

CONNECT

Microsoft Dynamics AX

Connectivity in Microsoft Dynamics AX 2009

White Paper

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Introduction

In today's fast-moving global marketplace, businesses must be agile so they can quickly respond to new opportunities, changing customer demands, and evolving organizational structures. Connecting people, processes, and information across boundaries—whether the boundaries exist within or outside the organization, or across the globe—gives organizations the agility they need to improve productivity, effectively manage growth and change, and help simplify compliance.

Too often, an organization's existing IT infrastructure cannot adequately meet business demands, and systems may be inflexible or difficult to adapt to new business requirements. Typically, the problem is not lack of functionality. Instead, the problem is that crucial business systems, such as customer relationship management (CRM) systems, often operate in isolation from other key line-of-business (LOB) systems. Because business processes often span multiple applications, organizations must develop manual methods to bridge the gap between systems or implement costly integrations that can be difficult to maintain or upgrade.

To stay competitive, organizations need an end-to-end view of the business that integrates information, processes, and systems. Rather than starting over by replacing systems or applications, businesses need a unified solution that simplifies complexity and controls cost while providing the flexibility to leverage existing IT investments and integrate across business systems.

This white paper outlines the connectivity enhancements in Microsoft Dynamics® AX 2009 that enable businesses to optimize legacy systems, automate business processes, and gain comprehensive, real-time insight into critical business data. With the ability to extend connectivity throughout the enterprise and across the supply chain, organizations can improve productivity, enhance partner and customer relationships, and manage the demands of growth and change.

Today's Business Imperatives

Business today requires more flexibility, increased visibility, the ability to work well across functional or organizational boundaries, and ways to adapt quickly to changing business requirements.

Although organizations value the efficiency, information access, and integration of enterprise solutions, they agree that rapidly changing circumstances and the intricacies of global competition still leave them facing challenges. According to recent Forrester research,^{*} some problems businesses encounter with existing enterprise solutions include:

- Inflexibility that limits process changes.
- Inadequate visibility into process results.
- Poor cross-functional processes.
- A mismatch between business requirements and solution functionality.

^{*} Forrester Research, "The Dynamics Business Application Imperative," September 24, 2007.

To be effective, solutions must meet the demands of how people actually work and deliver the structural flexibility necessary to support change. These solutions need to evolve at a pace set by the business and be able to shift continuously while preserving process integrity.

Microsoft Dynamics AX 2009 and Connectivity

To help businesses compete in the demanding global marketplace, Microsoft Dynamics AX 2009 provides fast, simplified, and transparent access to people, processes, and information. With full integration across systems and applications—internally and externally—you can gain the insight and agility you need to support growth and streamline end-to-end business activity.

Connectivity enhancements in Microsoft Dynamics AX 2009 are uniquely designed to deliver business value by:

- Replacing nonintegrated systems with centralized, cost-effective, industry-specific solutions.
- Enabling integration with legacy systems to maximize your IT investment.
- Automating business processes and adapting solutions to increase responsiveness to changing market conditions.
- Providing a business application platform for integrating with other business systems or building additional functionality needed.

Interoperability: The Integrated Business

Microsoft Dynamics AX provides a foundation for creating an integrated business. As shown in Figure 1, this foundation supports interoperability that extends within and outside the company, helping to streamline business processes.

The "Integrated Business"

