

Microsoft[®] Office Excel Services Business Value

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Abstract

Spreadsheets are used by most businesses for data modeling, reporting, analysis, and sharing information. Organizations are now confronted with a need to efficiently share spreadsheets broadly, securely, and without liability. Excel Services, part of Microsoft Office SharePoint Server 2007, includes an integrated set of server-based spreadsheet services that complements Microsoft Office Excel® 2007. Excel Services was designed from the ground up as a server-side set of technologies that are fully integrated to work with Excel 2007, extending it to a natively multi-user environment. Excel Services also allows spreadsheets and the data they contain to be utilized within an organization's larger Business Intelligence infrastructure that supports spreadsheet consumption by both information workers and applications while allowing organizations to address requirements such as the following:

- **Secure Sharing of Spreadsheets:** Excel Services helps centralize spreadsheet management by allowing a spreadsheet author to broadly share a single version of a spreadsheet that is calculated at the server and viewed in a Web browser. Spreadsheets are secured by the server and governed by the inherent enterprise content management controls of Office SharePoint Server 2007, such as check in – check out, version control, auditing and logging, and role-based security which allows authors to control which spreadsheets users can view and/or change. This helps organizations meet compliance and regulatory requirements and prevents errors associated with multiple copies or out-of-date versions.
- **Excel Based Business Intelligence:** Excel 2007 includes newly designed PivotTables™, a new formula based model for accessing Analysis Services data, improved sorting and filtering capabilities and a completely redesigned visualization engine, empowering the user to make better business decisions. Information workers can use Excel 2007 to author business Intelligence reports and analysis in Excel workbooks, and publish those workbooks to SharePoint Server 2007. Excel Services renders them as web pages and provides interactive capabilities, such as the ability to drill down into PivotTables. Published spreadsheets can also be incorporated into business intelligence dashboards using new business intelligence features in Microsoft Office SharePoint Server 2007.
- **Reusable Business Logic:** Excel 2007 provides a powerful means for modeling business data, and organizations stand to benefit dramatically from directly reusing that business

logic within other applications without the need of redeveloping code. Excel Services allows other SharePoint applications the ability to directly access spreadsheets via web services, enabling the reuse of the underlying business logic without added effort.

- **Reliability and Availability:** There are significant benefits to running calculations on servers instead of client machines. Offloading to servers frees up the desktop for the user and allows them to take advantage of the additional computing power of long-running calculations. Calculating on a server provides the high reliability and availability of redundant, enterprise-class systems and dramatically reduces risks associated with system failure.

These advantages all yield business benefits in terms of added flexibility and decreased effort required to analyze and communicate data, as well as improving the time to market for business-critical applications. By enabling enterprise data to be directly and dynamically accessed from back-end systems, Excel Services ensures that the most current version of that data is always used by spreadsheets and dashboards, as well as preventing users from creating multiple, conflicting versions. Together, these capabilities provide a "single version of the truth." Moreover, Excel Services dramatically accelerates the development of solutions by supporting the reuse of data and underlying business logic, without having to rewrite the model as code.

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Spreadsheets in the Enterprise: The Challenges of Ubiquity

Spreadsheets are the primary data modeling and analysis tool in most companies. Their ease of use and ability to analyze and report on data make them extremely popular. Because of the familiarity of Excel among a broad spectrum of users, many organizations have identified business needs geared toward expanding the role of spreadsheets in the enterprise. In doing so, many challenges arise.

Lack of Control: No Centralized Management

Data stored and disseminated through spreadsheets must be available to users throughout the enterprise at the same time, and to be useful and relevant this data must be current. Many critical decisions are made based on the analysis performed in spreadsheets. Imagine the impact if those decisions are based on out-of-date information. Security is another concern since many organizations use spreadsheets to store confidential financial and other vital information, uncontrolled spreadsheet distribution runs the risk that this information may be leaked outside of the organization. The ad-hoc distribution of spreadsheets through e-mail and file shares exacerbates these security and version-control challenges.

In addition, it is also common for users to copy and paste corporate data from back-end sources into spreadsheets. This static data becomes 'stale' if the back-end source is updated without those changes being manually propagated to the spreadsheet. This data, if sensitive in nature, can also become a security risk.

With the introduction of corporate governance requirements such as those of the Sarbanes-Oxley Act (United States, 2002) and the Data Protection Act (European Union, 1998), organizations need corporate data to be accurate, access to be controlled, and changes to be auditable.

