

IT Framework for the Implementation of Balanced Scorecard in Healthcare Systems

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Abstract

Hospitals operate in an environment demanding demonstration of excellent care in a challenging fiscal environment where markets for talented individuals are extremely competitive. This requires attention to multiple areas of clinical, financial, and operational performance. The Balanced Scorecard (BSC) has proven to be a useful strategic management and performance management tool in healthcare. The balanced scorecard (BSC) was developed by Kaplan and Norton to help organizations succeed by embedding a strategy of balanced focus and performance monitoring into the heart of organizational culture. Yale-New Haven Health System, a three hospital system whose anchor is a large tertiary care teaching hospital, implemented an electronic Balanced Scorecard using a commercial product, “SAS[®] Strategic Performance Management for Healthcare”. This paper aims to document the balanced scorecard implementation process and the associated IT framework across the System.

Introduction

Healthcare industry is facing increasing challenges in the days of shrinking budgets, increased government regulations, declining reimbursement and an aging population, while maintaining the highest-quality patient care. Successful health care management in the 21st century will depend on organizations and top executives balancing quality and customer satisfaction with adequate financing and long-range goals (Judith, 2003). In order to cope with the challenging nature of running a hospital, Healthcare Executives are increasingly implementing a professional performance management tool, the “Balanced Scorecard”. The Balanced Scorecard (BSC) was first introduced in the early 1990s through the work of Harvard professor Dr. Robert Kaplan and consultant David Norton. Since then, the concept has become well known and its various forms widely adopted across the world (Rigby, 2001). Financial indicators—which have traditionally been measured with great accuracy within most organizations—tell the story of the past events, which is not entirely helpful for organizations struggling to chart future directions. Balanced scorecards attempt to replace these “lagging” financial indicators with “leading” indicators that provide a picture of what might be ahead for the organization, allowing it to modify business strategy accordingly (Shannon, 2005).

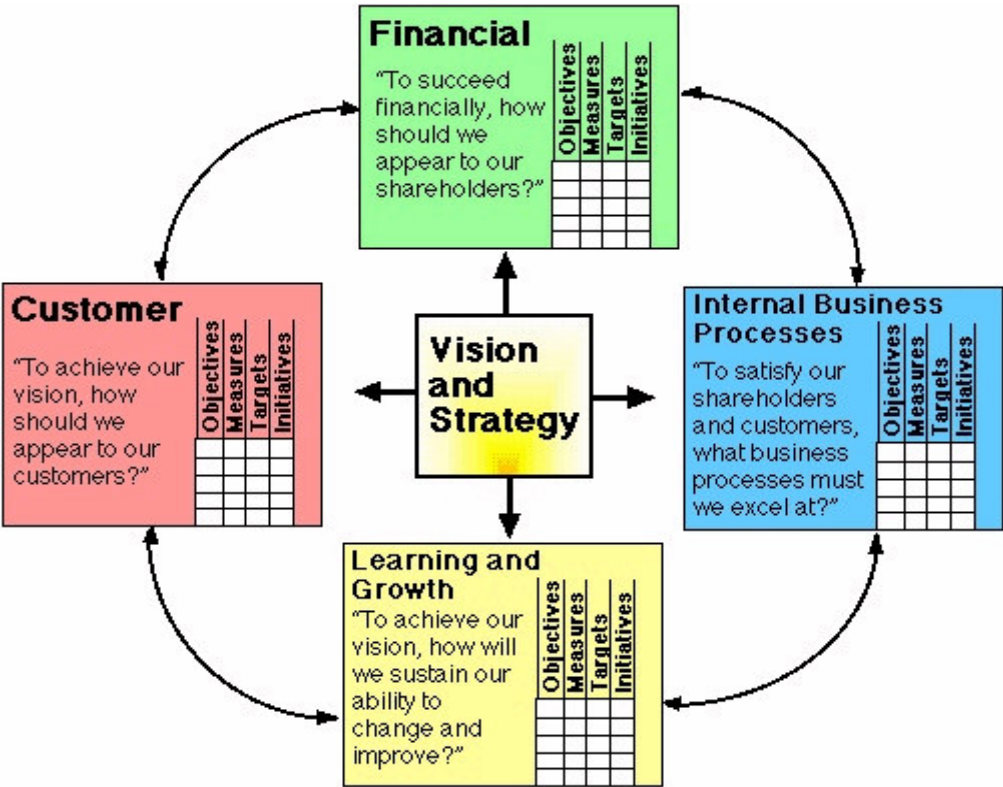
Since 1994, when the first refereed article was published on the BSC in health care settings, numerous articles have appeared in the health services and management literature, as the BSC appears to have gone into a growth phase (Zelman, Pink et al. 2003). According to Zelman and coworkers study (2003), the BSC has been adopted by a broad range of health care organizations, including hospital systems, hospitals, psychiatric centers, and national health care organizations. Several articles have described the use and potential benefits of this tool in various healthcare settings: community health partnership (Hageman et al. 1999); Children’s Hospital (Meliones et al. 2001); Army medical department (AMEDD) (Holt 2001); outpatient services (Curtright, Stolp-Smith, and Edell 2000). Although many health care organizations have successfully implemented BSCs, Neely and Bourney (2000) claim that as many as 70% of