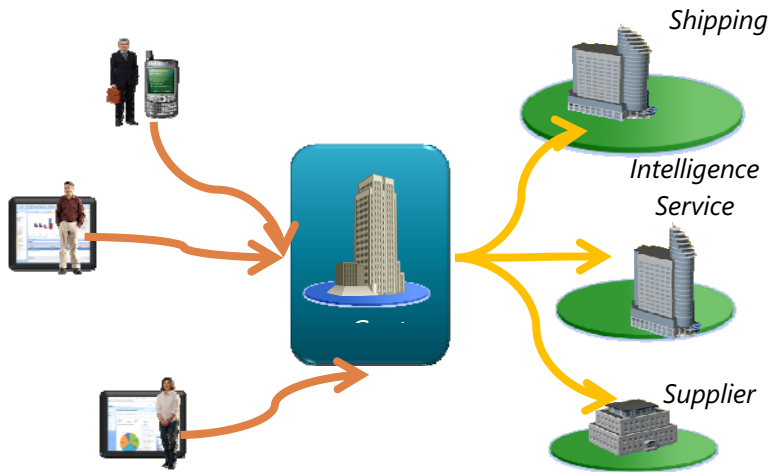
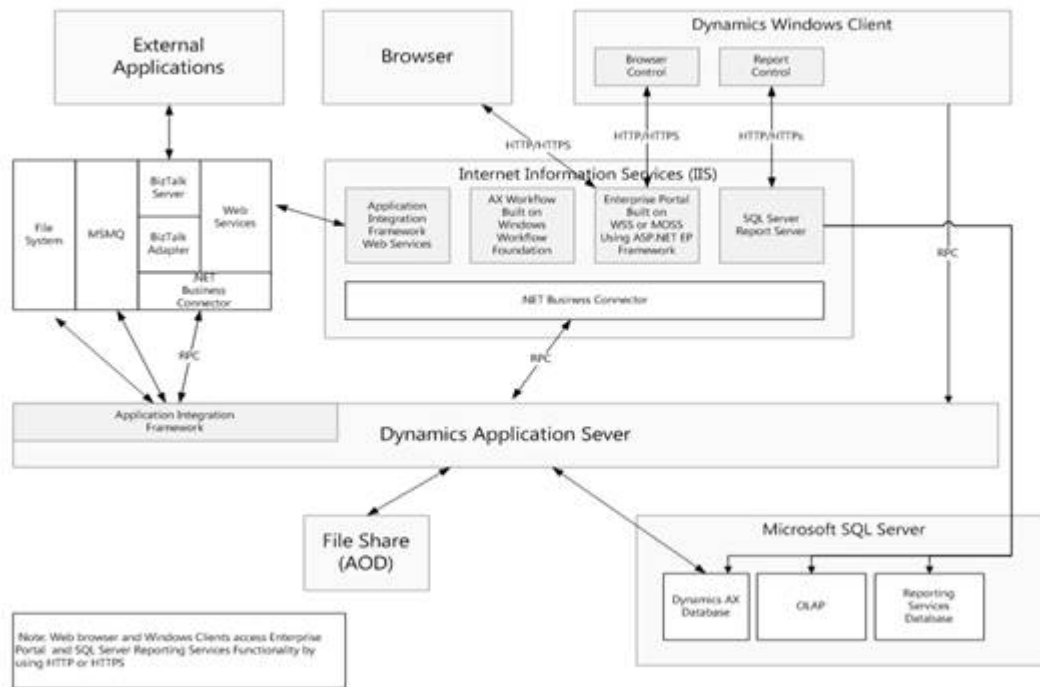


Figure 1. An overview of the integrated business model.

Microsoft Dynamics AX 2009 delivers this connectivity through the Application Integration Framework (AIF), which supports multiple integration technologies including Web services and Microsoft® BizTalk® Server technologies.

Application Integration Framework (AIF)

To stay competitive, organizations need the ability to streamline business processes and smoothly exchange data with multiple systems. With AIF in Microsoft Dynamics AX 2009, you can integrate external business processes, such as order-to-cash and procure-to-pay, and support application-to-application integration, such as deployments that connect subsidiaries to an enterprise resource planning (ERP) system at corporate headquarters. Figure 2 shows how the Microsoft Dynamics AX 2009 system architecture enables comprehensive application-to-application and business-to-business integration.



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Figure 2. Technology integration in the Microsoft Dynamics AX 2009 system architecture.

AIF and Web services enable you to establish business policies, manage data access, and control who sees specific information. For example, a manufacturer might decide to expose inventory data to its vendors, but reveal different levels of information to preferred vendors. With XML-based transactions and document-oriented interfaces, it is easy to establish this flow of information across organizational boundaries through Web services.