Data Overload: The Need for Business Intelligence

"Business Intelligence" refers to a set of core capabilities around gathering, analyzing, and reporting on business data in order to support business decision-making. For many years, Excel has been among the most prevalent tools for capturing this data and performing analysis on it. A key challenge in the area of business intelligence has been sharing this analysis in an ubiquitous way. For business intelligence data to be useful, it must be broadly available to support timely decision making, and the data contained within reports must be

up-to-date in order to support accurate decision making. For these challenges to be effectively addressed, a solution must be found that allows spreadsheet authors to broadly share their analysis in a secure, centralized and managed way. In addition, Excel spreadsheets need to be integrated with other business intelligence reports and data in dashboards and scorecards.

Isolated Data: The Need for Logic Reuse and Integration

Organizations often house a wealth of business models within spreadsheets. This logic represents a substantial investment in terms of the time and effort it takes to create and refine it. Making it accessible to other applications represents a significant opportunity. Removing the need to recreate, or re-code this business logic multiple times provides productivity advantages and avoids the element of risk that errors would otherwise be introduced. In essence, business logic created within spreadsheets should be readily available for reuse in or integration with other business applications. This reuse should be seamless, and should not require it to be altered or 'translated' to facilitate reuse. This business logic should be available from a single source, the spreadsheet, not stored in multiple locations with the risk one or several instances of the logic becoming out of date.

Timeliness: The Need for Reliability, Availability, and Performance

Excel Services addresses some common performance issues found in environments where spreadsheet files are shared. With files stored centrally on a server and accessed through a lightweight Web interface, the need to wait for a large spreadsheet file to download over a slow link is mitigated. In environments where multiple users might be sharing the same file, time spent waiting for spreadsheet data is minimized, making access to spreadsheet data more timely.

In environments where large amounts of spreadsheet data must be processed, high performance, the ability to offload calculations onto multiple machines, and high availability are best achieved through the use of high-end servers and server software such as Excel Services. These environments can include redundant components, fail-safe power, and a structured backup regimen, offering enterprise-class processing of spreadsheet data.

As the role of spreadsheets in corporate organizations has grown, the need for better control, availability, and integration has increased. Excel Services extends the value of Office Excel

2007 by enabling each of these requirements with server-side functionality that helps to enhance the timely delivery of spreadsheet data.

Excel Services: A Single Version of the Truth

Excel Services enables the rapid creation of server-side solutions that complement the use of client-side spreadsheets. SharePoint Server 2007 increases the ability of businesses to securely share data through spreadsheets, with greater control over that data, while also better meeting requirements in terms of reliability, scalability, and availability. It also enables Excel to participate in interactive Business Intelligence dashboards and portals. It provides browser-based access to spreadsheets that are centrally stored and managed on servers, addressing key enterprise requirements:

- **Centralization Enabling Secure Sharing of Spreadsheets** – since spreadsheets are hosted and calculated on centralized servers, all users access the same version of the spreadsheet through a Web browser. Built-in enterprise content management and version controls and prevents unauthorized access, changes, and the propagation of multiple, versions.
- **Rich Tools Enabling Business Intelligence** – spreadsheets can be easily integrated within dashboards, scorecards, and reporting portals hosted within SharePoint Server 2007.
- **Shared Logic Enabling Reuse and Integration** – reusable business models contained within spreadsheets are directly available for developers via web services to reuse within other business applications.
- **Server-Side Solutions Enabling High Availability and Performance**– Excel Services can be optimized for a variety of environments and scaled up to meet an organization's enterprise needs.

It's worthwhile to examine each of these advantages in more detail.

Centralization Enabling Secure, Sharing of Spreadsheets

Excel Services centralizes management and provides robust control over spreadsheets. Spreadsheet authors use the familiar toolset in Excel 2007 to create spreadsheets that contain the data and functionality they need, and to explicitly define portions of the spreadsheet are accessible by others. They then publish spreadsheets to the server environment for secure sharing. When viewing spreadsheets in a Web browser, users are not able to edit the spreadsheet. Users can interact with data values only as parameters that must be explicitly defined by the spreadsheet author during the publication process or through filtering, sorting, and navigating Tables and PivotTables. Management functionality

builds on the core capabilities of SharePoint Server 2007, including check-in/check-out, versioning, metadata enrichment, and role-based security to control and track access, auditing, and usage of the spreadsheets.

User access to the data in a spreadsheet can be granularly controlled, at the level of a workbook, a worksheet, or an individual named object such as a table, chart, or a group of individual cells. Users can also be granted limited access to view only spreadsheet values via a web browser without being able to see the underlying data or formulas contained, ensuring protection of proprietary information. Those limitations extend to allowing or disallowing users to download the spreadsheet for use with the Excel rich client. By controlling who is allowed to save full copies of spreadsheets, unauthorized users are prevented from seeing proprietary formulas and data. They are also prevented from creating copies of the spreadsheet that can potentially become stale and out of sync with the sanctioned versions. Download can also be limited to just a snapshot of a spreadsheet, a version of the spreadsheet containing values and formatting but no formulas, for archival or offline data browsing purposes.

