline progression model to track the different sales stages of the buying opportunities for an enterprise customer. The sales stages are defined as *SS-1* for relationship building stage, *SS-2* for identified stage, *SS-3* for validated stage, *SS-4* for qualified stage, *SS-5*

for conditionally agreed stage, *SS-6* for won stage, and *SS-7* for tracking lost opportunities.

The dynamic movements of the pipelines are important for the understanding of how the opportunities are moved from one sales stage to the next. This information provides the base for the evaluation and prediction of the entire sales performance. Thus, we exploit a set of metrics for both financials and opportunities with different dimensions including the pipeline movements as *Revenue, profit, sales attainment, Customer buying frequency, Options clothing rate, Customer accept (CA) units, Backlogs, Total opportunities, Opportunity win rate, Opportunity lost,* and *Opportunity* at different *sales stages.* The various dimensions are *Time (daily, weekly, quarterly, yearly), Geography* and *Regions, Telesales representatives, Brands, Sales stages (SS-2 to SS-7),* and *Pipeline movements (moved-in and moved-out).*

The BPM dashboard aggregates both historical data from back-end databases and data marts, and real-time data from operational applications to provide an integrated and historical view of the business metrics. The system provides alerts for metrics that fall below target thresholds or meet threshold criteria. The main goal of the dashboard is to integrate operational data and present business results and performance to individual business users in an on-demand fashion. In the past, crucial information for performance evaluation was collected piecewise and manually by IT staffs from different data sources. The process was slow, tedious and error-prone, and needs to be performed frequently for different business users.

3. Information Integration

The integration of information for our dashboard is realized with a BPM approach that extracts, transforms and aggregates multi-dimensional data from both back-end databases and real-time events emitted from business applications. The BPM solution architecture, components, and metric generation with ETL processes are summarized the next sections.

3.1. Solution Architecture

The BPM architecture consists of a set of framework components that follow the highly configurable, flexible and reusable SOA patterns as shown in Figure 2. The framework components provide capabilities to capture and correlate incoming events, compute, generate and store the KPIs. The data artifacts generated during the monitoring process are stored in an operational data store (ODS). Historical data for the KPIs are stored in data feeds that are extracted, transformed and loaded daily from back-end enterprise databases using a data bridge with a set of pre-defined data feed rules. Real-time data are captured from events emitted by business applications upon performing business transactions. Both historical data and real-time data are aggregated, transformed and stored into a performance data warehouse for OLAP queries based on various dimensions and segmentation rules. The framework also provides the capabilities to generate business situations and alert entries in the data warehouse based on thresholds given by business exception rules. The various services are summarized in the following.

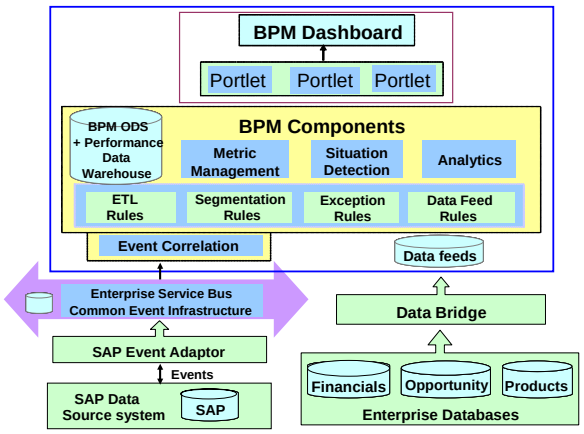

Figure 2. BPM Solution Architecture

The *Metric Management Service* is responsible for managing the metrics, maintaining complex dependencies between metrics, calculating and deriving high-level metrics based on lower-level inputs. The service provides a model tool that can be used to capture the dependency relationships.

The *Situation Detection Service* is responsible for handling the situation detection part of the functionality of the *Event Correlation Service*. The implementation of the situation detection in the current solution is just a simple expression evaluator that evaluates the expression condition. This service also includes the generation of alerts if a metric falls short of target thresholds or matches an alert condition. Alert conditions are defined in exception rules, and are formulated by business requirements. The threshold values for the metrics are supplied periodically to reflect the current business requirements. The alert conditions are formulated as SQL queries that are executed against database tables in data warehouse.

