

# Sage ERP MAS | White Paper

## Flexible Sage ERP MAS Delivers Unmatched Customization and Scalability

Innovative Customization and Choice of LAN, Client Server, or SQL



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## Executive Summary

CPAs recommend Sage ERP MAS 90 and Sage ERP MAS 200 more often than they recommend any other midrange accounting solution. This white paper describes the recent update of its underlying software architecture that should lead informed IT personnel to add their enthusiastic recommendations as well.

A key issue facing companies when choosing and implementing an ERP solution is whether or not to modify the product to meet their unique business requirements. While a custom solution can provide many benefits, the potential costs involved in implementation, and ongoing maintenance to keep up with product enhancement releases, have traditionally outweighed these benefits. The net result is that the company's staff is forced to change workflows to accommodate the ERP system and implement manual workaround procedures where they have functional gaps.

The new Sage ERP MAS 90 and 200 Business Framework™ was designed and architected to address this problem at three different levels:

1. **Customization**—The built-in customization capabilities provide unparalleled flexibility in tailoring the system to handle the unique business requirements of small to medium-sized companies. VB scripting allows the addition of business logic to existing or added data fields that can guide business processes across the entire ERP system. Since these customizations do not require source code modifications, they are upgrade-safe.
2. **Extensibility**—The object-oriented nature of the Business Framework provides a best-practices development environment. Development Partners can still leverage the powerful language tailored for optimizing business transactions that drew them to Sage ERP MAS 90 and 200 originally. Now they can also extend the base product without modifying the underlying source code, making product upgrades more seamless and lowering the customer's overall total cost of ownership (TCO).
3. **Personalization**—The numerous configuration options and built-in personalization capabilities allow individual users to streamline the dual-grid data-entry process, improving productivity and reducing data entry errors. These personalizations are all upgrade safe.

Additional benefits of the transformation of the Sage ERP MAS 90 and 200 products are realized in the increased scalability and reliability from robust support for Microsoft® SQL Server®, with all of the resulting data integrity and business intelligence capabilities. Smaller companies that prefer a self-contained database requiring fewer IT resources can still choose a high-performance Indexed Sequential Access Method (ISAM) database.

Another challenge facing businesses is integrating home-grown or third-party applications with their ERP systems, such as an eCommerce Shopping Cart application or a custom cost-tracking and billing system. A common requirement is to implement the integration in a manner to make sure the appropriate data flows into the ERP system. With the Business Framework, third parties or IT staff can now build integrations in modern languages like Java, VB.net, or C #, with full enforcement of the business rules built into Sage ERP MAS Business Objects. They can choose the standard Component Object Model (COM) interface or a self-describing Web Services interface built on Simple Object Access Protocol (SOAP) and Web Service Definition Language (WSDL). As a result, the rich ecosystem of add-on modules for Sage ERP MAS 90 and 200 will continue to grow.

More on these capabilities and how they can be used to benefit a company's business are detailed in the following sections.

## Modern Architecture

The modern architecture of Sage ERP MAS 90 and 200 allows the software to adapt rapidly to changing technology and business requirements. Giving customers a choice in deployment strategy and database systems, it also supports powerful and flexible customizations to handle the unique needs of their specific business. It scales to support additional users, functionality, and connection between related business processes. All of which improves the productivity of the organization and lowers total cost of ownership.

Sage has continued to build on the customer-driven innovation in the Sage ERP MAS 90 and 200 product line for over 20 years. Recently completing a fundamental update of the core ProvideX interpreter, the Business Framework is centered on the business objects and layered interface design, which will support continued innovation for years to come.

ProvideX is similar to several other leading application development environments, including Apple with Objective C and Salesforce.com with its Force.com agile environment. Like those environments, the ProvideX-based Sage ERP MAS 90 and 200 Business Development Environment used by Sage and its Development Partners efficiently turns out world-class business applications because it supports current best development practices and standards. From advanced development tools to clear interfaces and scripting capabilities, the Development Environment supports speedy, interactive development by Sage and its partners.

Because Sage owns the ProvideX environment, we can quickly adapt to support emerging technologies and changing requirements in the market. We are able to leverage modern programmatic approaches including polymorphism, encapsulation, and multiple class inheritance directly within the Business Framework without sacrificing the high productivity of the interpreted language, all built on a syntax that was specifically developed and optimized for efficient handling of business transactions.

## Comprehensive Impact of Business Framework Object Interface

The Business Framework Object Interface provides a consistent Application Programming Interface (API) to a range of development languages, from VB.net or VBScript to C # or C++.

The Sage ERP MAS Business Framework enforces all the business rules built into Sage ERP MAS 90 and 200 for simple data retrieval as well as inserts and updates. Complex transactions involving many tables are completely separate from the user interface. This is where much of the power lies. Third-party developers can leverage the data validation routines within the business objects without modifying or reengineering the underlying source code of the application.

