# Reducing Total Cost of Ownership:
## Delivering Cost Effective Enterprise Business Intelligence

A White Paper by MicroStrategy

MicroStrategy®

# Reducing Total Cost of Ownership:
## Delivering Cost Effective Enterprise Business Intelligence

## 1. Executive Summary

With IT budgets under increasing scrutiny and business requirements becoming more complex, today's organizations need to critically examine Business Intelligence (BI) costs. The costs of successful Business Intelligence extend beyond the initial acquisition; over three years, IT staffing constitutes between 60 and 86% of BI Total Cost of Ownership (TCO).[1] An IDC study, "Demonstrating Business Value: Selling to Your C-Level Executives," concludes, "Because the single largest factor affecting TCO is staffing cost, IT initiatives that can reduce IT labor costs are likely to find greater acceptance among financial decision makers, and initiatives that enable IT consolidation or automation can significantly reduce TCO across the IT infrastructure."[2] To save costs, IT buyers should make evaluating the technical capabilities that reduce staffing costs their highest priority.

This white paper presents TCO data collected from over 80 MicroStrategy customer production deployments. The data shows that MicroStrategy customers deploy BI to thousands of users with a small number of IT staff, resulting in a low Total Cost of Ownership. In a March 2008 BI customer survey of 373 respondents, a leading analyst firm found that on average, the MicroStrategy platform had the most favorable ratio of administrative staff to users across major BI vendors.[3] Over the past 20 years, customers and analysts have recognized MicroStrategy's scalable BI platform for delivering cost efficient enterprise Business Intelligence.

Many organizations have saved millions of dollars by switching from traditional fragmented and IT-intensive BI to MicroStrategy's unified and scalable platform. MicroStrategy designed its architecture to speed design and deployment time while minimizing administration and maintenance efforts. This white paper will help decision makers understand the features MicroStrategy customers use to reduce their BI ownership costs.

MicroStrategy software offers fast time to value through low IT development efforts and easy deployment. End users can serve the majority of their own analysis and reporting needs through MicroStrategy's self-service prompted reports and easy formatting. MicroStrategy's object reuse speeds IT development and reduces effort. End users can automatically view the same MicroStrategy report or dashboard definition through any interface – including any Web browser, mobile devices, or export formats – reducing IT deployment efforts. MicroStrategy's zero-footprint Web interface eliminates the client installation and update costs required by many traditional BI vendors. This paper identifies the design and deployment capabilities from BI technologies that help companies save money and decrease the time to value for their BI applications.

Administration and maintenance activities consume extensive IT resources using traditional BI tools. Centralization and automation can reduce administrative efforts. A BI architecture with duplicative or redundant metadata, user interfaces, administration consoles, and servers – software inefficiencies – is difficult to manage and more costly to maintain. MicroStrategy's single object repository and single server provide maximum administrator efficiency. Consolidation reduces costs and, as the data shows, allows a single MicroStrategy administrator to serve thousands of end users. Dynamic data sourcing, database optimization, and instantly propagating MicroStrategy object updates reduce maintenance overhead. MicroStrategy's BI platform provides efficient administration and requires little maintenance, reducing IT costs and allowing the IT staff to focus on delivering new business value.

---

[1] IDC. "Demonstrating Business Value: Selling to Your C-Level Executives." Three-Year Server TCO. Based on more than 300 interviews conducted across numerous platforms, presented in composite form. April 1, 2007.

[2] Above n.1.

[3] Gartner. "BI Platforms User Survey: How Customers Rate Their BI Platform Vendors." March 6, 2008.

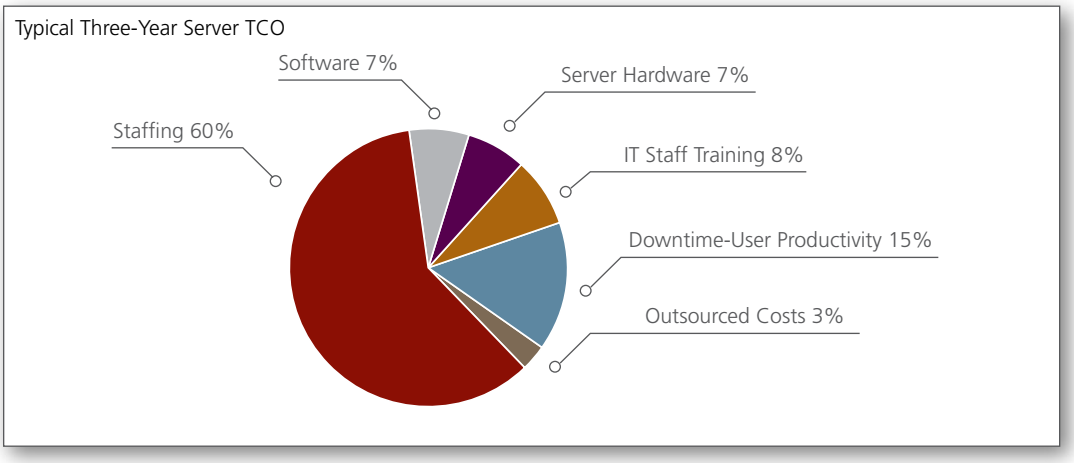
MicroStrategy's efficient BI software results in the lowest Total Cost of Ownership. For successful and affordable BI, evaluators should base platform decisions on the major ongoing costs of maintaining and enhancing their BI applications which represent up to 86% of the overall Total Cost of Ownership over three years rather than the comparatively minor software license expenditure which only constitutes 7%.[1] This white paper helps decision makers understand which features have the greatest impact towards reducing BI ownership costs.

## II. INTRODUCTION

Businesses today are demanding more and more out of the same IT budget. As a result, many Business Intelligence buyers are seeking better ways to assess their Return on Investment (ROI). Evaluating ROI requires two components: (1) the business value obtained and (2) the investment costs spent. The business value of a BI application is often difficult to measure, given that value continues to evolve and grow over the application's lifetime. On the other hand, the investment costs often represent a more objective and quantifiable estimate. This paper focuses on how organizations can measure and lower their investment costs, thereby increasing their ROI.

Analysts agree that enterprise software TCO is comprised of three broad categories: software, hardware, and personnel costs of deploying and maintaining the system. Figure 1 shows analyst firm IDC's breakdown of multi-year TCO.

**Figure 1: Multi-Year TCO is Comprised of Several Components**




Note: The figure is based on over 300 interviews conducted across numerous platforms, presented in composite form.
Source: IDC, 2007.

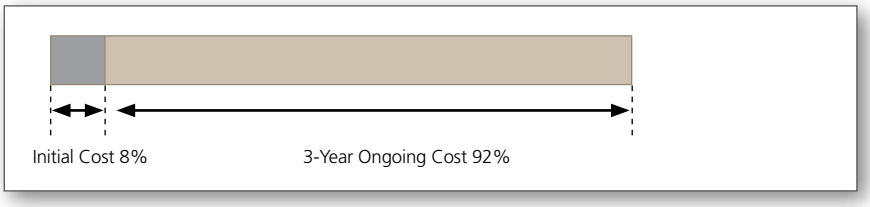
BI industry analysts' TCO estimation methods reach similar conclusions: A BI project requires a significant number of skilled personnel, which represents the largest cost component over the BI application's lifetime. Microsoft told the Wall Street Journal, "…that the initial purchase is only 5% of the total cost of owning and maintaining a program."[4] IDC estimates that ongoing staffing costs constitute between 60-86% of owning enterprise software over a three-

[4] Bulkeley, W. M. and Buckman, R. The Wall Street Journal. "Microsoft wages Campaign Against Using Free Software." December 9, 2002.

year period while hardware and software each represent only 7%.[5] Personnel cost components dominate three year TCO, as shown in Figure 1. Over five years, a professional IT resource can cost more than $500,000.[6] Therefore, a decrease in even a few IT resources can subtract millions of dollars from an application's TCO.

BI buyers have the opportunity to select a technology that minimizes staffing efforts, and consequently, reduces overall costs. The typical BI buyer may concentrate on initial BI acquisition costs, particularly software license costs, because these costs are often most immediate and easiest to measure. However, the majority of staffing costs lie in recurring activities, including the staffing overhead needed to maintain, upgrade, and expand existing applications. Gartner estimates that 92% of the money customers spend on BI applications occurs after the initial deployment, as shown below in Figure 2.

