

REENGINEERING HR APPRAISAL LEGACY SYSTEM TO BI PLATFORM

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Abstract: This paper introduces business intelligent (BI) systems and its relationship to the Human Resources (HR) development. Then the paper describes a project on how a HR appraisal system was re-engineered into BI platform. Two major data sources that existed for HR data are merged to construct the required star schema of the data warehouse. This process is done using the standard data warehouse procedure of extract, transform, and load (ETL). To accomplish this task, the following BI platform options are considered: IBM Cognos, Microsoft BI, in addition to the most general tool of Excel sheet. Since the HR data resides on MS SQL server, the Microsoft business intelligent development studio is used to construct a native required star schema. Once that task is accomplished, data analysis is conducted on the historical HR data warehouse data mart to extract relevant report to assist in HR planning and development.

Key-words: Human resources appraisal, star schema, Microsoft business intelligence, extract, transform, load, BI dashboard.

1 Introduction

Business Intelligence (BI) research comprises the design and implementation of infrastructure, processes, and best practices for data warehousing, that leads to efficient integration of data from different sources, on-line reporting, and analysis of business information for planning and decision-making purposes.

Data analytics may lead to clustering, classification, segmentation, and prediction. Data warehouse focuses on enterprise wide data, or data marts that are restricted to one area such as customers, suppliers, and human resources. With advancement of storage capacity and the use on the Internet, clouds, and extranets, enterprises are faced with information overload. By 2020, the amount of data generated each year is projected to reach 35 zetta bytes (1 zettabyte = 1 billion terabytes, 1terabyte = 1000 gigabytes) [1]. Such data will require different type of data analytics that will afford companies to seize the opportunity to optimize overall enterprise performance as well specific area, such as HR. For example, IDC predicts

that business analytics to Become the center of business value for Asian organizations in 2012 [2].

Two major organizations conducted analysis of current BI platforms. In Forrester's 72-criteria evaluation of enterprise (BI) platform vendors, we identified the 11 most significant software providers — Actuate, IBM, Information Builders, Microsoft, MicroStrategy, Oracle, QlikTech, SAP, SAS, Tableau Software, and Tibco Software [3]. The other one is performed by Gartner [4]. The Fig.1 depicts the location of venders along the quadrants of BI. Clearly, both evaluations agree on the top producers of BI software.

1.1 BI Components

One author suggested the following four component of BI system [5]:

1. The Data Management sub-system includes components, relating to Data warehouses, data marts, and Online Analytical Processing (OLAP).
2. The Advanced Analytics sub-system includes analytic functions based on statistics, data mining,

forecasting, predictive modeling, predictive analytics, and optimization.

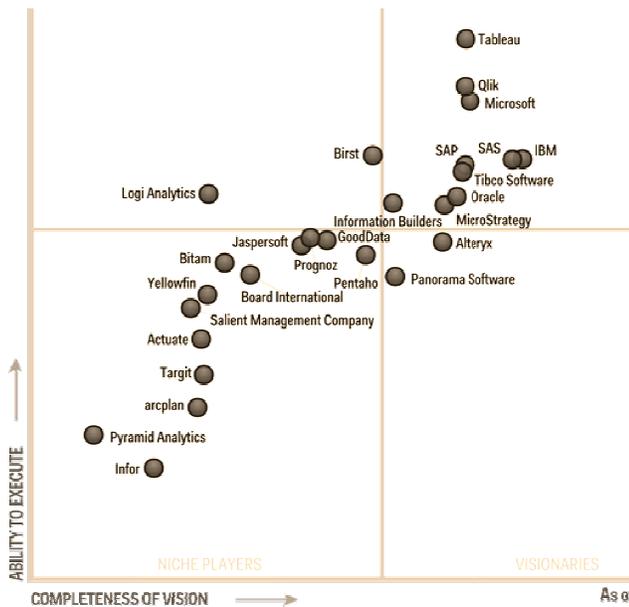


Fig.1. Magic Quadrant for Business Intelligence Platforms

Source: Gartner (January 2014)

3. The Business Performance Management sub-system consists of processes for strategic goals and objectives, performance measurement and mentoring, analyzing performance and making decisions to improve business performance.