Microsoft Dynamics AX 2009 provides a range of out-of-the-box Web services, but developers can easily create custom Web services using simple tools. You can also take advantage of online services, such as payment services that integrate credit card processing, including authorization, data tracking, and returns into Microsoft Dynamics AX. Or, speed shipping processes and orders with access to third-party shipping tools.

Support for standard document exchange

Simplify information sharing and collaboration with support for standard XML document exchange with trading partners, customers, and vendors. You can exchange XML documents over various transport mechanisms, including FTP servers, Microsoft Message Queuing (MSMQ), and outbound Web services.

AIF supports various document services, including create, read, update, and delete (CRUD) operations for a wide range of common document types, such as Advanced Shipping Notice (ASN), Sales Order, and Purchase Order, which are provided out of the box with Microsoft Dynamics AX 2009. (For a list of supported documents, see the Appendix.)

The Web services framework in Microsoft Dynamics AX 2009 also includes:

- A programming model that supports document services that encapsulate business logic and provide an interface between Microsoft Dynamics AX 2009 and external systems.
- Functionality for consuming external Web services from within Microsoft Dynamics AX 2009.
- Performance improvements, such as the ability to manage more messages through parallel message processing, and the addition of multiple application object servers (AOSs). AOS is a Windows®-based service that controls communications among Microsoft Dynamics AX clients, databases, and applications.

In addition to providing support for native Web services, Microsoft Dynamics AX 2009 includes connectors and adapters that deliver interoperability across different systems using Microsoft Internet Information Services (IIS).