organizations fail to implement them successfully. It is reasonable to expect that the success of a BSC implementation depends not only on selecting measures that are relevant, manageable, and important but also on how leadership, supervisors, and employees gain knowledge about the status of the BSC metrics.

Electronic information systems may have a number of benefits that could make BSCs more effective. These include: automatically calculating metrics to provide more timely measurements of performance, broad and rapid distribution of updated measurements, and improved access to supportive data as well as analytic tools that allow managers to more easily answer the question “why” when performance does not meet expectations. Many reports have described the implementation of BSCs in healthcare settings (Chow, Ganulin et al. 1998, Stewart and Bestor 2000; Pink, Mckillop et al. 2001; Oliveira 2001; Fitzpatrick 2002, Shutt 2003, Tarantino 2003: Radnor and Lovell 2003a, b). However, the majority of these have described the development of the scorecard metric set. Given the complexity of most hospital and healthcare organization information systems, the architecture of automated BSCs will have considerable influence on the success or failure even when an appropriate set of metrics have been defined. This paper documents a successful implementation of an automated BSC in Yale New Haven Health Systems in Connecticut.

What is Balanced Scorecard?

Balanced Scorecard (BSC) framework is increasingly being used to solve the above mentioned problems in the hospital (Kershaw, 2001). The balanced scorecard, first proposed in the January-February 1992 issue of HBR, provides executives with a comprehensive framework that translates a company’s strategic objectives into a coherent set of performance measures. Much more than a measurement exercise, the balanced scorecard is a management system that can motivate breakthrough improvements in such critical areas as product, process, customer, and



market development (Kaplan & Norton, 1993). The BSC takes the mission of the organization and the strategic initiatives for the year and translates those into objectives and measures in four traditional quadrants. The quadrants are Financial Perspective, Customer Perspective, Internal Business Perspective, Innovation and Learning Perspective as shown in the picture (Kaplan & Norton 1992). The balanced scorecard is like the dials in an airline cockpit: it gives managers complex information at a glance (Kaplan & Norton 1992). Traditional measurement systems have sprung from the finance function. That is, traditional performance measurement systems specify the particular actions they want employees to take and then measure to see whether the employees have in fact taken those actions. In that way, the system tries to control behavior. Such measurement systems fit with the engineering mentality of the industrial age. The balanced scorecard, on the other hand, is well suited to the kind of organization many companies are trying to become. The scorecard puts strategy and vision, not control, at the center. It establishes goals but assumes that people will adopt whatever behaviors and take whatever actions are necessary to arrive at those goals. The measures are designed to pull people toward the overall vision. Senior managers may know what the end results should be, but they cannot tell employees exactly how to achieve that result, if only because the conditions in which employees operate are constantly changing. This new approach to performance management is consistent with the initiatives underway in many companies: cross-functional integration, customer-supplier partnership, global scale, continuous improvement, and team rather than individual accountability. By combining the financial, customer, internal process, and innovation, and organizational learning perspectives, the balanced scorecard helps manager understand, at-least implicitly, many interrelationships (Kaplan & Norton 1992).