4. The Information Delivery sub-system gives the business users the ability to access reports and continuously monitor organizational performance at enterprise and lower levels.

1.2 Human resources and BI

A working paper stressed the importance of linking HR to BI to motivate BI department and employee in enhancing HR functions [6]. In fact, this was the major factor this project was undertaken by the BI department as reported in this paper.

Another major report highlighted the importance of Human resources (HR) analytics that have emerged as a critical method for organizations that seek improved hiring practices, development of human resources, and retaining the best employees to sustain competitiveness in their respective fields of operations. HR departments must align company goals with employee goals, and then automate HR processes to translate these goals into staffing needs, expected employee performance, and the skills and knowledge

employees must have to meet these short- and long-term company goals. These processes result in greater HR efficiencies. Analytics, on the other hand, make HR departments more effective. Using BI analytics requires addressing the right questions that are related to key organizational soreness points and determining the metrics and best practices that will improve the organization’s productivity. The report will assist and guide HR professionals through these areas with a focus on analytics to support decisions related to recruitment, HR appraisal, and knowledge sharing and learning [7].

Finally, another article highlighted the importance of HR and BI for global multinational companies to maintain international HR data bases to cope with global competitiveness and align HR strategies with the business global strategy. [8]

1.3 BI in HR features of major vendors

This section provides a summary of major features of BI vendors based on Gartner Group Magic Quadrants, as shown in Fig.1.

Tableau for Human Resource Experts [9]

Tableau puts the power of data discovery, ad-hoc analysis, and dashboard creation directly into your hands. Productivity, profitability and morale often linked. Human Resources professionals often make decisions affecting one or all of these important metrics. Using HR analytics in Tableau Desktop, you can understand trends and explore potential tradeoffs. You can review resulting insights with colleagues to avoid surprises and find creative solutions.

- Manage productivity and understand staffing trends
- Identify areas of risk with “what if” planning
- Audit Equal Opportunity Employer (EOE) issues such as gender and race

Keep employee data secure but sharable with authorized managers, right in a web browser

SAP Workforce Analytics features [10]:

Workforce Planning

-Understand current workforce trends -- and plan future needs -- by using workforce demographic data.

-Use more than 200 predefined reports to analyze headcount development, turnover rates, and workforce composition.

-Link the results of this analysis directly into headcount planning, budgeting, and key talent processes, such as recruiting and learning.

Workforce Cost Planning & Simulation

- Support HR professionals in all workforce cost-planning tasks, and empower HR executives to develop effective strategies.

- Provide access to a broad range of workforce-related data to support accurate planning, facilitate simulated planning scenarios, and enable continuous monitoring of actual performance relative to plan.

Workforce Process Analytics & Measurement

- Measure and analyze typical core HR processes such as payroll, employee administration, time management, and benefits.

- Analyze organizational structures, relationships, and attributes of jobs and positions.

Talent Management Analytics & Measurement

- Identify key attributes of your talent pool.

- Measure recruiting processes.

- Measure and analyze learning programs.

- Analyze succession programs.

- Monitor performance management processes.

- Measure employee compensation programs.

The MicroStrategy HR platform capabilities [11]:

- Payroll systems, benefits systems, time entry systems, etc.)

- Ensure compliance with government regulations

- Enables advanced and statistical data analysis, as well as alerting.

- Employees can view and manage their personal information, such as time-off requests, benefits selection and address updates.

- Managers are just clicks away from analyzing employee performance and ensuring parity of titles, salaries and skill levels.

- Vice presidents can monitor the salary ranges of prospective candidates.