When developers learn how to use one of the Business Objects—such as a Sales Order, Customer, or General Ledger Journal Entry business object—they know how to use all of them because they inherit their behavior from the same base classes. The Business Framework also includes Update Objects, which allows for the automation of processes such as batch posting of invoices. Access to lightweight Service Objects used for validations and related services, for example calculation of a payment terms due date, are also available. Report Objects enable executing reports from outside of the Sage ERP MAS 90 and 200 User Interface, allowing for custom report scheduling.

The Business Framework User Interface (UI) objects make it simple to launch user-customizable maintenance and transaction entry screens with the dual grid controls, calendar lookups, and other features that compose the powerful Sage ERP MAS 90 and 200 visual interface.

The most significant benefit of the Business Framework is that enhancements to Sage ERP MAS 90 and 200 are easier to develop and are more easily portable to product upgrades. These benefits can be classified into three categories: deep modification by subclassing objects without changing the underlying source code, integration with external programs through standard interfaces, and customization capabilities built into the product itself.

## Extensible Architecture Minimizing the Risks of Traditional Source Code Modifications

Sage has cultivated a vibrant ecosystem of Development Partners certified in the Business Framework and ProvideX-based Sage ERP MAS 90 and 200 environment. Companies that require unique capabilities that are not part of the standard Sage ERP MAS product go to these Development Partners for custom program modifications. Many Development Partners specialize in source code additions that are common to the unique needs of customers from a particular vertical. Examples are the energy and construction markets, where industry-established features are available to these segments from Development Partners who specialize in those solutions. Many additional industry segments choose Sage ERP MAS 90 and 200 because of the flexibility of the system and its ability for modifications.

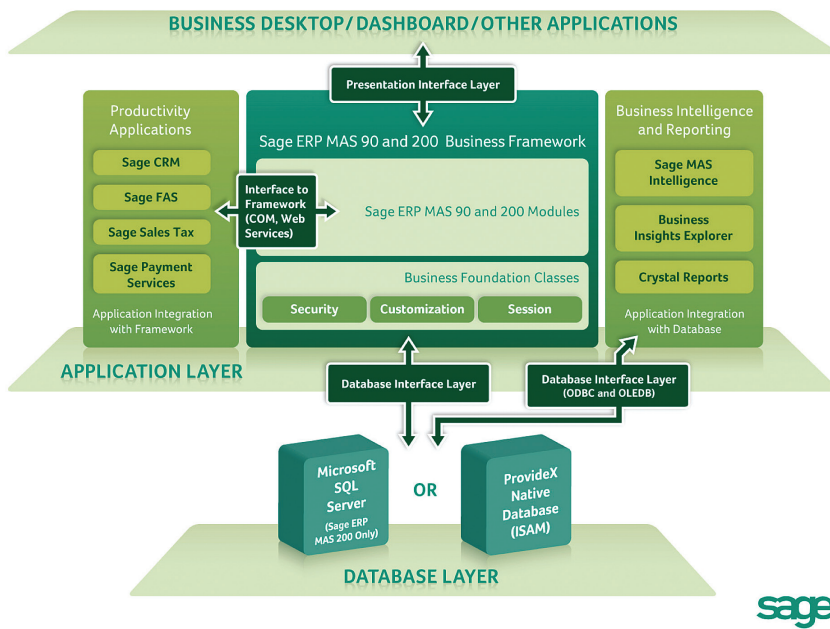
The Business Framework allows Development Partners to subclass the appropriate objects without modifying the source code. Occasionally, they will use the Business Development Environment to generate an additional Business Object. Their work is more efficient for a number of reasons—the most important benefit is that most of their modifications survive upgrades to new releases. This nearly eliminates the risk of having to reimplement custom development work with each new release or product update of Sage ERP MAS 90 and 200.

## Modification and Integration Using Standard Interfaces

To satisfy the requirement of integrating third-party applications, the Business Framework provides a consistent API across all the various object types used in Sage ERP MAS 90 and 200 through the Business Object Interface (BOI). BOI allows developers to use any programming language that can interact with COM to use the business objects to integrate at the appropriate level. The architecture defines a clean separation of the Presentation Layer and the Business Rules (or Application Layer), which means third-party developers can be assured that when they use the business objects to create, say, a new Sales Order, that the same rules are enforced as if a data-entry operator was entering the order through the Sage ERP MAS 90 and 200 user interface.

Visual Integrator (VI) is a productivity tool that can be used to map a variety of file formats (ODBC, comma-separated values (csv), and more) into the Sage ERP MAS 90 and 200 database using these same business objects, once again ensuring the integrity of the system by enforcing the business rules contained within those objects. VI jobs can be scheduled, giving IT staff and Business Partners another option when solving integration needs, or migrating data from another ERP system.