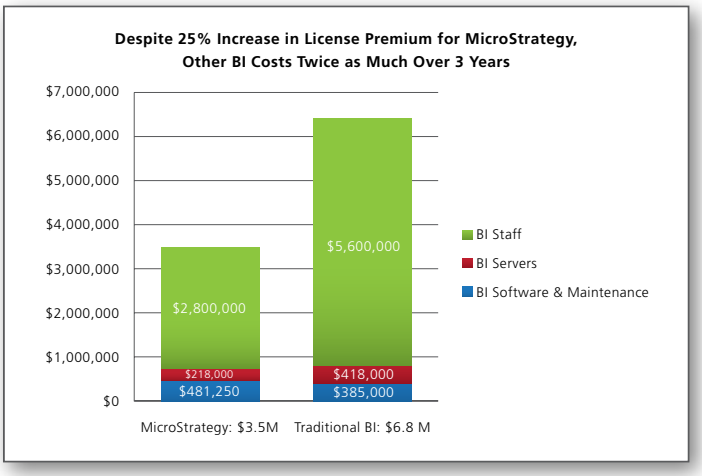
**Figure 2: 3-Year Ownership Costs Consume over 92% of Total Cost of Ownership**




Source: Gartner. Estimate reflects finding that customers spend up to four times the initial cost of their software license during every year they own their BI applications.

Since different BI platforms provide different levels of end user self-service, efficiency, and scalability, the number of IT staff required to deploy and maintain the BI application varies greatly depending on the BI platform chosen. A short analysis of differences in initial license investment costs becomes negligible when measuring TCO over three years as ongoing personnel costs dominate TCO, as shown in Figure 3.

**Figure 3: Differences in Initial License Investment Costs are Irrelevant to 3-Year TCO**




MicroStrategy Assumptions: BI Software: Initial License Investment: $312,500; Year 1, 2, 3: 18% Maintenance. BI Servers: Initial Investment: 8 Servers, $25,000 each. BI staff: Initial Investment: 10 IT Staff; Year 1, 2, and 3: 6 IT staff. Assume salary $70,000+ $30,000 HR benefits and overhead for a total of $100,000 annually.

Other BI Assumptions: BI Software: Initial License Investment: $250,000; Year 1, 2, 3: 18% Maintenance. BI Servers: Initial Investment: 16 Servers, $25,000 each. BI staff: Initial Investment: 20 IT Staff; Year 1, 2, and 3: 12 IT staff. Assume salary $70,000+ $30,000 HR benefits and overhead for a total of $100,000 annually.

[5] IDC. "Demonstrating Business Value: Selling to Your C-Level Executives." Three-Year Server TCO. Based on more than 300 interviews conducted across numerous platforms, presented in composite form. April 1, 2007.

[6] Assume annual IT salary = $70,000. Assume annual IT salary organizational overhead = $30,000. Assume 5 years.

Since personnel supporting BI software is the largest TCO component when deploying a BI application, this white paper outlines technical features that can reduce the number of people required to design, deploy, administer, and maintain BI applications. Organizations can lower the majority of application ownership costs by identifying technical capabilities that decrease the majority of TCO – staffing needs.

This white paper presents data from a survey covering the Total Cost of Ownership of customer implementations over and 18-month time period. Over 200 responses from 90 distinct organizations were collected.

## III. Staffing Costs

The majority of staffing efforts go towards simply "keeping the lights on," or maintaining ongoing operations. Ongoing staffing costs, which constitute the majority of TCO, can be grouped into four ongoing activities: Design activities, including creating new reports and applications required to meet changing business user needs; Deployment activities, including all efforts to make the application available for use; Administration activities, including overseeing users, software, security, and performance; and Maintenance activities, including updating reports to reflect changes in the BI system.

The BI platform's efficiency levels directly impact the number of required staffing resources. For example, end user self-service allows users to perform the majority of design and analysis, saving unnecessary cycles of designing activities. Technologies with centralized administration reduce administrator resources by several orders of magnitude. A highly re-usable business layer, or metadata, can decrease IT maintenance efforts by reducing the number of reports to maintain. In choosing a BI platform, BI buyers have an opportunity to select certain technical capabilities that drastically reduce IT staffing efforts.

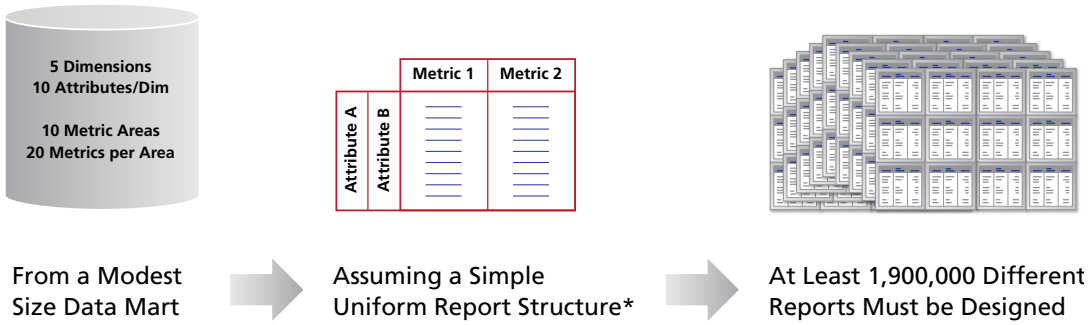
### DESIGN ACTIVITIES

Design activities include the recurring process of creating new reports and applications to meet changing business requirements. While an initial application requires designing new reports, new design is also an ongoing cost of a successful BI application. As end users start to analyze and drill down into the data, users inevitably refine and enhance their reporting requirements. Once users perform analysis using a single report, business users are usually able to identify additional reports, which may include new calculations and business fields required to further understand business trends. Over the course of a year, a BI application that began with a dozen reports may require hundreds of new report variations.

In addition to analysis spurring new design requests, expanding business requirements also create new design requirements. For example, expanding data and users may also require report designers to create new variations.

Figure 4 shows how a modest amount of data may create millions of desired report variations. The figure shows a relatively simple data mart with 5 business dimensions and 10 fields within each dimension (for example, Size, Color, Season, and so forth). The data mart also contains 20 metric areas and 10 metrics in each area (for example, Sales This Year, Sales Last Year, Sales % Increase this Year over Last Year). Next, the figure assumes an extremely simplistic report structure of two business fields and two metrics per report. This assumption remains extremely conservative as many organizations use well over 10 metrics on a report. Even with this simplistic model, over 1.9 million reports must be designed in order to generate all possible variations in data analysis. Figure 4 demonstrates how analyzing a relatively small data mart can demand over 1M different data combinations.

**Figure 4: Information Dilemma – 1.9M Different Reports from a Single Data Mart**

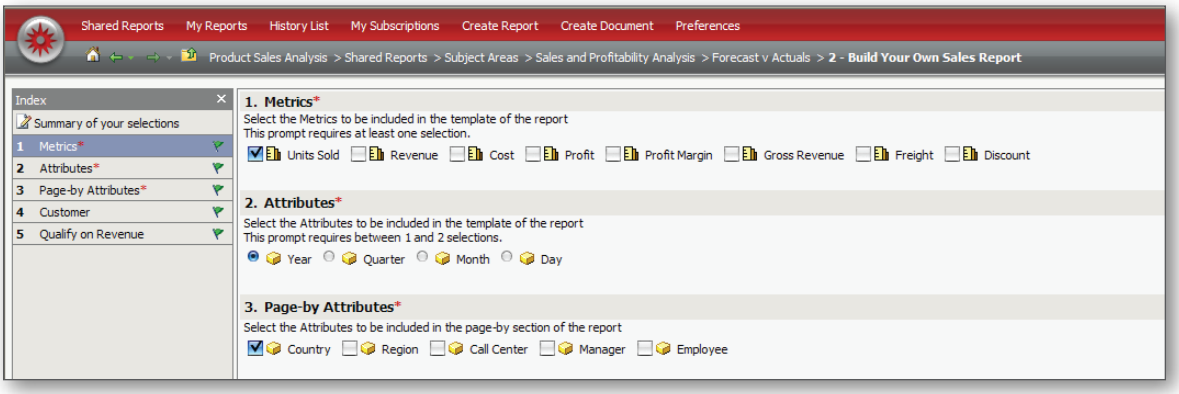



An organization's increasing design requirements can be met either through a corresponding increase in IT effort or through users answering their own requests through BI self-service capabilities. MicroStrategy reduces IT design activities through BI capabilities that allow a fewer number of more flexible reports, end user self-service, and design reuse.