The *Event Correlation Service* provides policy-driven filtering and correlation of business events to detect situation of interests. Correlations are also

performed to filter and select business data for metrics calculations. The *Analytics Service* provides the capabilities to perform data mining and analysis based on business model for trend predictions and forecasts.

3.2. Data Feeds

In an enterprise, the opportunity, sales, and product data may be available at different sources and various data marts. This information may have been defined independently in such a way that they cannot be easily linked to each other. Linking these information could provide business with very important information such as how many opportunities from a given customer have been converted into sales orders in a given time frame. One of the tasks for our information integration module is to gather data from such disparate sources and to establish a connection to support metrics that were previously defined.

Although the various source of information may provide plenty of information, only a subset of this information is relevant for a given BPM solution. To facilitate the linking of these data for metric calculations, our solution defines a set of data feed tables as staging tables to store the subset of source information obtained daily through a data bridge. Examples of some staging tables are the Opportunity, Order, Shipment, and Backlog tables. Basically, the data bridge process follows a daily schedule and applies a set of predefined data feed rules to perform the extraction and aggregation of data from back-end databases. At the end of this data feed process, an ETL process is kicked off to transform the information into the BPM performance data warehouse.

3.3. Performance Data Warehouse

An important role of BPM solution is to facilitate the storage of the metrics as well as provide enough historical information to perform analysis of data to identify a threat or an opportunity. To enable analytics, the data warehouse [6, 7] provides a framework to view business processes and information systems holistically, and link them horizontally across the breadth of the whole enterprise instead of as a series of vertical silos.

Data warehouse usually organizes information based on a star schema model which represents the relationships between metrics and the context surrounding it. At the center of the star schema is a fact table, which contains the actual data to be analyzed, such as product sales data. Radiating from the fact table are the dimension tables which contain context data that define the dimensions, such as days, months, product names, account numbers, and so on. Depending upon the metrics relationships and its contexts, there may be one or more fact tables.

Figure 3 shows an example of the performance data warehouse model for financial metrics illustrating relationships among metrics, shipments, customers, customer segments, users, geography, and time dimensions. The metric definitions are defined in a generic "*MetricTypeDim*" table such that they can be referenced and looked up by various components, and the timestamp information is represented by "*CAL_DATE*" element that is defined in "*TimeDim*" table. Similarly, a performance data model for opportunity metrics is defined to provide relationships among opportunity metrics, sales stages, brands, customer segments, users, geography, and time dimensions. With the opportunity data model schema, opportunity pipeline progression for sales stages can be readily computed from historical data along the time dimensions.

3.4. Metric Generation

In the case of our IBM Telesales BPM Solution, SQL scripts were used to capture the metric calculation logics. The scripts are part of an automated end to end process and are executed against the data staging tables, mentioned in the Data Feeds Section, and the results stored in the fact tables as mentioned in the Performance Data Warehouse Section.

The results for both financial and opportunity metrics are computed and stored in the fact tables using two kinds of ETL rules:

1. Metric calculation rules: Rules that translate the metric definitions into formulas as mentioned in the Performance Data Warehouse section. Some base metrics can be captured from the data staging tables without further computation and are loaded first. Complex metrics are then derived from them. The following are examples of metric calculation rules:

- *OpportunityWinRate = Number of Opportunities in Won Stage / Total Number of Opportunities in Closed Stages*
- *ClothingRate = OptionsRevenue / TotalRevenue*

2. Aggregation rules: Rules that define the dimensions in the star schema against which the metrics are aggregated for the dashboard. These rules are used by the ETL scripts to define the appropriate *GROUP BY* clauses used to populate the fact tables, as shown in the following examples:

- *Geo Dimension → ROLLUP (GeographyMaster. Geography, GeographyMaster. Region)*

- *Brand Dimension → ROLLUP (BrandMaster. BrandDivision, BrandMaster. SubBrand)*
- *Customer Segment Dimension → ROLLUP (Segment.SegmentId)*
- *Time Dimension → ROLLUP (TimeDim.Cal_Quarter, TimeDim. Cal_Week)*
- *Complete GROUP BY clause: GROUP BY ROLLUP (GeographyMaster. Geography, GeographyMaster. Region), ROLLUP (BrandMaster. BrandDivision, BrandMaster. SubBrand), ROLLUP(Segment.SegmentId), ROLLUP (TimeDim.Cal_Quarter, TimeDim. Cal_Week)*

On the other hand, the dynamic movements of the opportunity pipelines, represented by the moved-in and moved-out numbers and amounts of each sales stage, are computed from the historical changes of opportunities in different sales stages.