- Finance managers can receive alerts of their choosing, such as when a high salary is entered into the payroll system. HR professionals ensure labor law compliance and study ways to improve operational efficiency.

IBM Cognos Workforce analysis features [12]: Workforce analysis software for an integrated view of performance

- Accelerate time to insight with packaged workforce metrics and reports.

- Deliver accurate, organization-wide visibility using information from diverse HRMS and other data systems.

- Gain a comprehensive view of workforce management by seamlessly integrating packaged analytic applications for Sales, Finance, and other areas.

Oracle Human Resources Analytics features [13]:

- Workforce Insight—Monitor workforce demographics in line with your recruitment and retention objectives. Analyze efficiency of the entire recruitment process lifecycle, understand and prevent the drivers of employee turnover.

- Targeted Workforce Development —Gain insight into the movement of top and bottom performers in the organization to engage and develop internal talent. Gain insight into learning demand by analyzing course enrollments by job, delivery methods, and organizations.

- Improved Compensation—Understand how compensation impacts performance, ensure compensation is equitable and consistent across roles, and align variable compensation with your organization's objectives and goals.

- Leave and Absence—Get a comprehensive view into employees' current, planned, and historical absence events; monitor absence trends as a predictor for employee engagement.

- Better Understanding of HR Performance—Assess HR's overall performance and employee productivity using industry benchmarks such as revenue per employee, contribution per headcount, and return on human capital.

- US Statutory Compliance—Monitor US EEO, AAP, and Vets100 compliance reporting.

2 The Reengineering Project

This section contains information related to the project that involved re-engineering of HR appraisal system running under MS SQL server traditional database management system to BI MS server platform. In this project, the following approaches were employed: use a top-down approach for data usage processes: building reports that link strategy to goals, goals to metrics, and metrics to data, and use a bottom-up approach for all data preparation processes: sourcing, extraction, integration, cleansing, reconciliation, and modeling [3].

2.1 The current system

The HR appraisal system (HRAS) has two processes: objective setting and evaluation. For the objective setting process, manager of each Business Unit must discuss the plan for the coming year with his/her team members, the objectives must be in line with the

Annual Operating Plan of the Business Unit or department. The year objectives are divided into three main parts, Business Development with a total Weight of 75%, Organizational Development with total Weight of 15% and Personal Development with total Weight of 10%.

For the evaluation process, the following rating scale is used:

- Significantly above Target (SAT): Employee exceeded all objectives, and demonstrated all competencies at a superior level.
- Above Target (AT): employee met all objectives (and may have exceeded some objectives), and demonstrated all competencies at a high level.
- On Target (OT): employee exceeded most objectives, and demonstrated all competencies at an expected level.
- Below Target (BT): employee achieved some but not all objectives and/or inconsistently demonstrated competencies at the expected level.
- Significantly Below Target (SBT): employee did not meet most objectives and/or did not demonstrate competencies at the expected level. He/she requires improvement in quality, quantity and timeliness of work.

The overall evaluation result should be distributed as follows: 70% for the annual objectives, 30% for competences, 5% for the personal attributes, an extra of a maximum 5 points for over achievement. All annual salary increases and incentives are awarded based on this appraisal result.

Once objectives are set, the appraisal system measures two aspect of employee performance: competencies and professional behavior/ attributes. Here is an explanation of both of these measurements as used in the HRAS:

Competencies: Competencies are the measurable or observable knowledge, skills, abilities, and behaviors, critical to successful job performance.

Choosing the right competencies allows employers to:

- Plan how they will organize and develop their workforce.
- Determine which job classes best fit their business needs.
- Recruit and select the best employees.
- Manage and train employees effectively.
- Develop staff to fill future vacancies.

Competency Types:

- Knowledge Competencies: practical or theoretical understanding of subjects.

-Skill and Ability Competencies: natural or learned capacities to perform acts.

-Behavioral Competencies: patterns of action or conduct.