**MicroStrategy's Unique Report Prompting and Ability for End Users to "Surf and Save" Decrease the Need for IT Report Developers**

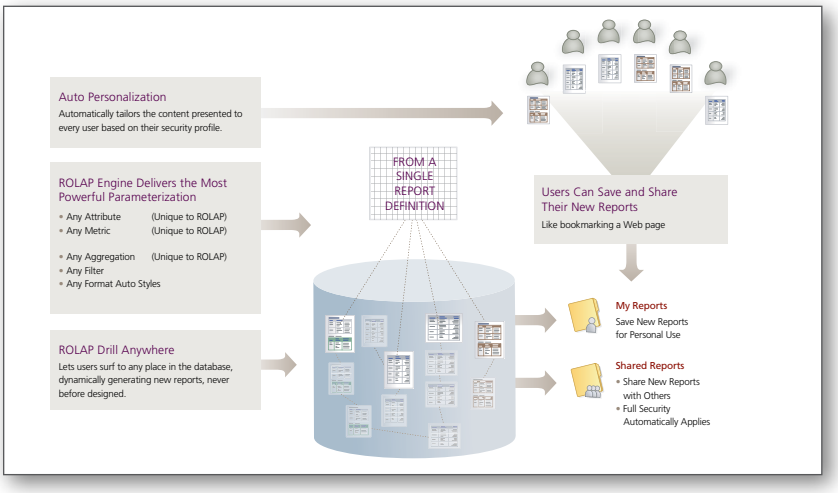
MicroStrategy's self-service capabilities allow users to create and format their own reports without IT involvement. MicroStrategy report developers build a small number of prompted reports that serve as starting points for thousands of potential report combinations. At report run time, users answer prompts to choose any number of desired report objects including filters and business criteria selected from anywhere in the data warehouse as well as calculations, subtotals, and formatting. This run time flexibility allows one prompted report to replace hundreds of variations of report designs.

**Figure 5: MicroStrategy's Advanced Prompting Allows Users to Create Reports without Requiring Technical Training or IT**



After running the report, users can then "surf" the data, analyzing and investigating the information using familiar OLAP techniques. Lastly, they can save personal report versions for themselves or to share with others. This self-service "Surf and Save" paradigm is similar to saving a bookmark of a Web page.

**Figure 6: MicroStrategy "Surf and Save" Represents a New Model for End User Self-service**




Many vendors offer a limited type of prompting; users can only request prompt answers that are contained in pre-calculated cubes. Choosing to filter on existing cube parameters does not offer the same flexibility as MicroStrategy's option to select from all reporting possibilities at run time. The lack of these self-service capabilities in other BI products results in IT building, maintaining, testing, and upgrading hundreds of extra variations of cubes and reports. As a result of MicroStrategy's prompting capabilities, a few MicroStrategy report developers can meet the dynamic requirements of thousands of business users.

**Figure 7: End User Self-service Delivers Economies of Scale Cost Savings**

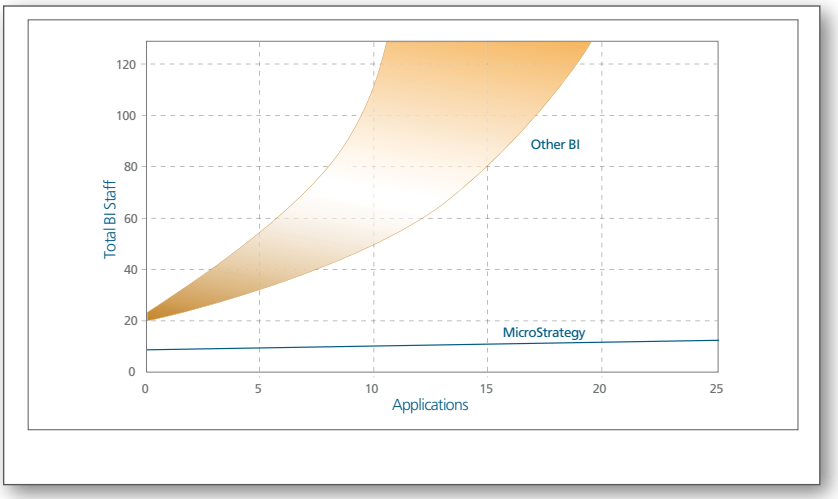


Figure 7 shows how many BI staff are needed to support a certain number of applications on a single server implementation. MicroStrategy's highly reusable metadata allows organizations to add applications that serve more users without requiring a proportional increase in FTEs. For example, MicroStrategy customers support a range of 5 to 25 applications with an average of only 10 FTEs. Other BI technologies require recreating business metadata objects for each application, and this recreation effort necessitates a proportional increase in FTEs. The research shows other BI technologies require around 20 FTES to support 5 applications and around 40 FTEs to support 10 applications, a directly proportional cost increase.

**End Users Perform Intuitive and Drill Anywhere Analysis across All Data Assets without Requiring Further IT Design Activities**

End user investigative analysis including the ability to drill anywhere – up, down, or across hierarchies – is available from any starting report in a MicroStrategy application. Unlike other BI tools, MicroStrategy does not require that all drill paths be anticipated and pre-calculated ahead of time for each report. When a MicroStrategy business definition object is added to a report, users can automatically click and drill anywhere to the full breadth and depth of transaction-level data. In addition to being able to automatically drill up and down – for example, drilling from Year down to Day – a user can drill across. For instance, a user can begin with a list of top revenue generating customers and from Customer, can drill across to Store in a single right-click.

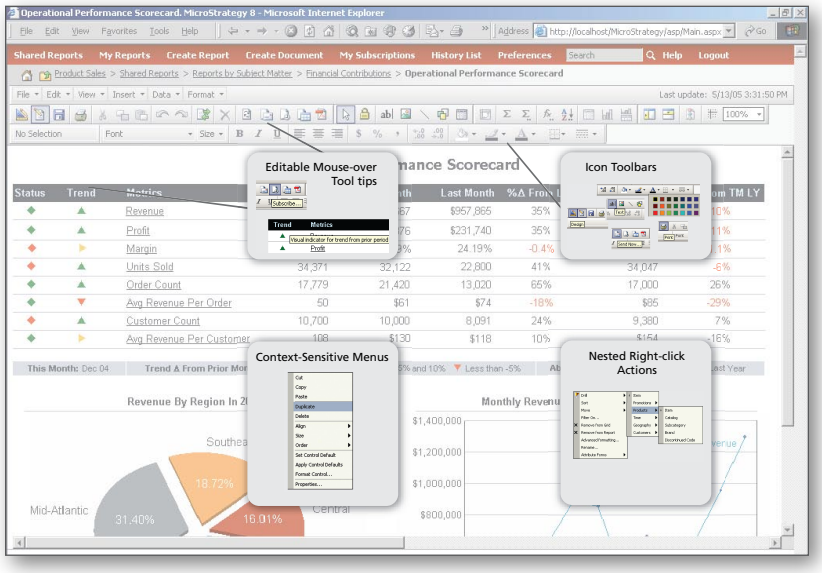
MicroStrategy's automatic drilling capability, including the ability to drill across to new business dimensions and down to transaction-level data, is both powerful and unique in the BI market. Other BI tools confine drilling to drilling up and down a hierarchy and constrict drilling to prebuilt cubes. When analyzing large data volumes, it is often impractical or impossible for other vendors' cube-based BI tools to provide all users this degree of granular access to data because detailed data access would require huge cube sizes and correspondingly, large amounts of BI hardware to process these large cubes. Cubes represent secondary data staging repositories that must be maintained by IT professionals. Many other vendors' larger BI implementations dedicate an entire team of trained professionals to building and maintaining proprietary BI cubes or pre-defined subsets of data necessary to support specific reporting requirements.

**MicroStrategy End Users Perform their Own Analysis and Formatting, Reducing IT Design Efforts**

MicroStrategy users can easily launch into intuitive, out-of-the-box online analysis, including right-click menus for inserting percent-to-totals, sorting, pivoting, and formatting from the MicroStrategy Web interface. Moreover, MicroStrategy offers users a what-you-see-is-what-you-get (WYSIWYG) interface to speed the formatting process. WYSIWYG enables users to see changes in real-time instead of being required to expend time and break concentration by switching back and forth between an editing interface and a publishing interface. Users automatically access a MicroStrategy library of more than 250 basic, mathematical, financial, and statistical functions, such as inserting a percent to total calculation, which can be used to create business metrics and key performance indicators. At report run time, the MicroStrategy query engine translates users' requests into database queries specifically tuned for the database or data source type. As a result of the MicroStrategy interface's easy-to-use formatting and analysis, as well as the MicroStrategy query engine's run time optimization, users are free to perform uninterrupted analysis on their entire data warehouse and other data assets without IT dependencies.