3.5. Situation and Alert Generation

Another important function that BPM provides is the ability to allow user defined conditional statements and thresholds around one or combination of metrics for alerts. The BPM framework alerts users via preferred medium of communication if any of the alert conditions are met. The communication medium usually consists of email notification and/or visual cues with highlighted symbols when the users access the dashboard.

In case of the IBM telesales center, the metrics threshold along given time horizon and desired dimensions are captured as database records. The alert conditions are expressed as SQL scripts that compare the actual metric values against the threshold and if any conditions are met, the situations or alerts are generated and stored in another set of database tables as shown in Figure 4. This information can be historically analyzed to determine the trend and also show a user past remedial actions taken against such situations.

The following are some examples of definitions of exception rules for alert generation:

1. ADR Exception Monitoring (QTD by Segment and Region):

- *TotalRevenueException = TotalRevenue < TotalRevenue Target*
- *ClothingRateException = ((OptionsRevenue/TotalRevenue) * (1– Tolerance))% < (Segment Target) %*

2. Customer Exception Monitoring (QTD by Customer):

- *Cust.RevenueException = Cust.Revenue < Cust.Revenue Target*
- *Cust.ClothingRateException= ((Cust.OptionsRevenue/Cust.Revenue) * (1–Tolerance))% < (Cust Segment Target)%*

3. Opportunity ForecastDate Exception Monitoring (QTD by Customer):

- *OppForecastDateException = (OppForecastDate < (CurrentDate + x ThresholdWeeks)) AND (OppSalesStage < SS-5)*

As part of the end to end process, the situation elements get executed after the metrics data are calculated and populated in the Performance Data Warehouse. These alerts are selectively retrieved and displayed in the BPM dashboard as a set of highlighted entries.

3.6. Real-Time Information

Real-time information is the timely information obtained from operational applications. The information is usually delivered directly to the system through messaging and/or event mechanisms. In a BPM system with event-driven mechanism, an event adapter is used to capture events emitted from back-end applications.

In a typical event adapter, the adapter intercepts IT events and relays them to the target application with only a simple format conversion. The BPM system performs filtering, sorting and correlation of these low-level events according to the pre-defined business rules. A better adaptor design is to incorporate an event adaptation mechanism [8] that captures, analyzes, enriches and transforms IT events into high-level business events in order to alleviate the loading of BPM server.

In our solution for the IBM telesales center, an intelligent SAP event adaptor [9] is used to capture events emitted from a SAP ordering system. The scenario for emitting events is described as (1) a telesales representative conducts an order transaction (e.g. create an invoice) using a SAP application, (2) the SAP workflow processes generate real-time order transaction events and transmit them externally through a SAP Gateway, (3) the SAP event adapter connecting to the SAP Gateway receives the event and initiates a process sequence to handle the events, and (4) based on the event type, the process sequence retrieves the detailed data related to the events from the SAP system via the SAP event adapter, transforms and converts the data into a Common Base Event (CBE) format [10], and emits the resulting CBE event to Common Event Infrastructure (CEI) [11] to be consumed by the BPM system.