Using competency:

In Job Descriptions: Job descriptions explain the duties, working conditions, and other aspects of a job, including the competencies needed to perform the job's essential functions. Position-specific competencies are determined through the process of job analysis, and are documented in the Position Description (PD) form. These competencies form a basis for recruiting, hiring, training, developing, and managing the performance of employees.

In Recruitment, Assessment, and Selection: Describing desired competencies in recruitment announcements gives job seekers a clearer picture of what jobs entail. Competencies also provide the foundation for assessment and selection techniques, including exams, interviews, and reference checks.

In Employee Performance Management: Competencies allow supervisors to more fully describe to employees their performance expectations. Competency descriptions show employees what level of knowledge and skill mastery is required to successfully perform job duties, and what behavioral standards must be consistently demonstrated.

Professional behavior and attributes: Professional behavior creates an environment that promotes safe and high quality and engenders a constructive learning environment. It's important to remain professional at all the time especially when engaging in business environment. It is important to remain committed to your work and behave ethically and stand up for yourself and ideas in an appropriate manner.

Examples of Professional Behavior in Employees:

- Clearly identifies oneself to staff.
- Maintains a clean, neat appearance.
- Maintains composure.
- Treats people with dignity and respect.
- Collaborates with other members of the team and treats them with respect.
- Answers phone calls and pages in a timely and courteous manner.
- Respects cultural and religious differences of others.
- Is truthful in verbal and written communications.
- Communicates differences in opinion and good faith criticism respectfully in the appropriate forum.
- Is on time for meetings and appointments.

2.2 The current traditional databases

The current system uses two data sources based on traditional entity relationship diagrams (ERD): the appraisal system data base and MENA (Middle East and North Africa) HR system. This big data environment created a major problem in integrating and retrieving data from the two separate databases. It also posed the first hurdle in joining the two databases with proper SQL commands.

2.3 The company and the BI team

The company is a leading IT service provider of consulting and training in a developing nation in the Middle East. It acquired level 3 CMMI certification from its first attempt. Its IT solution covers both IBM and Microsoft products. The BI team comprised of 4 members with three having Computer Science degree and one with Management Information Systems degree. The project took 2.5 months to complete with .5 fulltime. This project was the first one to be performed by the team.

3 Building the BI platform

To Develop the Appraisal System, the project considered the following options:

- Excel pivot table: is a data summarization tool found in data visualization programs such as spreadsheets [11].
- IBM Cognos: The common foundation for your performance management solution including data access, system management and information delivery [14].
- SQL server services: provides a scalable BI platform optimized for data integration, reporting, and analysis enabling organizations to deliver intelligence where users want it [15].

The project used the SQL server services because it is less expensive and they have a direct link to the database running of the same platform. Fig.2 shows logical steps in building the BI platform. Building the BI platform required three components of the SQL server services.

3.1 Microsoft SQL Server Integrating Services (SSIS)

SSIS provides a scalable enterprise data integration platform with exceptional Extract, Transform and Load (ETL), integration capabilities, and enabling organizations to more easily manage data from a wide array of data sources. ETL Technology is an important component of the Data Warehousing Architecture. It is used to copy data from Operational Applications to the Data Warehouse Staging Area and