Most other BI technologies require the technical knowledge and advanced privileges of an IT developer to make any formatting and analysis requests. The implication of this lack of end user self-service is that business users need to continually stop analysis and request report changes, such as changing a background color or adding a new calculation, from IT. These ongoing formatting requests create an added burden on the BI IT staff and also require business users to wait for IT to prioritize and complete requests. While editing the documents, IT staff using other BI tools does not have the advantages of a WYSIWYG interface. The lack of WYSIWYG real-time editing adds time and effort to the design process, increasing cost of ownership.

**Figure 8: Analysis Does Not Require Technical Training**




**MicroStrategy's Reusable Sophisticated Business Abstractions Minimize IT User Design Effort**

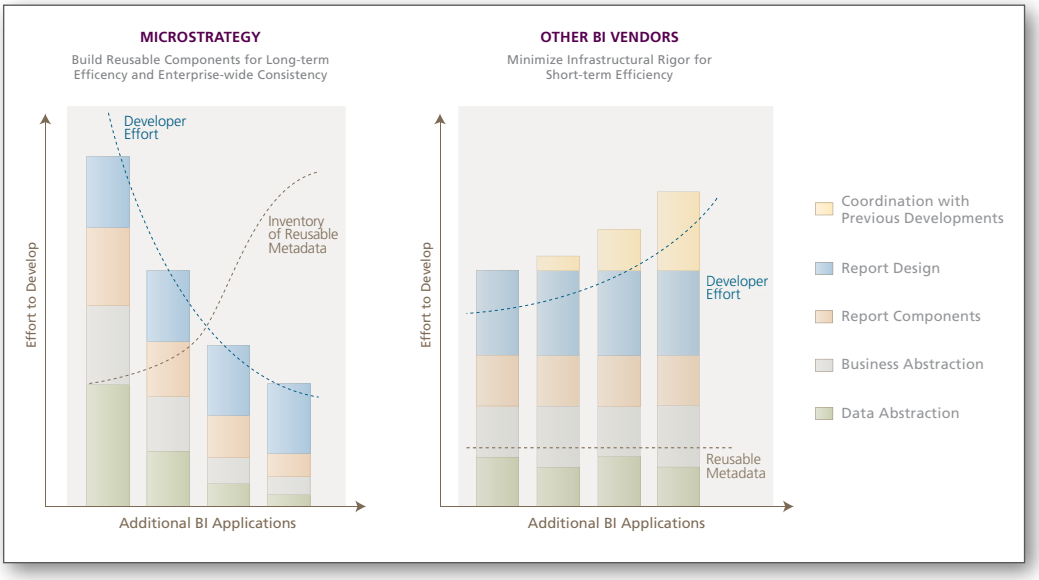
Using MicroStrategy, designers can meet enterprise analysis needs with complex business logic contained in reusable objects. Since MicroStrategy is engineered from a single code base, all objects can be reused across the entire platform; in fact, the same business metadata objects can be reused hundreds of times in reports, dashboards, or e-mail alerts. When changing business requirements demand new reports, MicroStrategy IT report developers have the option to reuse all existing business logic rather than spending time recreating business logic. Not only can IT reuse base-level definitions, but business users can also reuse these base-level definitions to create more sophisticated objects. As a result of reuse, each application requires less effort and can be deployed more quickly than the previous application.

A MicroStrategy architect can build business metadata objects (for example, Revenue, Cost, and Store) that are based on warehouse tables. Business users can reuse those base objects to create a reusable Profit object based on existing objects Revenue and Cost. Other business users can then reuse the Profit object to create another object Profit Margin, and yet another business user can build upon the Profit Margin object to create Profit Margin per Store. MicroStrategy's metadata architecture of reusable objects requires far fewer report developers and offers faster application development than other BI platforms, delivering tremendous cost savings and IT efficiencies.

Many BI vendors offer a limited degree of reuse. Most competing BI tools focus on developing the first version of a report as quickly as possible, avoiding creating robust and re-usable objects and instead favoring quick hard-coded parameters. Within the context of the previous example, many vendors have the ability to create low-level business metadata objects such as a Profit object based on warehouse tables. For more complex calculations, however, most other vendors require report-specific logic that cannot be reused from one report to the next. Using a traditional BI technology, the BI IT staff needs to replicate complex calculations such as Profit Margin per Store, rebuilding this calculation in each report. Not only is manual repetitive development tedious and error prone, it is also slow and expensive. This method of quick "one-off" report development is not scalable for a large number of reports. Lack of extensive business object reuse results in IT building and rebuilding hundreds of objects and adds to design time and costs. Repetitive design efforts risk the potential for multiple versions of the truth.

For true enterprise-class scalability, the BI architecture should allow each report to be developed faster than the last report. To accomplish this, BI technologies must employ report components that are reusable. Otherwise, the report development process will incur exorbitant ownership costs. Compared to other BI platforms, MicroStrategy has the broadest range of reusable business objects in its metadata repository, resulting in the most efficient application development.

**Figure 9: With MicroStrategy's Reusable Metadata, Companies Experience Greater Consistency Across Reports**




## DEPLOYMENT ACTIVITIES

After being designed, the BI application must be deployed throughout the enterprise. Deployment includes all activities that make software available for use. These efforts could include providing user access to BI by integrating BI with an existing corporate Web portal or redesigning reports and dashboards to be viewable over mobile devices.

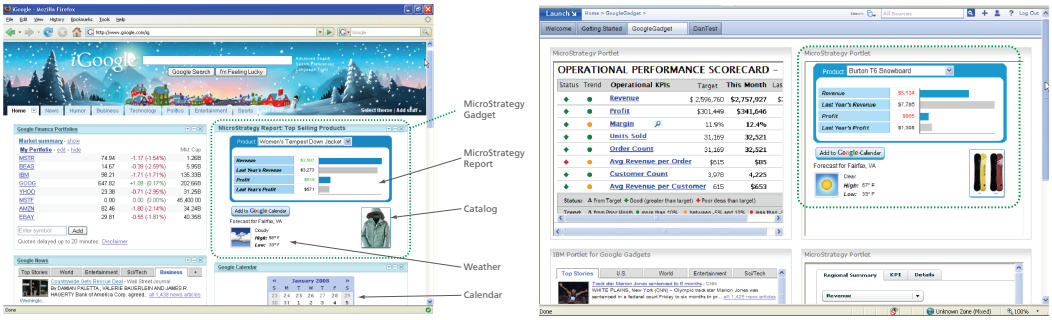
Platform features dramatically impact BI deployment time and subsequent costs. Some BI tools require end users to download applications on individual machines. Many BI tools require IT to redesign reports for viewing in different interfaces. MicroStrategy reduces deployment costs by providing enterprise features such as easy to upgrade customizations, a zero-footprint Web portal, and a flexible interface that enables the same report design to be viewed optimally on a computer screen or a mobile device.

### MicroStrategy's Open Systems Architecture Reduces IT Customization and Integration Time

MicroStrategy is an open systems vendor that embraces any database, portal, operating system, application server, or browser. IT departments can integrate report results, functionality, formatting, and user interactivity in any commercial or homegrown IT application using Web Services or MicroStrategy's Software Development Kit. Desired modifications are isolated to a single layer of the MicroStrategy architecture, and are upgradeable, which is normally a labor intensive job with other BI vendors. MicroStrategy's cleanly-layered architecture makes interface and application customizations much simpler. No coding is required for most customizations. Any changes made to report presentation and BI functionality are stored in external XML configuration files. MicroStrategy's simple and upgradeable customizations reduce developer time and effort.

Other BI platforms require IT to make customizations that require extensive technical coding knowledge and that must be implemented throughout many layers of the BI tool. Performing several customizations in multiple layers of the BI tool adds complexity to the customization effort. In addition to added complexity, embedding customization throughout pieces of the BI software often prevents easy upgrades. Organizations using other BI tools may require more IT time and effort dedicated to customization deployment and change management in addition to more difficult and costly upgrades.

**Figure 10: MicroStrategy Easily Integrates with Any IT Infrastructure**




**MicroStrategy's Zero-footprint Web Interface Eliminates Client Installation and Update Costs**

MicroStrategy deploys using a true zero-footprint client Web browser interface, MicroStrategy Web, which eliminates client installation costs. MicroStrategy Web is based on the latest Web 2.0 (Dynamic HTML and AJAX) techniques for an unprecedented level of Windows-like user interactivity through a zero-footprint Web browser. MicroStrategy Web is only installed on the Web application server and can be updated to the latest software version within minutes.