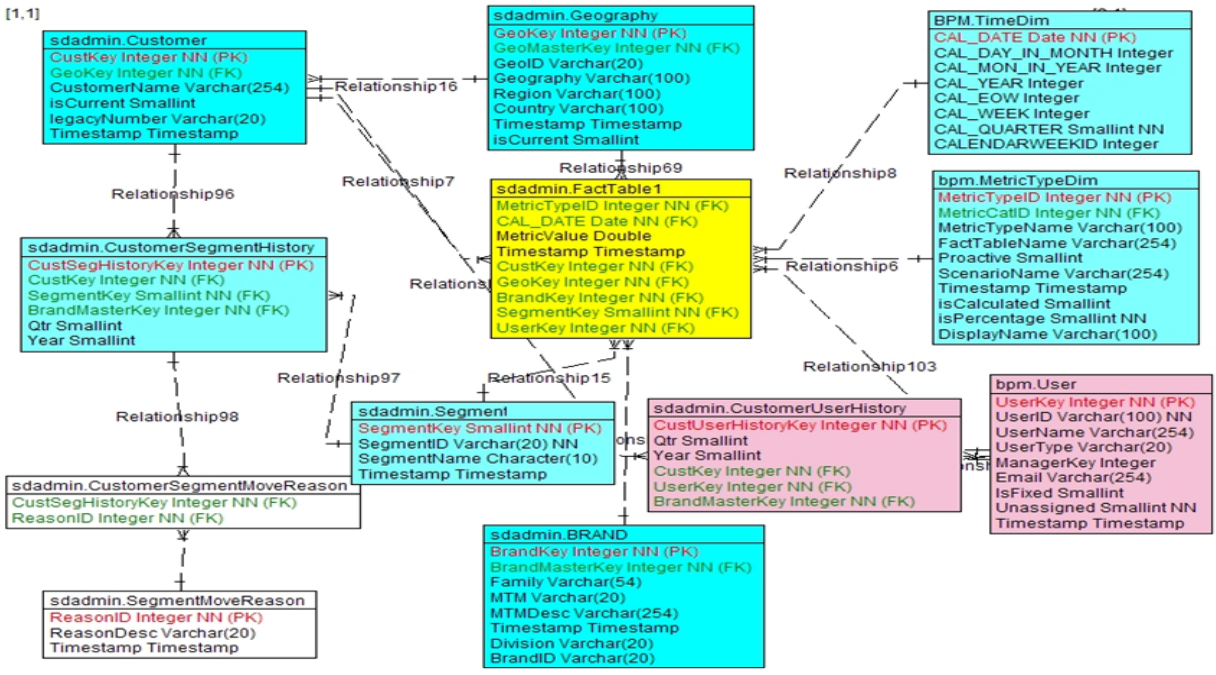

Figure 3. Performance Data Warehouse Model for Financial Metrics

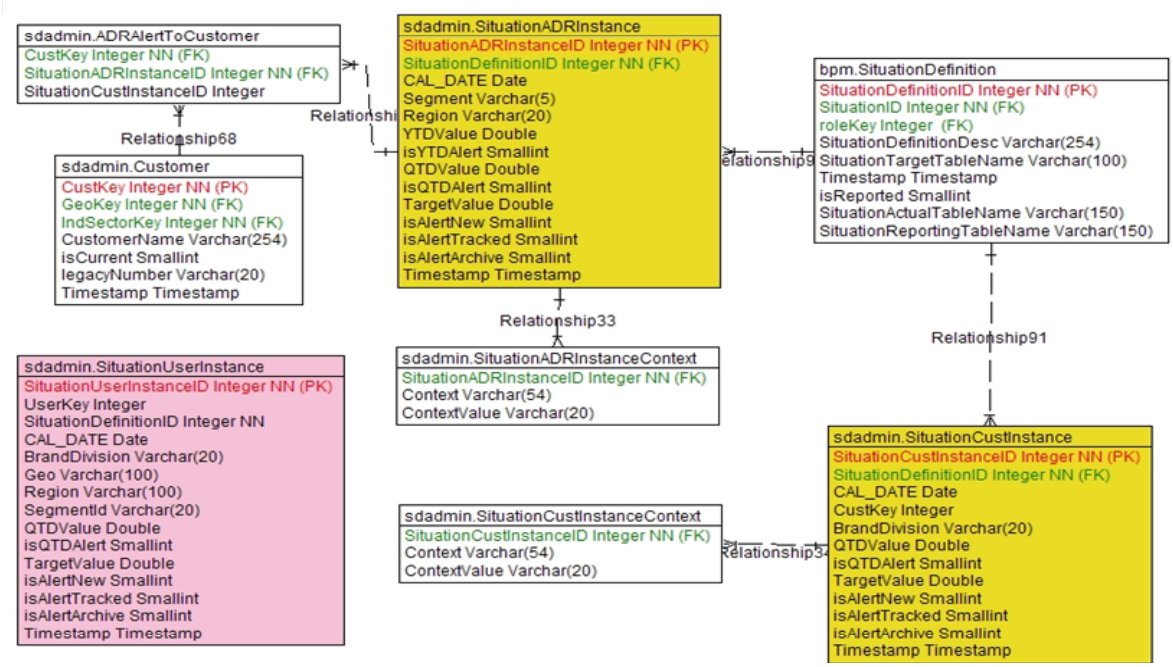

Figure 4. Data Model for Situations and Alerts

4. BPM Dashboard

4.1. Dashboard Hierarchies

Dashboard is the user interface presenting the unified view for the business user to monitor all the business process activities, exceptions, links to perform OLAP analysis. The dashboard in our solution is a web-based dashboard composed with

multiple portlets. It is designed to allow stakeholders to monitor sales performance and opportunities by region, customer segments, and by telesales representative based on roles. The information is organized following a geographical organization and reporting structure and can be viewed based on the user's identity and role as shown in Figure 5.