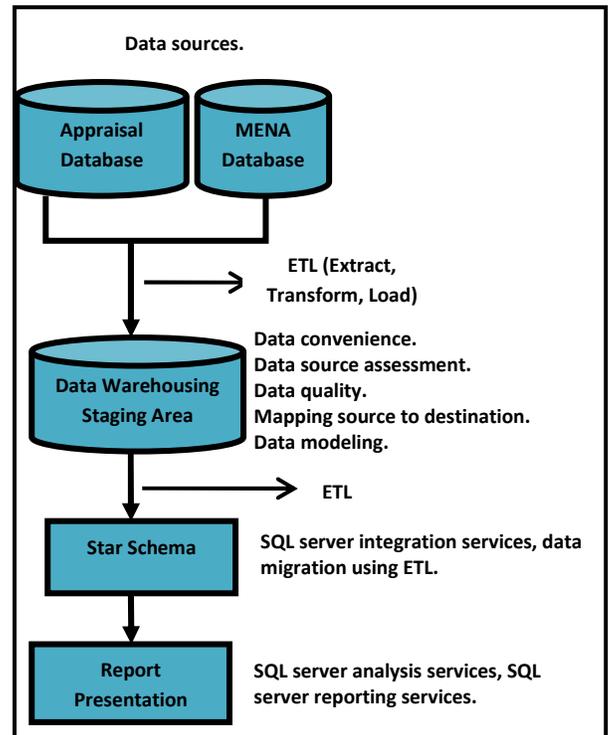


Fig.2 Logical design steps for implementing BI

from the staging area to create Star Schema. The ETL software extracts data, transforms values of inconsistent data, cleanses bad data, filters data and loads data into a target database [16].

The project used ETL in each table in the data environment to extract all the data needed. SSIS has two concepts: Control Flow and Data Flow. A control flow task is a SSIS component used to carry out an operation such as executing a SQL statement, or copying data from a specific database.

SQL Server Integration Services provides many different types of data flow components: sources, data conversion, and destinations.

-Sources extract data from data stores such as tables and views in relational databases, files (OLE staging).

-Data conversion modify, summarize, cleaning, data merging, and distributing data.

-Then after the conversion of the data type, SSIS will start to look up for the data extracted from external databases, with star schema and if the data was found, no adding will accrues, but if the data was not found, SSIS will create a field for this data and add the time element.

-Add time element date about the creation date and modification date to the ETL process.

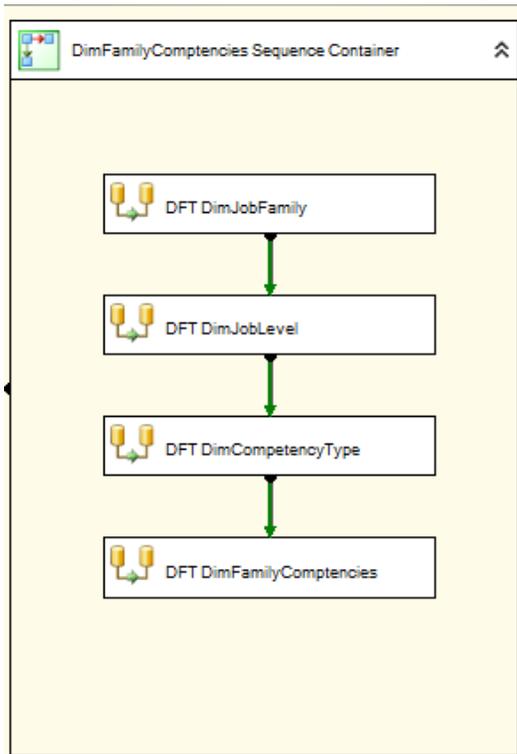


Fig.3 Control flow steps for creating competency dimension

-Destinations load data into data stores.

Fig.4 shows the data flow for the competency data base.

When designing dimension tables, there are a few rules to keep in mind. First, all dimension tables should have a single-field primary key. This key is often just an identity column, consisting of an automatically incrementing number. The information is stored in the other fields. As required by the SSIS, A star schema is constructed that consists of dimension tables and fact tables. Dimension tables, also known as lookup or reference tables; contain the relatively static data in the data warehouse. Dimension tables store the information normally used to contain queries, they are usually textual and descriptive. These other attributes, contain the full descriptions of

the dimension record. These attributes do not contain codes that link to other tables. Fact tables hold the measures, or facts. The measures are numeric, It contains all the primary keys of your dimension table, fact (additive, non-additive, semi-additive), and attributes [17]. Appendix A at the end of the paper shows the star schema for the BI platform.