Other BI vendors require client installations and subsequent updates, extra work that results in increased staffing costs. Some vendors claim a zero-footprint Web interface, yet still require end users to download a "click once" application, which creates more steps for end users and introduces possible security complications. Requiring end users to download and install plug-ins increases the risk of security breaches and increases deployment complexity. In addition to the initial complexity of downloading and installing the application, IT must then keep versions up-to-date and may potentially need to uninstall individual applications.

**Dynamic Dashboards Minimize End User Training Costs, Speeding Deployment and Increasing User Adoption**

A MicroStrategy dynamic dashboard can eliminate deployment costs, provide intuitive impact analysis, and personalize data security for a group of executives or thousands of business users. Dashboards require little IT effort to deploy as users can securely access dashboards from any e-mail inbox or across any Web browser. A single MicroStrategy dashboard can supply many thousands of users with personalized interactive analysis, embedding OLAP components and relationships that provide the workflow analysis of a self-contained application. One dashboard definition can be used for multiple types of viewing and interactivity – the same dashboard design can be viewed offline or online.

MicroStrategy dashboards are fully integrated with the rest of the robust MicroStrategy platform, automatically inheriting the platform's strengths, making MicroStrategy dashboards more reliable and available 24/7. Caching, failover, clustering, load balancing, user administration, and BI environment administration features improve performance. MicroStrategy dashboards inherit a sophisticated analytical engine to explore and display complex data. While some technologies do a good job displaying the data, many struggle to get the data set to be embedded in a dashboard. MicroStrategy dashboards require little effort to deploy because they leverage the project metadata, enabling users to reuse any metadata objects across the single user interface.

Other BI platforms require IT to offer separate dashboard designs for offline viewing and online viewing. Requiring two separate deployment paradigms adds time and complexity to the dashboard deployment process. Most BI tools do not offer embedded workflow and OLAP-enabled components which increase the interactivity and richness of analysis. This limits the value that end users get from their dashboards, requiring IT to create and maintain more dashboards to cover the paths for analysis that users demand.

**The Same MicroStrategy Report Deploys to all Devices Through a Single, Flexible Web Interface, Speeding Deployment and Minimizing Costs**

MicroStrategy users can access the same reports and dashboards securely through any Web browser or BlackBerry® smartphone. MicroStrategy business users of any skill level only need to become familiar with one interface and analysis paradigm to satisfy their reporting, analysis, and dashboard needs. A single, flexible, and customizable interface holds all functionality options. Providing users with consistent paradigms and standard functionality across styles of Business Intelligence and applications delivers a familiar interface that cuts training time and increases the likelihood and speed of user adoption.

Other BI product sets, which have expanded largely through acquisitions, require business users to learn several different interfaces. In addition, many BI tools require IT to format reports for viewing on specific devices or to install multiple stand-alone products, forcing IT staff to create and maintain multiple versions of each report. Requiring business users to learn several interfaces involves more training time and makes training content and delivery more complicated. For example, business users may need to learn how to navigate through data differently in separate product interfaces. More complex training required by other BI products often leads to lower rates of user adoption. MicroStrategy's single user interface reduces training time, and subsequently training costs, while providing a method for fast and cost effective business user adoption.

**Figure 11: One Design Automatically Displays Well on All Interfaces, Minimizing IT Deployment Efforts**


## ADMINISTRATION ACTIVITIES

All BI projects require a degree of constant administration effort, which increase with added numbers of users and applications. A primary task of administrators in any BI application infrastructure involves a number of routine housekeeping jobs that must be performed in order to maintain optimal system performance. These tasks may include updating users, configuring and tuning servers, and managing application versions. In addition, administrators need to perform event-based tasks such as clearing outdated pre-calculated information upon new database loads. Lastly, administrators need to set up and maintain user privileges, application, and data security. BI purchasers should investigate which BI capabilities can reduce administration efforts while maintaining application security and performance.

For maximum efficiency, the BI system administrators should have a comprehensive set of tools to centrally manage and automate their BI infrastructure. In a small BI implementation, administration tasks may be performed manually by a team of people. In order to contain costs as the scope of the application grows, however, it is vitally important that administration efforts do not increase at the same rate as application growth. In a complex application or in managing several applications, the capability to centrally monitor and administer the entire BI platform can reduce administration efforts by several magnitudes. Automation is another BI capability crucial to increasing administrator efficiency. From the first assembly lines, organizations have recognized that automation of common tasks leads to increased efficiency and lowered costs. This concept applies equally to routine administrative tasks performed in an IT environment. To reduce administration costs, BI buyers should look for specific capabilities, such as centralization and automation, which reduce manual administration efforts.

**MicroStrategy's Single Server for Entire BI Platform Minimizes Administration Effort**

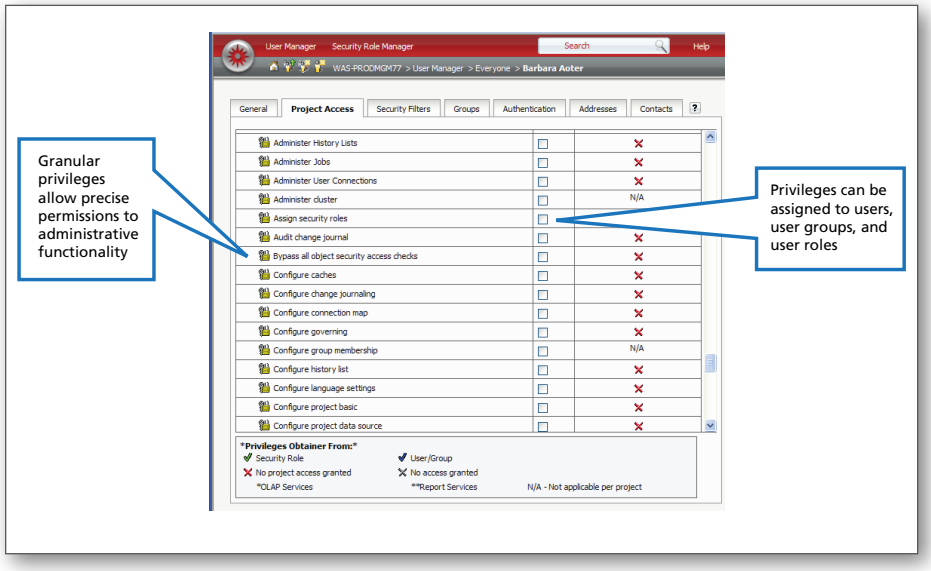
In order to maximize administrator efficiency, MicroStrategy offers a centralized location for all administrative tasks. MicroStrategy grew its platform 100% organically from a single code base and optimized administration so that a single IT person could administer thousands of users. MicroStrategy's organic architecture offers administrators a single enterprise metadata that stores all business logic, potentially including hundreds of applications, all application objects, and all users. Administrators need only create users and security settings once, and these settings apply to the entire MicroStrategy platform. Similarly, a single MicroStrategy server provides processing for the entire platform, including creating ad hoc queries, presenting dynamic dashboards, and delivering e-mail alerts. MicroStrategy's native server clustering capabilities allow administrators to group servers together for added processing power and failover capabilities without requiring the increased complexity of an additional centralized management service. MicroStrategy's single metadata and single server minimize administrative efforts, allowing a single administrator to efficiently deliver 24/7 Business Intelligence, including formatted reporting, ad hoc queries, dashboards, and e-mail alerts to thousands of internal and external users.

Other BI platforms require a much higher level of administration effort because administrators need to manually propagate changes at multiple security touch points. Many BI vendors grew their BI platforms by acquiring other BI platforms. While these other BI vendors may exert substantial effort rewriting all the acquired code into the same base, the integration process is usually slow and may take several years. In the meantime, the BI administrators are forced to administer multiple platforms; a typical example involves two separate platforms with five different metadata that must each be configured and updated. Multiple points of administration require overlapping administration efforts. Not only are overlapping administration efforts prone to error and dramatically increase the chances of mistakes in administering user, data, and application security, but overlapping administrative efforts are also expensive. For example, administrators need to spend time checking many servers. To gain a sense of administration overhead, BI buyers should investigate how many server and metadata points of administration are required and seek to minimize overlapping administration efforts in order to reduce BI administrator efforts.