Spreadsheets calculated at the server can take advantage of SharePoint Data Connection Libraries, which contain Office Data Connections that define connections to back-end data sources, so that spreadsheets always reflect the latest information. Each user accessing a spreadsheet on the server will only see the data values for which they have permissions on the back-end data source. Issues associated with having multiple versions of data are removed, and spreadsheets themselves become a powerful means of browsing corporate data, particularly when combined with Business Intelligence reporting functionality and business dashboards. This increased control over the data contained in spreadsheets helps to protect the integrity of the data, while making it readily available throughout the enterprise and at the same time meeting compliance requirements. Auditing access to spreadsheets enables tracking who viewed and who made changes. Snapshots of spreadsheet data for archival purposes can also be enabled.

Rich Tools Enabling Business Intelligence

Business Intelligence solutions bring together data from multiple data sources and repositories and display that data in meaningful ways. Excel 2007 and Excel Services support rich functionality for connecting to data sources making it easier to create Business Intelligence solutions. The Data Connection Libraries (DCLs) are a powerful tool for enabling Business intelligence. These are created by administrators to enable business users to access

external data sources without having to understand the underlying definition for the data connection. Business users identify the connections they need that are contained within DCLs from Excel 2007 by defining user-friendly names and descriptions that do not require knowledge of any technical details.

Excel 2007 also provides the ability to easily apply conditional formatting to spreadsheets, such as color-coding cells and applying visual icon sets that dynamically show the relationship of spreadsheet data to user-defined thresholds, and to create rapidly powerful features such as PivotTables. With these and other features in Excel 2007 and Excel Services, spreadsheets can be bound to a wide variety of external data sources and can be setup to update automatically. Excel Services supports similar data sources to Excel client. A special focus has been made on taking full advantage of the abilities of SQL Server Analysis Services to support advanced business decision-making in an agile framework. Users benefit from the power and familiarity of the Excel client, and solutions do not require custom interface development, simplifying deployment and reducing costs and time to market.

Excel Services provides web-based Business Intelligence, displaying spreadsheets as pure DHTML. This simplifies integration and reduces deployment costs by avoiding the need for client-side controls for specific browser and operating system limitations. The flexibility with which Excel Services allows information workers to direct data from various sources, for multiple uses, enables simple implementation of solutions to business needs with minimal time and cost.

Excel Services gives spreadsheet authors robust means to broadly share spreadsheets created with Excel 2007. They are able to hide sensitive information, as well as controlling the ability of users to change and manipulate the data. Excel Services also allows authors to guarantee the use of live data from external sources, ensuring that the latest values are always used. Excel Services displays spreadsheets very similarly to Excel 2007, has 100% calculation fidelity, and supports nearly the same level of interactivity. These capabilities allow spreadsheet authors to rapidly create business dashboards, scorecards, reports, and custom Web pages that provide visually rich data display and analysis, while ensuring that data from external sources is up to date. The combination of Excel 2007 and Excel Services provides the next generation of Business Intelligence for the enterprise.

Shared Logic Enabling Reuse and Integration

Excel Services allows the business logic created and stored within spreadsheets to be readily reused by and integrated into other applications. Business analysts can save spreadsheets to

the server, making models accessible to developers and others on a secure basis via Web services. This methodology means that any application can benefit from the business logic in the spreadsheet. In the past, developers have had to analyze the business logic contained within spreadsheets and then reproduce it in code in order to provide similar functionality in external applications. Excel Services allows developers to implement business logic directly from the spreadsheet into an external application. The developer is not required to interpret the spreadsheet logic and then manually recreate equivalent logic in their application code, avoiding duplication of effort and speeding time to market of external applications. Moreover, since the spreadsheets are executed as a service on a server, they are constantly available to applications in a robust and scalable way.

This model heightens efficiency by removing redundant work, while also reducing the risk of introducing errors when creating separate sets of business logic. Related to that efficiency, Excel Services also enables superior time to market and speed of development, which can be critical success factors. When the underlying business logic changes quickly and often, these applications change along with it, enabling changes by business users to be propagated directly into the solutions they depend on, without developer involvement. This modularization of the maintenance of the business logic (performed by the spreadsheet author) separately from the application-development effort (performed by a developer) leads to dramatically increased business agility.