Due to the nature of the Balanced Scorecard, based on perspectives and assigned multidimensional measures, an effective and powerful information system support is necessary in order to exploit the entire system (Holger & Thorsten & Jurgen & Thomas, 2005).

Application of Balanced Scorecard in Healthcare Systems

Implementation Strategy

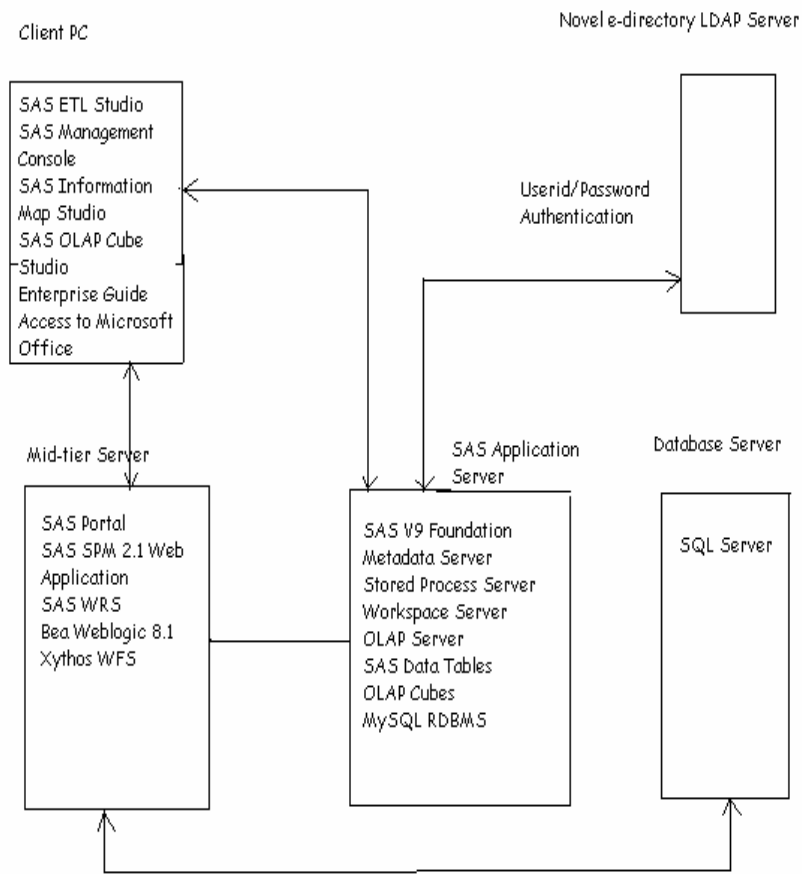
Yale New Haven Health System started this project from the beginning with the definition of a Vision and Mission statement by the top executive of the hospital. Then it identified the strategic dimensions, strategies followed by the Key performance Indicators (KPIs). Identifying critical success indicators is a very important step in the process of building a BSC, especially for healthcare organizations, because usually they have a habit of collecting large amounts of data without really analyzing whether those measures impact performance (Tian & Bruce, 2006).

Overview of the implementation process

Once the hospital identified all the KPIs necessary for this balanced scorecard implementation project, each metric is defined clearly, source data is identified, targets are established, performance thresholds are defined and detail reporting requirements including the 'drill-downs' for the OLAP cubes are identified. Frequencies of updating the KPIs are also identified. Measures are updated daily, bi-weekly, monthly, or quarterly.