**MicroStrategy's Single Interface Reduces Administrative Effort Through Centralized Flexible Privilege Allocation**

MicroStrategy allows administrators to centrally maintain thousands of varying user privileges with maximum efficiency through flexible centralized security. The MicroStrategy Web interface is easily tailored to the needs, role, and skill level of each user or user group. As users' BI knowledge and needs expand, additional functionality is granted via a user privilege checklist that requires no coding. This means MicroStrategy Web can satisfy the entire range of users, from novices who need simple reporting to analysts who need complex investigative capabilities in a single interface. A MicroStrategy administrator can change the user interface by selecting from a central list of check boxes in a graphical interface, or by running a line of code from a command prompt. Checking a privilege box may mean that the user now sees an additional ribbon of functionality, for example, the ability to add and format calculations. A central administration console allows for easy user privilege control and results in automatically personalized end user interfaces.

**Figure 12: Centralized Web Administration Allows for Easy Privilege Control**




Other BI products, whose platforms have grown through product acquisitions, require end users to use many different products in order to achieve a personalized user application interface. For example, other BI products may require power users to use separate products for Pixel Perfect™ formatting, static reporting, dashboards, and ad hoc queries. In this example, the power user needs to learn these four different interfaces, and the BI platform administrator needs to exert at least four times as much administrative effort to create and maintain the user profile in four separate locations. Most BI tools require this security to be manually propagated through several administration touch points. Some BI tools even require user data security to be hard-coded into each cube instance. This type of security is extremely rigid and maintenance intensive, involving multiple steps of administration in different products, interfaces, and cubes, in order to set up data access. MicroStrategy is able to define multi-layer security from a single administration point. These security settings propagate automatically across the entire platform. Automatic, multi-tiered security allows organizations to meet their most complex security requirements while maintaining low administration efforts.

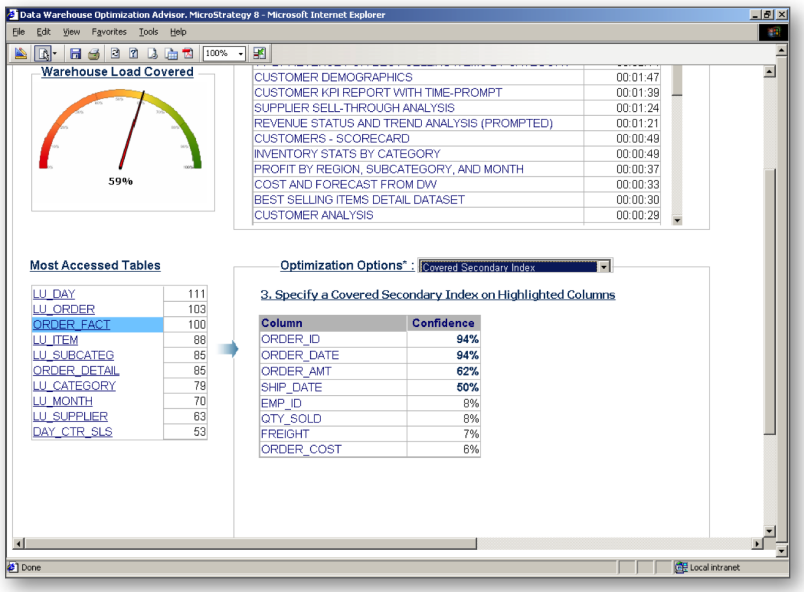
### Out-of-the-Box Monitoring and System Reporting Allows Administrators to Easily Optimize System Performance

MicroStrategy's out-of-the-box system monitoring helps administrators efficiently monitor and optimize system resources. Business Intelligence applications and their associated infrastructures are constantly evolving and therefore require constant monitoring to maintain optimized system performance. MicroStrategy Enterprise Manager is a data gathering and reporting tool that offers administrators centralized, out-of-the-box monitoring of the entire MicroStrategy platform usage, including user and group activity. MicroStrategy Enterprise Manager incrementally gathers and transfers usage data about the entire BI platform to a centralized data warehouse. MicroStrategy Enterprise Manager comes with prebuilt reports and dashboards that allow the administrator to analyze centralized usage data down to the details, determining which database fields are most in demand. MicroStrategy's prebuilt system-wide performance reports and dashboards have been refined and improved over many years of meeting the largest enterprise customer needs. MicroStrategy administrators have effective and actionable monitoring

information from day one. Some reports identify spikes in system resource demands, allowing administrators to optimize system usage and help estimate user license needs for capacity planning. By monitoring the most popular reports as well as reports with above average response times, administrations can take action towards a performance-enhancing strategy to pre-calculate these reports during off-peak hours. MicroStrategy provides the capabilities to precisely understand how the application is being used in order to calculate ROI and tune the system for maximum performance and optimal resource utilization.

Some BI tools may come with incomplete or non-customizable system monitoring. With some BI tools that lack prebuilt monitoring applications, IT administrators need to define requirements for system monitoring and to build their own monitoring reports. In this case, IT spends a significant amount of time trying to determine how to monitor their system. In addition to costs of application development time, the IT team requires several iterations in order to arrive at an effective and actionable system. Some other BI tools offer a limited degree of monitoring with static reporting. While these rigid reports may be useful, the reports are often static and do not allow the administrator basic analysis, such as the ability to sort rows. In order to maximize administration efficiency, BI buyers need to investigate the level of effort required to obtain a comprehensive and actionable system monitoring application.

**Figure 13: MicroStrategy's Out-of-the-Box System Reporting Reduces Administration Efforts**




**Flexible and Powerful Scripting Lowers Total Cost of Ownership Through Automation**

MicroStrategy significantly reduces the overhead of maintaining BI applications with a scripting interface called MicroStrategy Command Manager that can automate tasks across the entire platform. Repetitive administrative tasks can be run through a graphical interface or command line scripts. Automation tasks range from starting and stopping servers to updating thousands of user security profiles. The script files created by Command Manager can be scheduled through operating system utilities or integrated into third-party Systems Management Software such as IBM® Tivoli®, CA's UniCenter®, or BMC® Patrol®. MicroStrategy's command automation ensures that the

BI environment can dependably operate under changing user and system loads automatically without manual intervention. Command Manager's asynchronous access capabilities enable IT staff to administer several BI applications simultaneously. Automating administrative tasks offers distinct business benefits to the IT organization. Total Cost of Ownership is lowered significantly due to a reduction in the number of administrative resources required to maintain the application. By automating improved reliability and manageability of the system, administrator work load is dramatically reduced; the BI platform can react automatically to certain events such as server shutdown, increased user load, or the initiation of data load windows.

By running a script that automatically creates thousands of users or business metadata definitions, administrators can eliminate days of development over the time required to create the same business logic objects manually.

**No Automation**

| | For 1 BI Application | For 10 BI Application |
|---|---|---|
| Time Per Day | 2 - 3 hrs | 20 - 30 hrs |
| Time Per Week | 10 - 15 hrs | 100 - 150 hrs |

**vs.**

**Automated Administration***

| | For 1 BI Application | For 10 BI Application |
|---|---|---|
| Time Per Day | 25 - 40 min | 2 - 3 hrs |
| Time Per Week | 2 - 3 hrs | 10 - 15 hrs |

**Estimate assumes 80 to 90% savings*

A simplified example shows the potential time savings of automating administration: An average BI administrator without the use of Command Manager may spend 10-15 hours per week tending to routine administrative tasks per BI application. Large organizations typically maintain between 10-20 BI applications in production at any given time. This translates to between 100-300 man hours per week of administration. With Command Manager, a conservative estimate is that between 80-90% of these tasks can be automated, leading to an estimated savings of 80-270 man hours per week. This time savings represents actual cost savings of hundreds of thousands of dollars over the course of a single year.