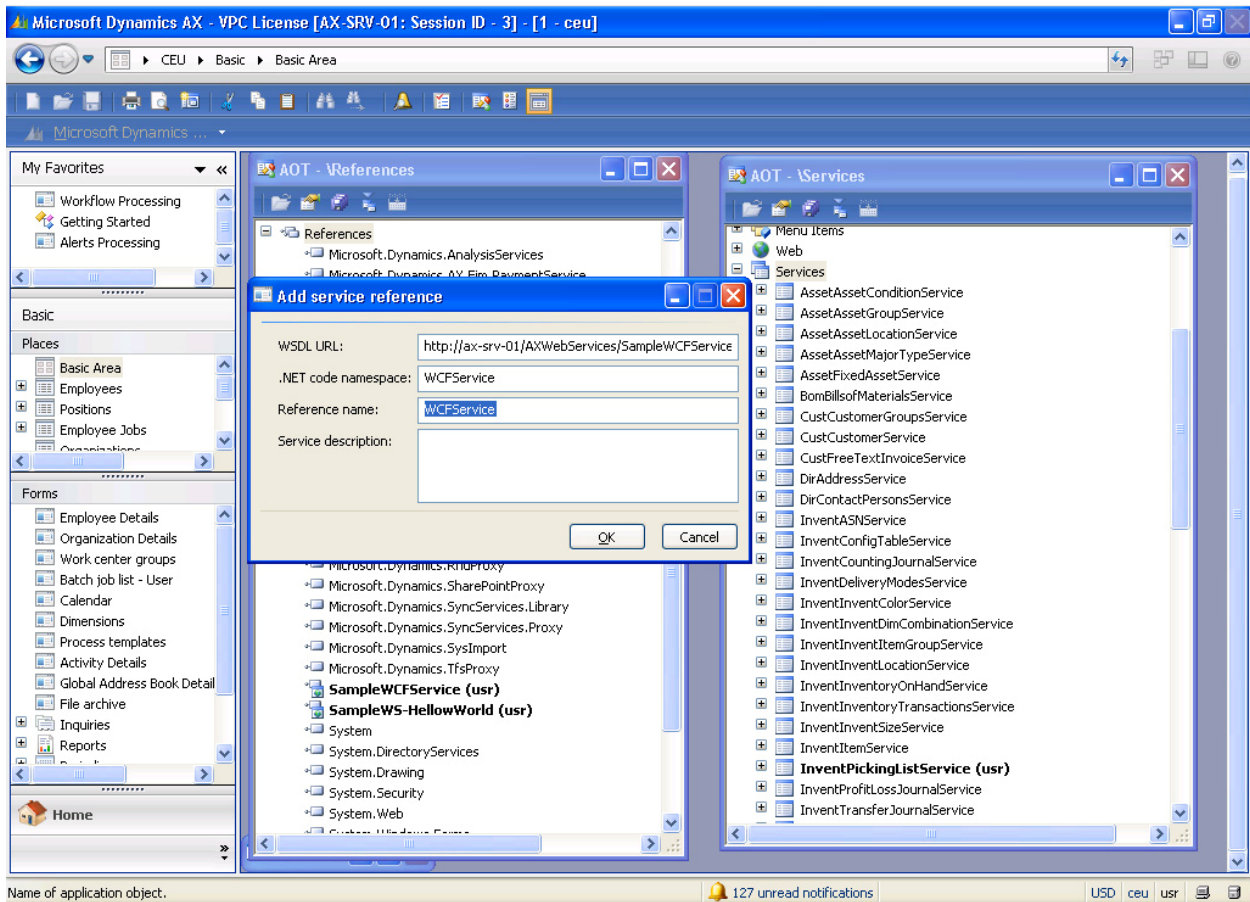


Figure 3. Exposing and consuming Web services in Microsoft Dynamics AX.

BizTalk Server

By using BizTalk Server 2006 R2 with Microsoft Dynamics AX 2009, you can further extend automated business processes, increase visibility, and enhance communication between systems and people. BizTalk Server streamlines data transformation and workflow among multiple systems to deliver a real-time view of the business and expand shared processes with suppliers, logistics providers, customers, and vendors. It also enhances security by encrypting information exchanged across the network.

BizTalk Server Adapter for Microsoft Dynamics AX 2009 adds flexibility for growth and innovation, and enables you to connect easily and with enhanced security to LOB data. The adapter has a schema import wizard that is integrated with Microsoft Visual Studio®, so you can import schemas and service descriptions from Microsoft Dynamics AX 2009. BizTalk Server delivers more than 20 out-of-the-box adapters that provide connectivity to applications such as SAP, Oracle, PeopleSoft, and other legacy systems.

Connecting Systems, Information, and People

With Microsoft Dynamics AX 2009 connectivity enhancements, businesses can easily integrate internally and externally, across multiple sites and systems. The following integration scenarios demonstrate how Microsoft Dynamics AX 2009 can help you connect systems, information, and people:

- Integrate a single ERP system with other applications and systems.
- Integrate multiple organizational ERP systems.
- Connect remote workers.
- Exchange data as part of supply chain management.
- Manage the supply chain using a value-added network (VAN).
- Add business value by integrating online services, such as credit card processing.

Scenario: Integrate a Single ERP System with Other Applications

Organizations often struggle to integrate disparate internal systems, especially older legacy systems. Being able to support line-of-business needs while maximizing the value of existing IT investments can help organizations improve productivity and realize a fast return on investment (ROI).

In this scenario, an organization with multiple business divisions wants to integrate a new ERP system with other applications and systems. Because other applications and systems often support larger systems—such as a product lifecycle management (PLM), an AutoCAD system, or a payroll system—it can be a challenge to integrate data and business processes.

Microsoft Dynamics AX 2009 can solve this challenge by helping you integrate and maintain existing systems to enable data sharing and financial reporting across the entire organization. You can connect data from multiple systems in real time, both across the extended enterprise and across business units, into a single, centralized system that synchronizes complex financial data and provides a consolidated view of business information.

By integrating a new ERP system with disparate systems, you can:

- Streamline and automate business processes with cross-functional capabilities.
- Maximize the value of existing systems.
- Minimize manual processes and reduce redundant data entry and manual errors.
- Gain a broad, real-time view of the enterprise.
- Minimize training time and get people started quickly.
- Establish data exchange with enhanced security.