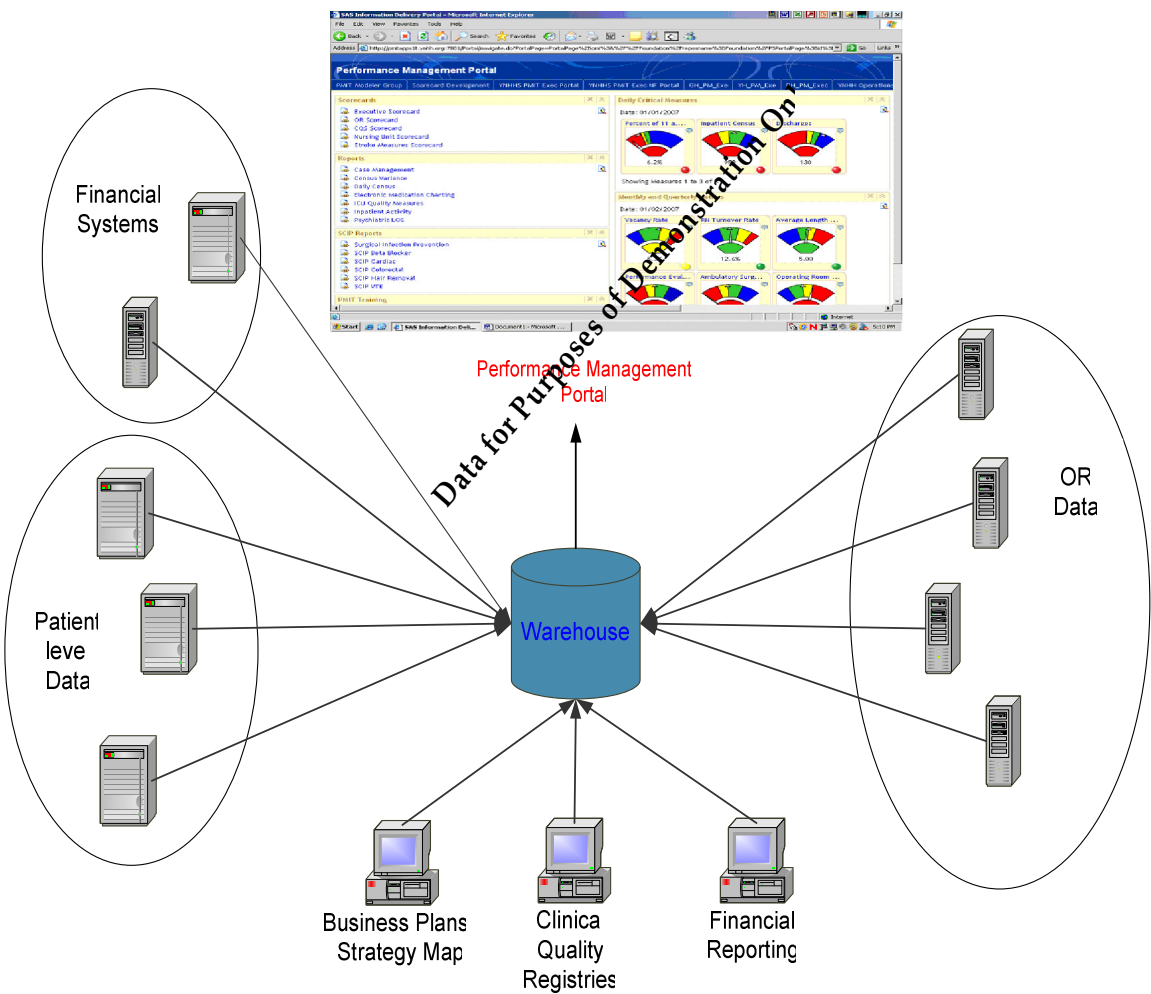
Implementation Architecture at this Hospital using SAS® Solutions

This picture represents a pictorial view of the IT infrastructure. We have three servers, one for



application server; another is mid-tier server/ web-server and another is data server. Users primarily access this application through the Intranet. Power users utilize SAS ® Enterprise Guide®, SAS ® Information Map, SAS ® Web Report Studio etc to perform data analytics and reporting. That allows them to dig data further to understand the hidden pattern of the data that is driving some of the critical measurements.