In this structure, the highest level is Geo level that can only be accessed by a Geo manager with Geo manager role. Under the Geo level, there are a finite number of reporting regions that can be accessed by assigned managers with regional manager role. Telesales representatives belong to the lowest level in the organization structure with telesales representative role reporting to each region. Following this hierarchical structure, telesales representatives access only their financial and opportunity performance metrics corresponding to their customer accounts. Regional managers access the aggregated performance results in the region and also the individual results corresponding to each telesales rep reporting in the region. Finally, Geo manager has the super-user access to view the overall performance for the entire geography, as well as the detailed performance corresponding to each region and its reporting telesales representatives.

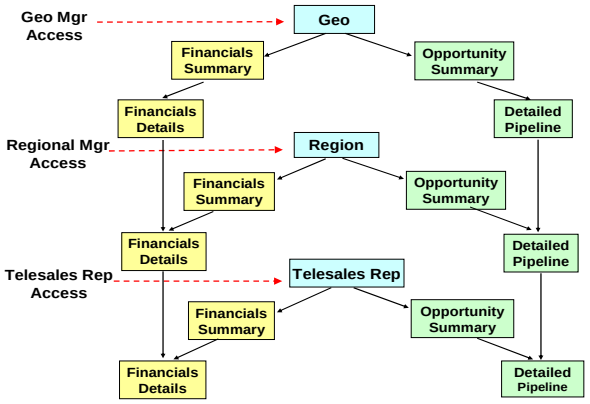

Figure 5. Hierarchical Structure of Telesales Dashboard

4.2. OLAP Queries

With a hierarchical organization structure, the metric data corresponding to business users can be readily retrieved from data warehouse following a depth-traversal algorithm for a tree structure. The retrieval algorithm starts from a parent node and sums all data contributions from children nodes. The SQL scripts for metric calculations are developed based on the OLAP aggregation, grouping and rollup functions mentioned in the Metric Generation section above to efficiently compute the moving averages, sums and cumulative values.

4.3. Dashboard Views

Dashboard views provide the visibility of KPIs to business users. In this solution, the dashboard views are implemented using web-based portlets with reusable templates. Information interaction between components and portlets are realized via data beans with predefined data structure. Figure 6 shows a summary view of all portlets that display the financial and opportunity KPIs in the IBM telesales center.

In the summary view, different portlets are used to present the financial performance, the opportunity performance, and the business alerts for the various KPIs. These portlets are listed in the following:

1. Financials Portlet – monitors sales performance metrics by Geo and regions, ADR segment, brand and sales agent, including revenue, legal profit, sales attainment, clothing rate, average unit revenue, number of customer accepts, and backlogs.

2. Opportunity and Pipeline Portlet – monitors opportunity metrics by Geo and regions, ADR segment and sales agent, including identified opportunities, validated pipeline, win rate and win percentage, and pipeline progression in different sales stages.

3. ADR Exception Monitoring Portlet – monitors the status of the ADR segments to ensure that the segment results are in line with the segment targets. The supported metrics include revenue, legal profit, clothing rate, opportunity identified, and win rate.

4. Customer Exception Monitoring Portlet – monitors the status of individual customer accounts to ensure that the results are in line with customer or segment targets. The supported metrics include revenue, legal profit, clothing rate and customer buying frequency.

5. Opportunity Forecast Date Exception Monitoring Portlet – monitors the status of opportunity which sales stage has not been advanced to the winning state when the forecast date is closing in.

The portlets in the summary view provide hyperlinks for the users to perform detailed drill-down of a particular KPI. Figure 7 shows a detailed view of an opportunity KPI for a Geo manager accessing the dashbaord. The detailed view consists of a summary of the metric, a graphical chart and a performance table showing the historical, weekly performance of the metric in the current quarter, and a detailed list of reporting regions or telesales representatives if any. The graphical chart is generated as an image file from an Excel charting web service by providing the detailed weekly performance table as input.