Simplifying data exchange

The goal of this scenario is to create and/or deploy a new application, but reuse application logic or data from the existing system. AIF enables access to data and data exchange between Microsoft Dynamics AX and other systems using various formats. It integrates different systems

using XML import/export capabilities to simplify data sharing for multiple systems via FTP servers and MSMQ. MSMQ enables applications to communicate at different times across heterogeneous networks and systems that may be temporarily offline. MSMQ helps ensure message delivery, efficient routing, enhanced security, and priority-based messaging for asynchronous messaging scenarios.

The BizTalk Server Adapter for Microsoft Dynamics AX 2009 extends this flexibility by connecting Microsoft Dynamics AX to BizTalk Server and thus to the various applications and systems across the enterprise. AIF can also be used with heterogeneous network environments that include non-Windows operating systems. The Microsoft Dynamics AX client and Microsoft Internet Information Services (IIS) can then connect to via RPC and the .NET Business Connector to Microsoft Dynamics AX.

Using asynchronous transport

As an extensible framework for data exchange, AIF supports multiple asynchronous transports. It also supports synchronous transport using Web services to enable the exchange of XML documents with trading partners or legacy systems.

An asynchronous exchange uses an adapter to convert the document into the proper format for exchange by means of a particular transport mechanism, such as MSMQ. Adapter-based exchanges are asynchronous and involve moving the document into a queue, where it waits for processing by a Microsoft Dynamics AX batch job.

Adapters support the following transaction types:

- *Send Documents* to send documents to another system.
- *Receive and Create Documents* to receive documents from another authorized system and create new records in the Microsoft Dynamics AX database.
- *Respond to Read and Query Requests* to receive requests for documents from an authorized system, retrieve the requested information from the Microsoft Dynamics AX database, and return the data to the requesting system with appropriate filtering and security.

Technologies

- AIF
- Web services
- BizTalk Server and BizTalk Server Adapter for Microsoft Dynamics AX 2009
- FTP servers
- MSMQ
- .NET Business Connector
- IIS

Scenario: Integrate Multiple Organizational ERP Systems

Having multiple, disconnected ERP systems can lead to inefficient processes, incorrect data, and redundant data entry—especially for companies with multiple sites. With Microsoft Dynamics AX 2009, you can create a single, integrated ERP system that standardizes business processes across the extended enterprise. For example, if you produce the same item at multiple sites, you can manage a single bill of material (BOM) and consolidate a master schedule across sites. You can also process orders from all sites by splitting postings by site or shipping from multiple locations.

By integrating multiple ERP systems, you can:

- Streamline and automate business processes.
- Eliminate redundant tasks.
- Provide a real-time, enterprise view of data.
- Improve productivity and collaboration.
- Lower costs.
- Help simplify compliance for corporate and trading partner initiatives.

Exchanging data across systems and locations

In this scenario, company headquarters uses one central finance system, while other sites use different systems due to their small size or location. Employees from each site must be able to access and work with data from the primary financial system and the other smaller systems—regardless of geographic boundaries, varying currencies, and different local regulations.

This scenario shows how Microsoft Dynamics AX uses the Web services framework to exchange data with other systems, and uses XML to enable data exchange in different formats. It also uses BizTalk Server and the BizTalk Server Adapter for Microsoft Dynamics AX 2009 to expose applications through an XML interface, including proprietary data formats, and current and future standards in XML.

Technologies

- AIF
- BizTalk Server and BizTalk Server Adapter for Microsoft Dynamics AX 2009

Scenario: Connect Remote Workers

Keeping remote workers connected by enabling them to collaborate easily, whether across the hall or across continents, is essential in today's business world. From sales representatives and other field personnel to project managers working on-site at a customer's location, all mobile workers need to connect securely with the company's ERP system to get the right information at the right time. For example, sales representatives working remotely need to obtain current customer data and sales history information. They might also need access to the latest price list, current inventory levels, or additional product information.