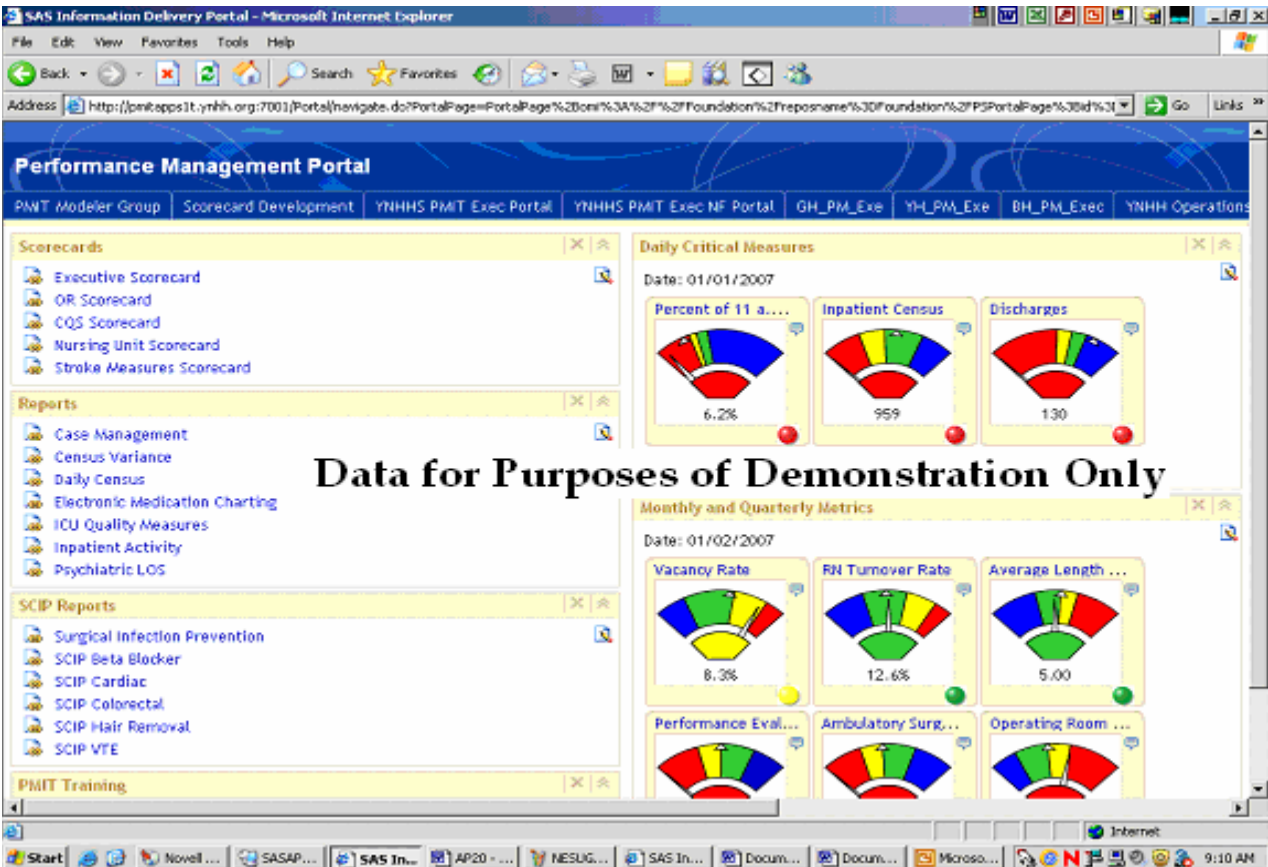
Data Flow Diagram of Yale New Haven Health System Balanced Scorecard Implementation



We receive data from almost all-functional areas of the business as shown in this data-flow diagram. Data sources include: admission/discharge/transfer (ADT) systems, the electronic general ledger, operating room information systems, clinical information systems, and others. SAS ® Data Integration Server, which is a component of the SAS ® 9 Enterprise Intelligence Platform is being used to pull data from different source system and load data to the warehouse. SAS ® Data Integration Server is also used to load data to the SAS ® Strategic Performance Management where the data is stored in MySQL® database. A Job scheduling tool ‘LSF Job Scheduler’ which is a part of SAS BI infrastructure is used to schedule all the ETL processes to run automatically in the batch mode.