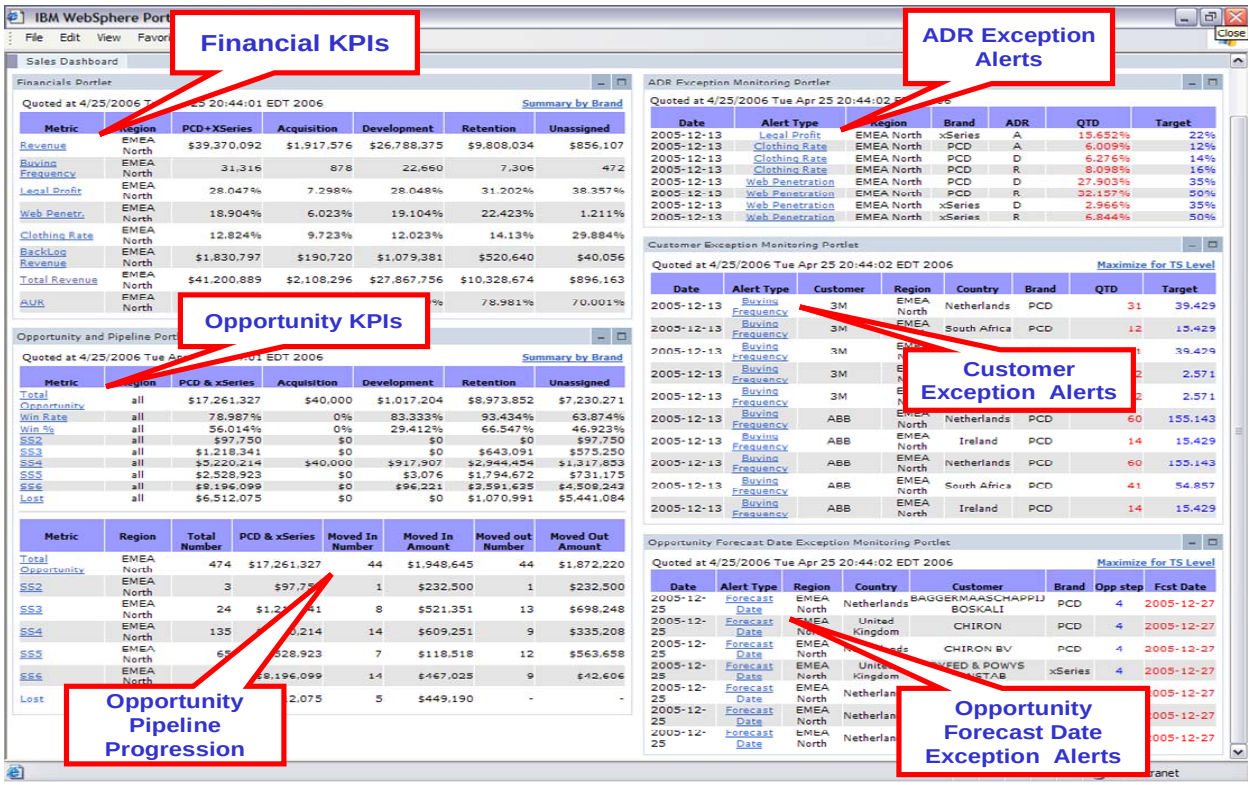

Figure 6. Summary View of All Portlets for Financial and Opportunity KPIs in Telesales Dashboard