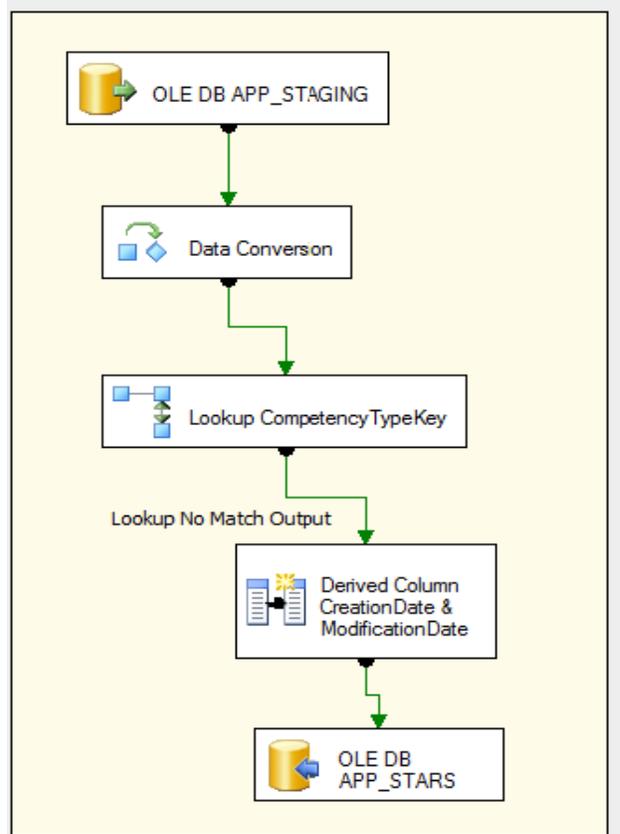


Fig.4 ETL data flow process

3.2 Microsoft SQL Server Analytical Services (SSAS)

SSAS helps enable organizations to build comprehensive, enterprise-scale analytic solutions that deliver actionable insights through familiar tools.

These services include:

- Develop solutions quickly with the new, streamlined Cube Designer
- Take advantage of enhanced Dimension and Aggregation Designers
- Avoid common design problems by using best practice
- Optimize performance with subspace computations
- Enable high-performance “what if” scenarios

- Take advantage of enhanced data mining structures and improved Time Series support
- Monitor and optimize analytical solutions by using Analysis

Once these steps are completed, the BI software is ready to generate analytical reports.

3.3 Microsoft SQL Server Reporting Services (SSRS)

SSRS provides a complete, server-based platform designed to support a wide variety of reporting needs enabling organizations to deliver relevant information where needed across the entire enterprise.

These services provide:

- Improving performance for report development process
- Completed server platform for developers
- Advantages of Web-Enabled Reporting
- Enabled real-time and interactive reports
- Open, Extensible Enterprise Reporting Platform
- Integration with Microsoft Business Intelligent Products

Appendix B at the end of the paper shows a sample screen snapshot that demonstrates a report of top employees and top departments performers. Other analytical reports can now be generated from the BI software effectively and efficiently.

4 Conclusions

This paper focused on how and HR appraisal system can provide the managers with informative reports, and how to reduce the time for preparing a report. Preparing a report in the current situation traditional database using SQL requires time between collecting data, make sure that the data is updated, consistence, and is not redundant and then prepare a report based on the manager requirements.