Server-Side Solutions Enabling High Availability and Performance

By extending the spreadsheet environment to servers, information workers can continue to create spreadsheets using Excel 2007, while offloading time and processor intensive spreadsheet calculations to servers. By offloading calculations to servers, Excel Services guarantees high availability. Many organizations depend upon large-scale, complex calculations carried out on mission-critical data by spreadsheets. Many of these calculations are long running and take overnight, or even longer, to complete. The potential risk of system failure in such scenarios must be limited. Excel Services improves availability by moving calculations to one or more reliable servers. Redundant servers running Excel Services enable enterprises to virtually guarantee that calculations will be completed successfully.

Excel Services also allows calculations to be cached on the server, which improves the performance of subsequent requests when sharing spreadsheets across multiple users. This

capability is exceedingly valuable for regularly occurring calculations and queries that would otherwise be delayed by recalculating or downloading data to the client. In addition, spreadsheets rendered in the web browser page data to the users. Users that are connecting to the web client will be sent small amounts of DHTML providing clients accessing over slower network links with a quicker, improved experience.

In addition to improving the reliability of data storage, access, and calculations, by adding Windows Computer Cluster Server 2003 to an Excel Services implementation, information workers can publish and schedule jobs to multiple servers. These capabilities help to ensure that calculations are consistently and reliably performed, utilizing whatever level of hardware resources are required for large-scale problems. That capability protects the business value associated with the calculations and frees the user's desktop to perform other activities.

Putting Excel Services to Work: Scenarios

Excel Services represents outstanding opportunity in real-world scenarios. A few such opportunities are described in this section, as they relate to an organization that uses the technology to automate and streamline day-to-day activities.

Controlling Data Flow with Centralized Management

Consider a scenario where a business analyst needs to distribute sales and support data, using a spreadsheet, to a number of people within a company. The analyst creates the spreadsheet by making a few changes to a previous model, and the figures on the spreadsheet are automatically updated from the live data stored in a SQL Server database. He then saves the spreadsheet to a server, where it is flagged for approval by his manager, who receives an automated e-mail message that the spreadsheet is ready for review. At this point, the spreadsheet in its unapproved state is not viewable by the general user community.

The manager checks out the spreadsheet and, deciding that she wants some changes made to the business logic, she adds some comments to the spreadsheet and checks it back in. The analyst makes the required changes, and the approval process begins again. Since versioning is handled transparently by SharePoint Server 2007, the manager is able to readily compare the previous version (before her changes were implemented) with the current version. That versioning also forms the basis for rich auditing later, vastly simplifying the satisfaction of regulatory requirements. She decides to approve the spreadsheet by flagging it in SharePoint, and the system instantly sends a message to the analyst notifying him of that approval, as well as to the relevant user community, notifying them that the latest figures are available for review. Over time spreadsheets can be archived to offline storage, or permanently deleted. Retention policies can be overwritten by placing documents on hold due to investigation or pending litigation. And the server maintains an audit trail and provides reports for who viewed which version of the spreadsheet and who edited them.

Availability and Scalability from Server-Based Solutions

Financial analysts at the company perform very large risk analysis calculations on a nightly basis based on Monte Carlo simulations. The statistical models associated with these calculations are very large, and they must be run on a large number of spreadsheets, each of which requires a large number of parametric sweeps to estimate the required results. These calculations generally take several hours to complete, and it is important to have current

results available when needed for compliance reviews. The primary risks associated with meeting that deadline are related to the reliability and scalability of the hardware on which the calculations are performed. The risk of calculations failing during the simulations must be minimized, and the ability to handle ever-increasing workloads must be supported.

As part of their implementation of Excel Services, the IT department provides support for these Monte Carlo simulations on the company's computing grid, which enables a very high degree of redundancy, so that the failure of individual nodes do not significantly impact the timeframe on which the calculations are successfully completed. Moreover, this topology allows calculations to be divided among a large number of servers (with all calculations on a particular spreadsheet being performed by a given server), so that the solution is extremely scalable as workloads grow or time requirements become tighter. There are also security advantages associated with running calculations in a secure area and having the data backed up according to a structured regimen. Best of all, the existing business logic that had already been used for the simulations is able to be used intact, vastly simplifying the implementation from the financial analysts' point of view.

Abstracting Business Logic from the Larger Solution

Field sales personnel routinely quote prices to their customers for various products, which includes the application of volume pricing models based on centrally maintained business logic. The availability of such volume pricing and the size of the discount are dependent on a number of factors, such as the quantity to be sold and the profit margin associated with the individual product. The formulas that underlie this volume pricing have traditionally been maintained in a spreadsheet by the financial analysis department, and by entering data points into the spreadsheet, sales representatives are able to generate volume pricing in the field.