The new eCommerce Web Services were designed primarily for integration with third-party eCommerce Shopping Cart applications, using the SOAP and WSDL standards, allowing the creation and updating of Sales Orders, Customers, and Customer Contact information. The self-documenting nature of the Web Services Definition Language simplifies rapid development of specialized capabilities that feed directly into Sage ERP MAS 90 and 200. Developers just point their Integrated Development Environment (IDE) to the WSDL file to learn and understand the methods and members of the target class.



## Business Framework's Breakthrough Is Ease of Customization

A strategic architectural benefit of the Business Framework is to ensure that a deep level of customization is possible with tools and features built right into the product, without the need for custom programming. This affords companies the flexibility to tailor the system for their specific business needs without concern that modifications will break when applying the next product update. Using these built-in tools also results in a lower TCO when compared with traditional custom development. These capabilities are unsurpassed by anything offered in other midrange ERP products.

The Custom Office module in Sage ERP MAS 90 and 200 supports customization in three key areas: Database Schema and Data Dictionary; Presentation Layer (or User Interface); and Business Rules.

**Database Schema and Data Dictionary**—User-Defined Fields (UDFs) can be added to virtually any table in the Sage ERP MAS 90 and 200 database, allowing companies to store and track additional information that their business requires, but are not available in the noncustomized standard system. Type (Date, String, Numeric, and more), length, default values, and validation rules (required, list of values, upper-case, and more) can be assigned to these fields. User-Defined Tables (UDTs) can be created to store additional data inside the ERP database. Advanced Field Settings allow establishing validation rules as well as default values for standard Sage ERP MAS 90 and 200 fields and can force validation of a UDF or standard field against a UDT. One of the most powerful features of UDFs is the ability to control how a UDF flows through the system. For example, a UDF that stores a customer rewards level of BRONZE, SILVER, or GOLD in the Customer table could be defined to flow into the Sales Order Invoice, and through the posting process to the Invoice History table, all without custom programming.

**Presentation Layer**—Sage ERP MAS 90 and 200 screens can be modified to streamline the data-entry process and eliminate errors. Fields can be rearranged or hidden if not needed, and field labels can be changed (for example, Vendor to Supplier). Tab stops can be set so that only the fields that each user routinely maintains are included, minimizing keystrokes and boosting productivity. UDFs can be added to screens as well as the dual-grid entry. If screen real estate is at a premium, a new tab folder or pop-up dialog form can be added, or screens can be resized to create the space that's needed for new UDFs. New buttons can be added

that can perform different actions such as launching another Sage ERP MAS 90 or 200 task, or executing a script using JavaScript or VBScript to perform some custom operations.

These customizations can be defined for a specific user (or group of users) and a specific Sage ERP MAS 90 and 200 company, enabling the flexibility to have different entry screens for different types of users. For example, sensitive information such as cost and gross profit can be hidden from certain groups of users.

**Business Rules**—The Sage ERP MAS 90 and 200 Business Framework supports very powerful scripting logic in the form of User-Defined Scripts. This built-in capability allows code written in VBScript to execute on specific events within the business objects. Scripts can be tied to events at both the column level as well as a row (or table) level. Column-level events allow establishing additional validation rules to determine if a column value is valid (for example, only managers can set the credit limit field), or triggering some action after a value has been set (such as after customer ID has been entered check to see if there are any available discount coupons for that customer in a UDT ). Row- or table-level events allow scripting logic to run pre- and postwrite, pre- and postdelete, as well as when establishing a default value for a new row. This gives control to define new rules specific to the unique needs of each business on when a row can be deleted (for instance, don't allow a sales order to be deleted if it has already been approved for shipping in the warehouse) or ensuring all required information is complete prior to allowing a row to be saved (for example, if the terms code for a customer requires a credit card deposit, but the deposit has not yet been recorded, do not allow the order to be saved). Because these scripts run within the business objects, these company-specific business rules are also enforced when those objects are being used by third-party products using the BOI, eCommerce Web Services, or Visual Integrator. Also important to note is that because scripts are written in VBScript, these capabilities are open to all 2000+ partners in the Sage ERP MAS 90 and 200 ecosystem, as well as those companies that have internal IT staff with scripting expertise, providing the ability to create solutions that traditionally would have required custom programming.

Because all of the aforementioned customizations do not modify the underlying source code, their design enables them to survive product enhancement upgrades. These capabilities make it safe to tailor the Sage ERP MAS 90 and 200 systems to meet specific business needs and eliminate manual workarounds.