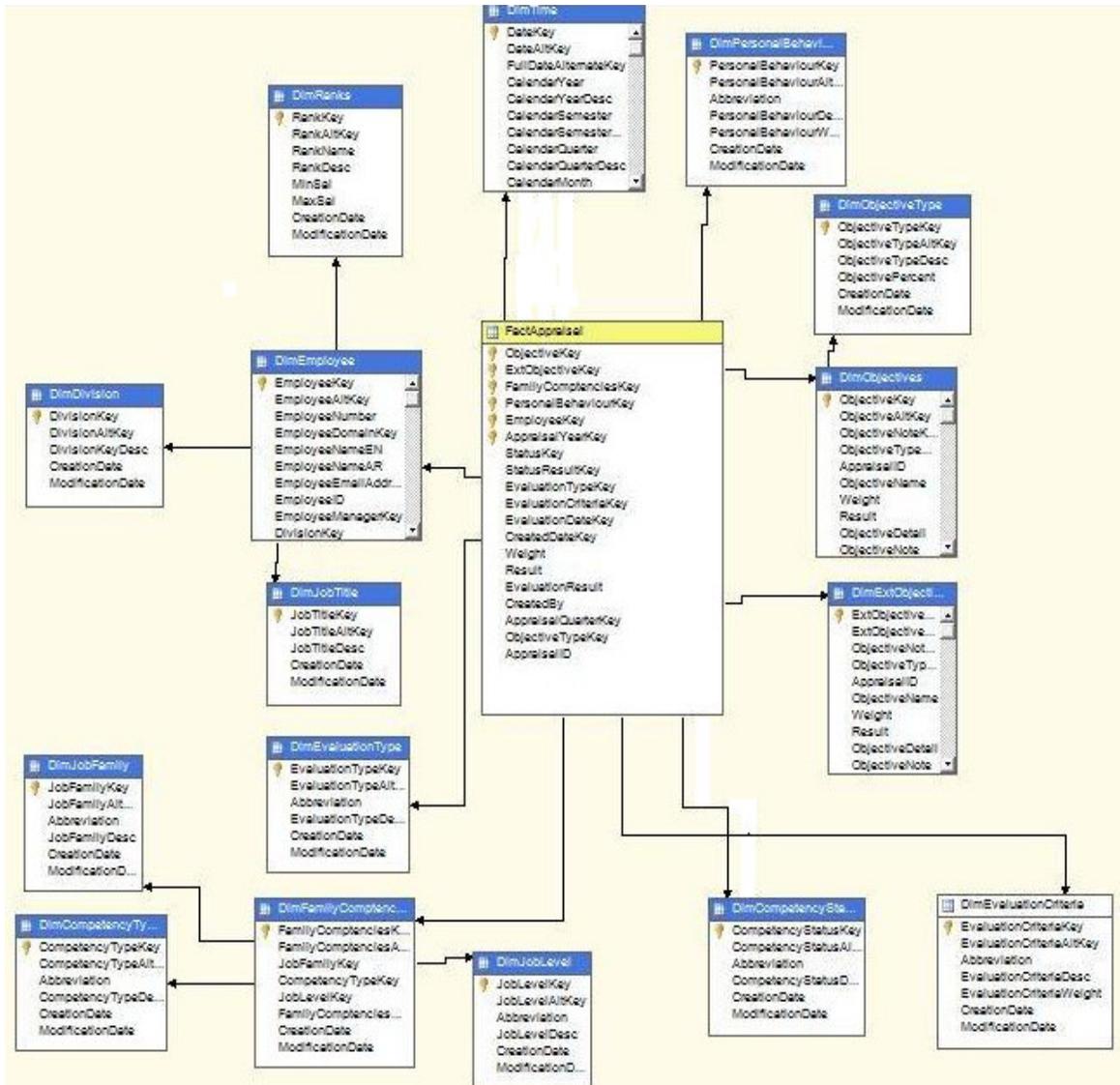
The new reengineered BI system will enhance the performance of the company, provide advanced analytical reports, assist management in making better decisions based on the analysis of available historical data, will support the company forecast for the future, and finally merge all the data from all the departments in one report. With the new BI system, the company can perform many of the on-line reporting capabilities supported by the BI platform.

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 Appendix A. Star schema for the project

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Appendix B. A dashboard for a sample BI report for top employees and departments (Actual data suppressed for secrecy policy)