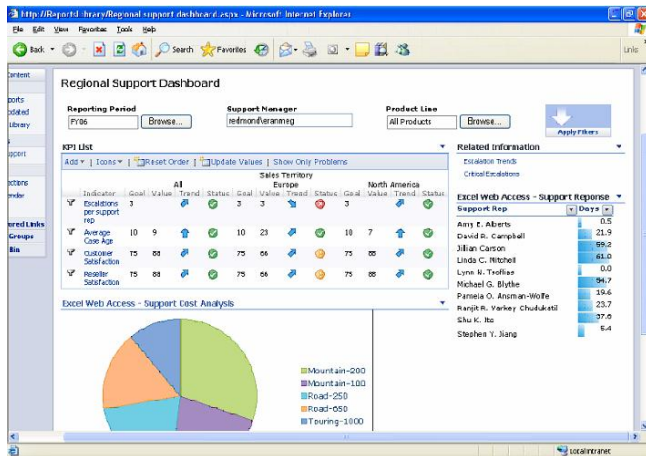
This mechanism is cumbersome, because up-to-date versions of the spreadsheet need to be regularly distributed to the sales representatives, which introduces the possibility that sales personnel could use out-of-date versions. When a change needs to be made to the spreadsheet, such as adding a pricing promotion, it requires a new version to be distributed. The process is also inconvenient for field personnel, since it depends on a stand-alone spreadsheet that is not well-integrated into the sales process.

When Excel Services is deployed at the company, the financial analysis department continues to maintain the business logic as they always have, in an Excel spreadsheet, but that spreadsheet is saved on the server. A custom application accesses that logic through Excel

Web Services and incorporates it into the sales tool used by field-sales personnel. When the financial analysts change the business logic, those changes are automatically propagated to the field, with no action required by the application developers or sales team to ensure that the latest models are always in use throughout the company.

Supporting Agility and Better Decisions with Business Intelligence

The sales and support analyst provides reports to field-sales personnel in the form of spreadsheets that reflect account activity over the course of an accounting period. In



addition, in order to make regular reports to senior management, the director takes information from those spreadsheets, collects it into a master reporting spreadsheet, and then creates charts and total figures to represent the progress of the department, relative to historical data. This technique is very cumbersome since the director must manually copy and paste the data into his report every week. He

also has to create a second, scrubbed version with sensitive data removed which is published in a newsletter.

When the company implemented Excel Services, the sales and support director's life became easier. With the addition of Excel Services to that scenario, each of the field sales personnel accesses a personalized dashboard in SharePoint that provides them with updated data from their sales database. The data is presented with Excel Services. The analysts used the new Excel 2007 Business Intelligence capabilities to make full use of SQL Server Analysis Services for reporting, OLAP analysis, KPI scorecards, and data mining. The spreadsheet was published to the server and incorporated in the dashboard that is automatically kept up to date with the most current data on an ongoing basis, minimizing maintenance. Since the data view is managed by SharePoint Services on a per-user basis, it is never necessary for him to create multiple versions of his reports. He has a variety of graphical options available to him from Excel Services, such as charts that support identifying trends, finding opportunities, anticipating problems, and making better business decisions.

Conclusion

Microsoft Excel Services is a server-side set of technologies that is fully integrated with the Excel 2007 client, extending it to a natively multi-user environment that supports spreadsheet consumption by both information workers and applications. With Excel Services, organizations can efficiently share spreadsheets broadly, and securely, allowing them to leverage spreadsheet analysis as part of Business Intelligence solutions in dashboards, portals, reports and custom Web pages. Enabling developers to easily access business logic directly from published spreadsheets for reuse by and integration with business applications. This solution runs is as a server-side companion to the Excel rich client providing high-performance calculations, and highly reliable and available implementations. This solution allows businesses to address current and emerging needs for data modeling, analysis, reporting, and sharing.

Resources

The Future of Microsoft Office: 2007 Microsoft Office System

<http://www.microsoft.com/office/products>

Project REAL – Business Intelligence in Practice

<http://www.microsoft.com/sql/solutions/bi/projectreal.aspx>

Business Intelligence Case Studies

<http://www.microsoft.com/business/productivity/decision/intelligence/casestudies.aspx>

Business Intelligence Webcasts

<http://www.microsoft.com/events/series/sqlserverbi.aspx>

SQL 2005 Business Intelligence

<http://www.microsoft.com/sql/solutions/bi/default.aspx>