## ERP That Fuels Growth

Good ERP systems preserve the initial cost of the software, implementation, training, and customizations by providing the ability to meet the expanding needs of each business on an ongoing basis. Sage ERP MAS 90 offers robust features and the ability to add specialized modules and additional users as needed. For growing organizations, the upgrade path to Sage ERP MAS 200 provides the same features and functionality as Sage ERP MAS 90, which smoothes the transition to a larger system and keeps overall TCO low. The system grows with the business.

The ProvideX ISAM database architecture is optimized for handling business transactions in a network environment, which is well suited for smaller organizations lacking complex computer systems and the IT department to manage them. That database is secure, installs automatically, and requires no specialized knowledge to maintain or run. The data files expand dynamically, so there is no need to worry about running out of space until the capacity of the disk drive is reached.

With the release of 4.45, the Sage ERP MAS 200 SQL product now supports Microsoft SQL Server, which offers increased scalability and improved performance for reporting and analysis. This is a good choice for companies that may already have another application in a SQL Server database to ease the overall administration and backup. Other benefits include making use of SQL Server processes, including backup, replication for disaster recovery, and snapshots for point in time restore.

## Reporting and Business Intelligence

Whichever underlying database is chosen, the Business Insights Dashboard and Explorer (BID and BIE) are the tools of choice for inquiry and navigation through the wealth of information stored within Sage ERP MAS 90 and 200. Business Insights Explorer provides filtering, grouping, and drill-down capabilities. The ability to perform ad hoc queries on all data in the system including UDFs is powerful. Companies can use the default report views or create and save drill-down views relevant to the company, particular departments or users. Individual users can also create companywide, department, or personal views. Business Insights Explorer can analyze “what-if” scenarios that can keep business owners awake at night. They frequently need to know important business information such as their top customers for each of their salespeople, what products they buy, and how many new customers they gained last month.

Customers choosing Sage ERP MAS 200 SQL will be able to leverage the robust reporting services, business intelligence, data mining, and analysis capabilities built in to Microsoft SQL Server. Additionally, using Crystal Reports® provides another alternative for accessing and reporting on relevant data throughout the organization. Sage ERP MAS Intelligence provides a tightly integrated, familiar Microsoft Excel® environment with an extremely flexible ability to summarize, analyze, explore, and present relevant business findings.

The Paperless Office features in Sage ERP MAS 90 and 200 allows sharing of business intelligence information through powerful forms delivery capabilities. These built-in capabilities improve communications with customers, vendors, and others in the company through immediate electronic delivery of Adobe PDF files by email or fax. Thus, an organization can lower its TCO and substantially save time and money from reduced postage, efficient and secure access to archived files with just a few clicks, and a reduction in the office space previously devoted to storage, all without concern for violation of document security.

Finally, all the standard Crystal Reports provided with Sage ERP MAS 90 and 200 are fully customizable, including the ability to leverage the aforementioned user-defined fields. All reports support the ability to create saved report settings for frequently used selection and format criteria.

## Power of Role-Based Security

Security is an important aspect of any software system where sensitive financial information resides. Sage ERP MAS 90 and 200 includes role-based security as part of the Business Framework—a very flexible security system that allows customers to choose exactly who has access to system data and tasks, without requiring a large effort to implement. Users can be assigned to one or more roles, such as a Financial Supervisor or Accounts Payable Clerk. Each role in turn would then have specific task rights assigned to them. Advanced security options within the Business Framework provide an even greater granularity, including full control of create, modify, delete, and view-only access. Additional Security Events go beyond the role and task level to allow or restrict access to specific functions within a task.

Sage ERP MAS 90 and 200 have the ability to leverage Windows® Authentication Logon as the default authentication option. This allows IT departments to configure user accounts and passwords once within their network infrastructure and apply them to various applications. Once authenticated within Sage ERP MAS 90 and 200, the role-level security takes over to determine which tasks and security events that user is authorized to perform.

Since security is also enforced at the Business Object layer, external access to information through the Business Object Interface or eCommerce Web Services are subject to the same security rules.



## Conclusion

From the very beginning, customers benefit from the modern architecture of Sage ERP MAS 90 and 200, effectively managing their business with a system that's flexible and quickly implemented. They keep total cost of ownership low through efficient use of resources and customization that survive upgrades. For growing organizations, the upgrade path to Sage ERP MAS 200 provides identical features and functionality as Sage ERP MAS 90. When a business requires the functionality of relational database, Sage ERP MAS 200 SQL provides cost-effective and powerful Microsoft SQL Server compatibility. Whatever the database choice, customers easily apply query, reporting, and statistical analysis to make faster and better business decisions. Sage ERP MAS 90 and 200 deliver exceptional price and performance value—flexible ERP, innovative customization, and powerful reporting to manage and grow their business.

## About Sage North America

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**Sage**  
6561 Irvine Center Drive  
Irvine, CA 92618  
800-854-3415  
[www.SageMAS.com](http://www.SageMAS.com)



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