Most BI tools lack the ability to automate thousands of administrative tasks on time- or event-driven schedules. Lacking batch scripting automation, administrators need to perform the repetitive work of clicking through a graphical user interface to make routine updates. Repetitive manual work represents a tedious task introducing possibilities for human error and consuming more administration time than if the administrator was able to automate a set of script options in bulk. Without event-driven automated administration, an administrator needs to physically perform tasks such as restarting the server.

| Example Tasks Performed Through Scripting with Command Manager | TASK DESCRIPTION |
|---|---|
| User and User Group Management | Create users, and groups, and manage application access and privileges associated with these users and groups. |
| Security Management | Change access properties for reports and folders for users, groups, and roles. Set authorization parameters including management of security filters. |
| Server Management | Stop or start servers based on a schedule and configure server parameters. |
| Cache Management | Clear, expire, invalidate, and purge object and report caches based on a specified time or event schedule by report or project. |
| Cluster Management | Add or remove MicroStrategy Intelligence Server nodes to a cluster. |
| Application Management | Change the database instances associated with projects and other configuration parameters. Load, unload, idle, or register applications for routine maintenance. |
| Database Connection Management | List all active database connections and create, alter, or disconnect specific database connections based on certain conditions. |
| Event Management | Create a new event-driven schedule, and trigger a specific event schedule based on certain criteria. |
| Job Management | Monitor and kill jobs running on MicroStrategy Intelligence Server. |
| Metric Management | Create, modify, or delete business metrics. |
| Distribution Management | Trigger specific distribution (i.e., e-mail services) to execute from a command line interface. |

**Centralized and Automated Change Management Reduces Administrative Efforts**

MicroStrategy provides administrators with a powerful enterprise tool, Object Manager, to reduce and automate most efforts involved in moving and auditing objects. A simple drag and drop interface allows developers to quickly choose the business metadata from one BI application and move or copy them to another application (for example, from Development to Test to Production). MicroStrategy automatically tracks business metadata changes, recording a convenient audit log without requiring IT staff efforts. A dependency check runs in the background and automatically identifies all related dependent business metadata, ensuring that the new report in the destination application always runs correctly. When reports or business metadata objects already exist in the destination application, MicroStrategy suggests possible conflict resolution options. Administrators can schedule an application upgrade during off-peak hours to minimize application downtime. MicroStrategy Object Manager can automatically move and localize all or part of the BI application from a master application to other internationalized applications. MicroStrategy's BI enterprise business metadata management significantly lowers the Total Cost of Ownership of BI applications.

The multiple metadata built on different code bases offered by most BI vendors makes it difficult if not impossible to offer a centralized business metadata management, auditing and tracking capability. Administrators of other BI tools must spend a significant effort updating and migrating thousands of reports and business rules among many environments, which may include development, test, and production environments.

## MAINTENANCE ACTIVITIES

Analysts and vendors agree that ongoing maintenance efforts, or just "keeping the lights on," consume the majority of BI staffing efforts. Forecasting these reoccurring staffing efforts, the majority of TCO, proves difficult because BI applications continually evolve and grow. Successful BI applications quickly generate interest from other departments, growing in number of users, applications, data size, and complexity. The BI application may need to serve expanding business lines, new partner extranets or additional geographical regions. In addition, IT teams needs to accommodate changing business needs, including updating baseline business definitions and data query settings based on business changes or the addition of new data sources.

Over the past 20 years, MicroStrategy's large enterprise customers have gradually shifted in their approach to maintaining their Business Intelligence environments, because MicroStrategy's design and inherent architecture require lower maintenance. MicroStrategy minimizes maintenance efforts in three key areas: minimizing the number of business metadata to maintain, automatically optimizing data source queries, and automating software upgrades.

**MicroStrategy In-memory Intelligent Cubes Eliminate the Need to Maintain a Proprietary Mid-Tier Environment with Redundant Hardware and Databases**

MicroStrategy's in-memory intelligent cube technology lets users manipulate reports on a multi-dimensional cache of data that lies in-memory for optimized performance, rather than a limited, proprietary cube database. Caches are instantly populated and new intelligent in-memory cubes are created when users run a report – without IT assistance. Intelligent in-memory cubes are automatically built once and stored in MicroStrategy's unified metadata on the centralized server, where they can be shared across the enterprise. MicroStrategy administrators can automatically ensure that business users always have the most current in-memory information as the in-memory intelligent cube data expires and refreshes without any IT effort. MicroStrategy intelligent in-memory cubes provide users performance and data analysis efficiencies resulting in reduced hardware and server costs.

In order to provide BI functionality, many vendors use proprietary cubes, which require additional hardware storage and processing power. Proprietary cubes are created on top of relational databases or other data sources and do not leverage any database-specific functionality. Instead, in order to create and update cubes, it is necessary to pre-aggregate the information coming from the data warehouse or other data sources. The creation of cubes is time-consuming. Adding additional data to a cube creates a cube size explosion issue and consumes increasing amounts of database resources. Technologies that rely on cubes generate an enormous added burden to the data warehouse system and require additional hardware resources.

*"eBay selected MicroStrategy because of its exceptional user scalability and its ability to support advanced reporting and analysis. MicroStrategy also provides excellent query performance with our rapidly growing multi-terabyte data warehouse."* – eBay

**Multi-Level Shared Caching Results in Less Network and Hardware Used and Increased Performance**

MicroStrategy Intelligence Server automatically maintains query and interface performance while reducing hardware needs by effective caching – sharing and reusing data. With other BI products, query performance decreases as the number of users on the system increases. Some BI products attempt to implement caching by simply storing data at a single level of the middle tier, thus missing caching benefits and requiring repeated transferring of massive amounts of data between layers. The foundation of caching in the MicroStrategy platform is to implement caches at key

points within the overall query flow and to tune caching based on user activity. MicroStrategy caching prevents large amounts of data from being transported from the database to the client for every request and therefore consumes less network bandwidth, an additional hardware cost. Quite often, network bandwidth capacity is very expensive to enhance and generally overlooked.

Organizations not benefiting from MicroStrategy's self-tuning caching are forced to increase their network capabilities in order to increase the network bandwidth. Customers who do not use advanced caching end up buying additional database licenses and hardware to provide a level of performance that is acceptable to the users. Calculating and transmitting large amounts of un-cached data consumes more CPU processing power of the database. More CPU processor power used also results in more electricity consumption, a cost traditionally disregarded but that is becoming more apparent in recent years. MicroStrategy's efficient caching reduces costs in network bandwidth, hardware storage space, and processing power.

**MicroStrategy's Object Reusability Reduces Number of Objects to Maintain, Decreasing Maintenance Costs**

MicroStrategy architected a highly reusable business metadata to minimize manual work time used to update and verify business logic definition changes. Earlier in this paper, the flexibility of reuse was shown to reduce IT design efforts by eliminating the need for overlapping design. This same high degree of reuse dramatically reduces maintenance efforts by reducing the amount of business metadata to maintain. The ability to reuse the same business metadata across all interfaces – for example, the same profit metric can be reused in an e-mail report, a Web report, and a dashboard – means that MicroStrategy BI IT staff only have to maintain one business metadata object, in one place, whereas other BI technologies need to track changes on hundreds of copies of the same business metadata. MicroStrategy's reusable platform results in less ongoing maintenance of business metadata and one version of the truth.

Other BI platforms do not offer the same degree of business logic reusability; instead, BI IT staff must spend proportionately more effort maintaining a higher number of business objects. In order to address the same business user requirements, the MicroStrategy business layer typically requires substantially fewer business metadata objects to maintain than other BI platforms.

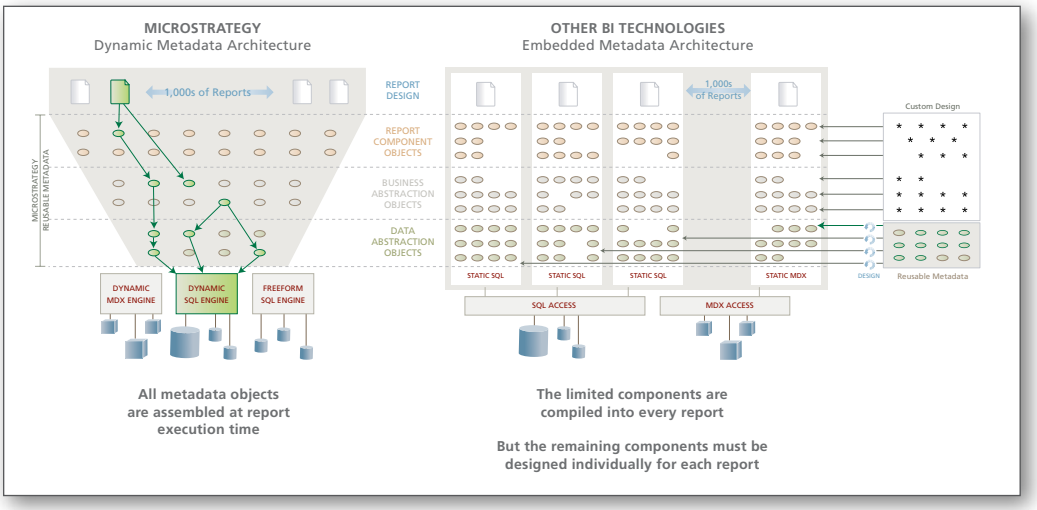
*"We have been highly productive using MicroStrategy for several years and found MicroStrategy's single metadata and object reuse has reduced our administrative costs. MicroStrategy is a natural fit for our analytic reporting environment at the enterprise level."* **– AmerisourceBergen**

**MicroStrategy Business Metadata Changes Propagate Automatically, Reducing IT Maintenance Time**

Any change to a MicroStrategy business metadata is automatically and instantaneously reflected in every place it exists without any IT effort. Automatic updates are possible because all MicroStrategy business metadata objects are constructed using references rather than physical copies to other business logic. For example, a metric calculation can be used to define a filter and the filter used in a prompt. Any change to the original metric will be automatically reflected in both the filter and the prompt. Change management is simplified as updates to these business definitions and business objects propagate bottom-up to higher-level business metadata in the BI application. Other vendors' products require IT professionals to update repeated business definitions hundreds of times. When a MicroStrategy report is run, the latest business definitions are used, without the need to make any changes to the report itself. These automatic, dynamic updates reduce repetitive IT maintenance efforts.