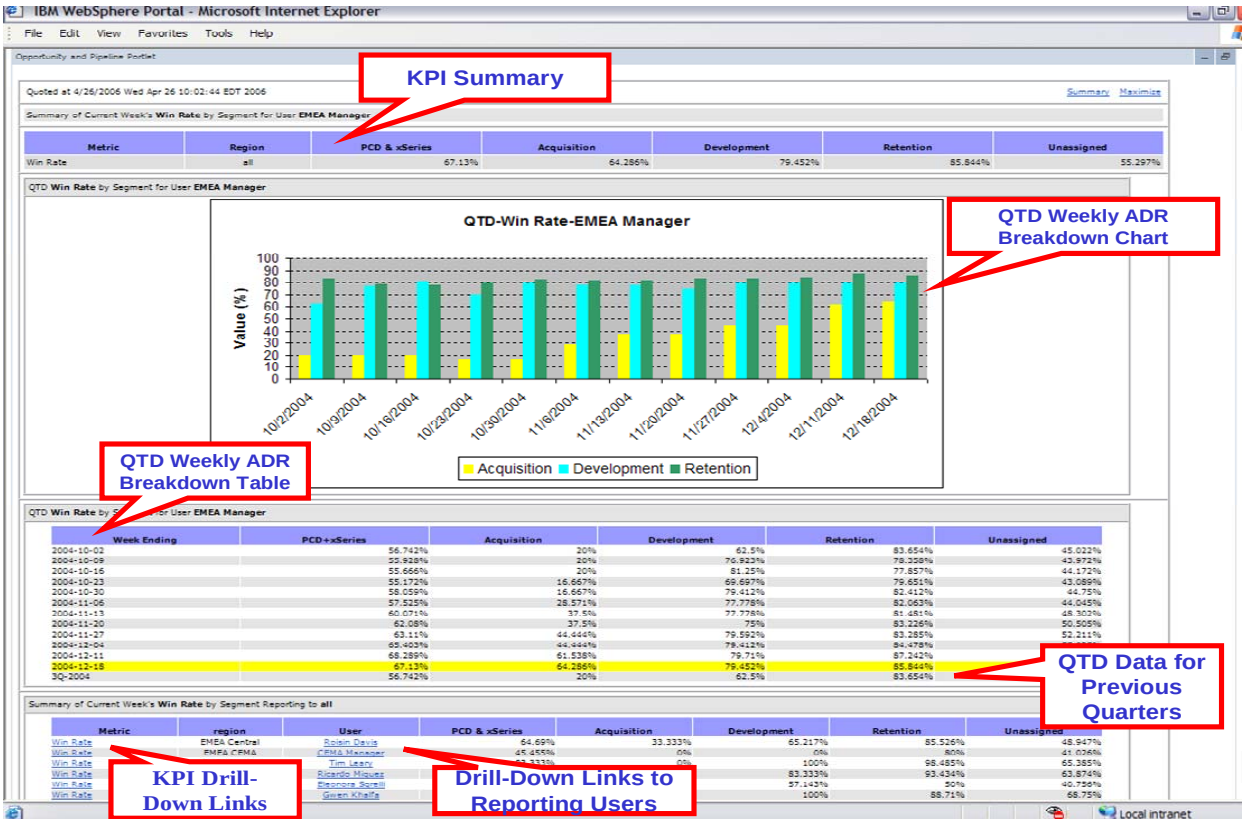

Figure 7. Detailed View of an Opportunity KPI for a Geo Manager Accessing the Dashboard

With the implementation of a hierarchical structure, the BPM dashboard thus allows managers of the IBM telesales center to timely manage the financial and opportunity performance and perform root cause analysis of situations based on their reporting structure and role from a single, integrated IT tool. For instance, a Geo manager can log in to the dashboard and monitor the overall performance and alerts of the entire geography through the summary view. The Geo manager can utilize the drill-down links to explore the detailed information of an alert. He or she can investigate further details following the reporting structure from a link list of regions or telesales representatives in the detailed views. On the other hand, a regional manager can also log in to the dashboard and view the exact, same detailed information corresponding to the region or telesales representatives reporting in the region.

The dashboard views also facilitate the telesales representatives to track and monitor their own up to date opportunity performance on customer accounts. Visual alerts are displayed to signal the negative situations so that corrective actions may be taken in time to remedy the circumstances.

5. Conclusions

In an enterprise telesales center, telesales representatives and managers need up-to-date information to monitor business performance and to make timely and sound business decisions. In this paper, we introduced an information integration and presentation solution based on a business performance management operational framework to help business users in an IBM telesales center in visualizing and interpreting performance information upon demand.

By integrating both historical information from back-end databases and real-time information from business transactions, our solution delivers detailed visibilities into both financial and opportunity performance of an enterprise telesales center, and enables telesales representatives and managers to easily monitor and measure timely key performance metrics and access early warning alerts on a personalized dashboard. With personalized and timely information available for them to make faster and more well-informed decisions, both productivity and revenue opportunity of the IBM telesales center have been found to be six to seven times more cost effective than traditional field sales.

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