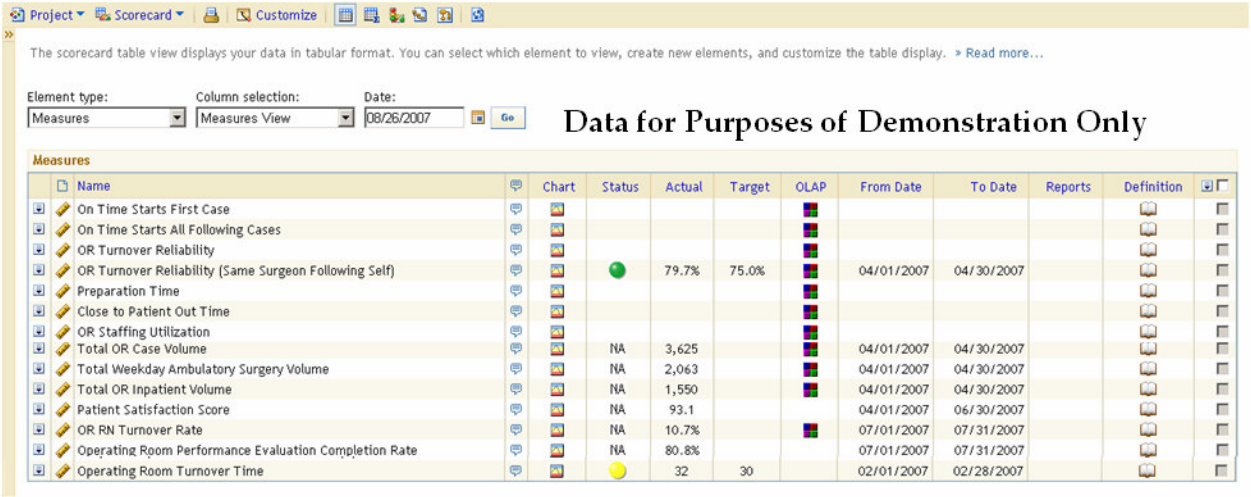
The Performance Management Dashboard

SAS ® Information Delivery Portal provides immediate visibility of those KPIs that are most relevant for each individual user. The performance is reported in a way that users can see instantly whether performance is on target. Users can completely customize the portal depending on what information they want to see in the portal. The portal also provides ready access to a range of reports that provide additional information needed to understand root causes and trends. A sample dashboard used by some of Yale New Haven Health System users are shown here.