Some tools offer a limited form of dependency checking and require IT to run a process that is only able to check specific dependencies. Other tools' business metadata dependency checking capabilities range from a repetitive manual process to its complete inability to detect either related or dependent objects. Other BI tools do not offer any dependency checking capabilities; BI staff can easily delete an obsolete business logic object with no tools for forecasting the implications, which may be to break hundreds of dependent business definitions. Either of these options requires IT to go through additional manual work simply to permeate changes throughout the application.

**Figure 14: Automatic Platform Updates Minimize IT Maintenance Effort**




**MicroStrategy's Data Source Specific Queries Automatically Deliver Orders of Magnitude in Increased Performance on Any Hardware**

MicroStrategy's platform delivers automatically tuned database-specific queries that result in increased application efficiency with minimal IT maintenance effort. Business needs often dictate that information is retrieved from different data sources. A Business Intelligence system must be able to communicate with any data source to fulfill these requests. However, data sources have specific connectivity mechanisms, optimization techniques, and result formats. Since each database uses its own optimized syntax, a generic statement performs very differently on varying database platforms. The performance difference can be orders of magnitude depending on the complexity of the query. MicroStrategy is optimized to extract data from all major data sources. Optimizing data source performance in MicroStrategy only requires configuring a few single data source instances. Due to this automated query optimization, MicroStrategy customers can literally change their data sources overnight, maintaining high query performance without requiring extensive IT effort. In choosing a best-of-breed BI platform, MicroStrategy customers maintain data source flexibility while reducing their IT tuning efforts.

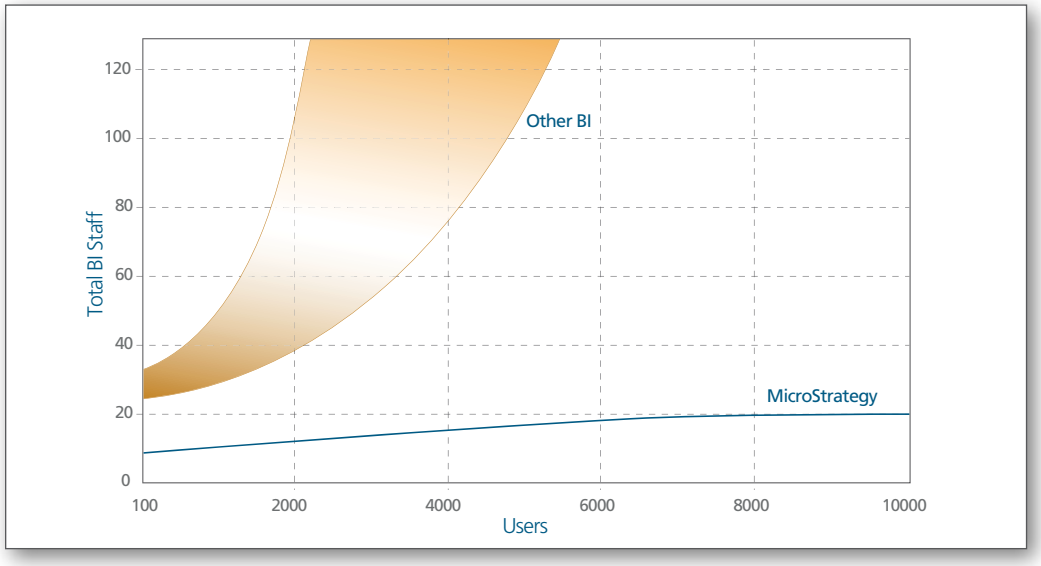
In contrast, other vendors not leveraging database-specific optimization settings require both more hardware and more IT tuning effort to achieve the same performance. Non database-specific queries consume more database processing power and more application server processing power. Some database vendors also sell a BI tool optimized for their specific database. When these customers need to utilize a new data source, they incur the staffing and hardware costs of moving data to that specific database platform.

**MicroStrategy Integrity Manager Automates Data and Application Regression Testing**

MicroStrategy offers customers the ability to automatically test and document all changes to reports and data; MicroStrategy customer data shows that introducing this capability reduces manual quality assurance or regression testing efforts by 98%. MicroStrategy Integrity Manager automatically compares Report SQL, data, and graphs to help customers verify data integrity when changes are introduced in the BI ecosystem. MicroStrategy Integrity Manager can be scheduled to run on a time schedule, such as nightly, or after an event, such as a warehouse data load. In automating a repetitive, labor intensive process, MicroStrategy Integrity Manager helps organizations achieve more efficient staffing costs.

After a software or hardware change, such as an upgrade, many other BI tools require dedicated teams of people to run all reports and manually compare new and previous versions. These quality assurance teams also check reports for incorrect data due to changes in the data warehouse or in data transformation and loading. This human quality assurance process is labor intensive and error-prone. Organizations with other BI tools spend significant amounts of money testing the integrity of the BI application.

**Figure 15: MicroStrategy Customers Achieve IT Resource Efficiency**




Source: MicroStrategy customer research study of over 80 production deployments.

Figure 15 shows that as MicroStrategy customers expand BI to more users, the incremental number of IT staff needed is minimal versus other BI vendors. This exhibits the efficiencies and economies of scale of the MicroStrategy platform. The MicroStrategy BI architecture uniquely delivers self-service reporting, employs a business-friendly layer of reusable analysis or metadata objects, and deploys quickly and securely. MicroStrategy's approach contrasts with other BI technologies, which often require trained IT staff to build new cubes and reports each time, duplicate analysis objects for use in reports, and manage an inefficient and complex architecture as users increase. Analyst research, such as the Gartner "BI Platforms User Survey: How Customers Rate Their BI Platform Vendors," shows that other BI technologies do not provide the same economies of scale as MicroStrategy and require significantly more BI staff to support more users.

## IV. Conclusion

Business Intelligence applications must now be developed, deployed, and maintained with a minimum of IT resources, while serving more users across the global organization. Clearly, the BI architecture can be either a liability or an asset to IT departments. A technologically superior architecture will meet a broad range of end user needs while minimizing the amount of IT maintenance and administration. Staffing costs will constitute between 60 and 86% of BI TCO over the next five years; therefore, IT buyers should evaluate technical capabilities impacting staffing costs.[7]

The up-front choice of an efficient BI platform can prevent cost restrictions to future growth. The capability for user self-service, including MicroStrategy's advanced report prompts and "surf and save" reports, dramatically reduce the need for trained IT report developers. Staffing man hours can be further reduced largely through MicroStrategy's single reusable metadata repository, which enables organizations to add new applications at the speed of business. MicroStrategy's single unified architecture and interface are key methods for reducing user training costs. MicroStrategy customers welcome many options to reduce deployment time and costs, including the ability to deploy a zero-footprint Web interface or a single dynamic dashboard that is automatically personalized for thousands of users.

Multi-year customer deployments found that by leveraging MicroStrategy's capabilities, customers were able to add thousands of users, dozens of BI applications, and grow data volumes without requiring significantly more IT full-time employees and hardware resources, therefore achieving an efficient TCO. MicroStrategy is widely recognized for its meticulously engineered software based on a single code base, scaling to applications of all sizes, and leveraging any hardware, operating system, and data source infrastructure while making BI more approachable for the average business user. MicroStrategy's resource efficient software has allowed thousands of MicroStrategy customer deployments to reach thousands of users and hundreds of terabytes of data while maintaining a low number of BI FTEs. The majority of these organizations save millions of dollars every year using MicroStrategy over their previous deployments with other BI tools.

[7] IDC. "Demonstrating Business Value: Selling to Your C-Level Executives." Three-Year Server TCO. Based on more than 300 interviews conducted across numerous platforms, presented in composite form. April 1, 2007.

COLL-0761 1208

MicroStrategy Incorporated • 1861 International Drive • McLean, VA 22102 • 703.848.8600 • www.microstrategy.com