The scorecard

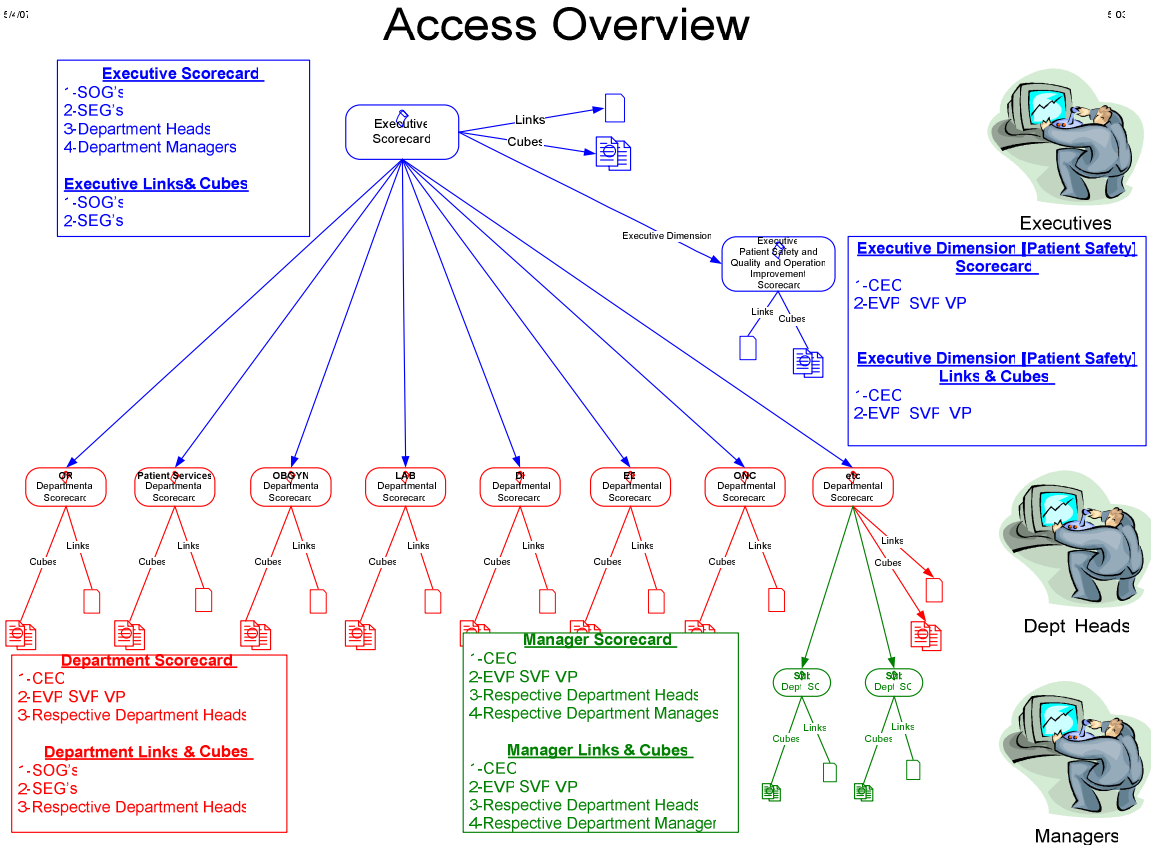
SAS Strategic Performance Management solution also allows the user to depict the metrics in a more traditional tabular format. A sample scorecard is shown here.



User can customize all the columns in the table. In this hospital, we have shown actual value, target value, status indicating the color of the ball, history graph, and custom report for the metrics in this table. History graph can be expanded to see the trend of that particular metric giving insight to details of the data. We also have OLAP cubes and custom reports associated with these metrics. OLAP cubes are created using SAS ® OLAP Cube Studio and custom reports are created by SAS Stored Process Web Application.

End-User security:

Security was a very important consideration from the start of this project. Because so much sensitive information is available through this performance management portal, it is important that we give access to information to the right people. SAS Strategic Performance Management with SAS/BI solution allows multiple level of security to the system. Initial user authentication is done through LDAP server. Once the user is authenticated through LDAP server, SAS validates user authorization to view requested data. SAS security allows authorization to be set from the highest level (scorecard) down to column on dataset. This also allows metric level security. We defined different groups for each scorecard and give them rights for viewing their respective scorecards.



The SAS Intelligence Platform uses an authorization facility to control user access to repositories and to specific metadata in those repositories. The authorization facility is a subsystem of the SAS Metadata server that returns authorization decision based on access controls that are in the metadata. To secure a metadata resource, we have created authorization metadata and associated with the resource metadata. The authorization metadata defines who can do what to a given resource. The secured resources can be both metadata and the actual computing resources represented by the metadata.

Conclusions

This study looked at the design and implementation of an integrated performance management system at Yale New Haven Health System in Connecticut. This IT-supported performance management system is used by the Hospital to communicate strategy to their employees. This performance management dashboard is one of the executive’s important application used in decision making, making the balanced details of the business that were often buried deep within this large hospital accessible at a glance to senior executive. Managers now can see key changes in the hospital almost instantly in a balanced perspective so now they can take quick, corrective action. It’s a key operational tool now for this hospital. Choosing SAS solution for this implementation proved to be a successful one as this product has the flexibility, responsiveness and adaptability for the changes in healthcare business trends.

Acknowledgments

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