With Microsoft Dynamics AX 2009, remote workers can connect by using:

- **Enterprise Portal in Microsoft Dynamics AX 2009.** Mobile devices must be able to connect to the Internet and have a Web browser. Connectivity is enabled through Microsoft Windows SharePoint® Services.
- **Microsoft Dynamics AX Web services.** Mobile devices must be online and have a client program that can consume Web services.
- **Microsoft Dynamics Mobile Client.** Mobile devices must have the Microsoft Dynamics AX Mobile Client installed, but do not need to be online. For more information, visit www.microsoft.com/dynamics/ax/product/mobilesolutions.aspx.

By connecting remote workers with Microsoft Dynamics AX 2009, you can:

- Enhance security and make it easy to connect from any location.
- Simplify the exchange of data, tools, and applications.
- Strengthen collaboration.

Streamlining data access from any location

Remote workers must be able to connect to the central office and access a range of applications, data, and tools. The challenge is enabling smooth connectivity on a variety of mobile devices for workers in any location. With Microsoft Dynamics AX, remote workers have the flexibility they need to stay productive with accurate, real-time data at their fingertips.

Automatic synchronization capabilities simplify the connectivity process and eliminate the need for manual data re-entry. Workers can manage customer data, enter new orders, or change a delivery location from a mobile device, and then automatically synchronize with the latest ERP data when they return to the office.

Technologies

- AIF
- Enterprise Portal in Microsoft Dynamics AX
- Microsoft Dynamics AX Mobile Client
- Windows SharePoint Services

Scenario: Exchange Data Across the Supply Chain

The ability to share information efficiently and securely is the foundation of an effective supply chain. This requires bringing together key stakeholders—customers, vendors, suppliers, and partners—so that they can exchange valuable information during the planning, operational, and delivery phases of production. For example, during the planning phase, vendors need advanced shipping information from suppliers. During the operational phase, suppliers require sales order and inventory data. In the delivery phase, customers may require delivery information, such as expected date and time of delivery.

By connecting and integrating LOB applications within the organization and throughout the extended supply chain, you can:

- Automate business processes.
- Gain real-time visibility into the supply chain.
- Improve productivity.
- Enhance customer and vendor relationships.
- Reduce costs by automating many common tasks.

Automating data exchange

In this scenario, Microsoft Dynamics AX uses Web services to connect systems so that information is rapidly accessible. For example, an electronics company that plans to ship the latest video game system to a big-box retailer uses this connectivity to gain the visibility and insight they need to speed decision-making. The company sends an advanced notice to the retailer alerting them that the shipment will arrive on a particular date. With an integrated system, the company can also view the retailer's current inventory levels. After discovering that the inventory is low, the company decides to ship an additional 500 items to the retailer. The company automatically ships the items that the retailer requires, without the need for human intervention.

Integration with BizTalk Server extends business processes and simplifies supply chain management by improving secure information exchange across the supply chain.

Technologies

- AIF
- Web services
- BizTalk Server and BizTalk Server Adapter for Microsoft Dynamics AX 2009

Scenario: Use a Value-Added Network (VAN)

In this scenario, information exchange is managed through a value-added network (VAN), which helps to automate business processes throughout the supply chain. A VAN is a third-party provider for Electronic Data Interchange (EDI), encryption, secure e-mail, management reporting, and other data sharing and collaboration services.

By using a VAN, you can:

- Automate business processes across the supply chain.
- Connect to trading partners using Microsoft Office to create and edit XML documents.
- Communicate with disparate business systems using EDI.

Extending visibility across the supply chain

Simply put, the VAN receives incoming orders and helps ensure that the order is delivered. The VAN standardizes business processes so all key players in the supply chain process—from sales, warehouse operations, and suppliers to shipping companies and customers—follow the same processes for each order.

With the VAN, data exchange and collaboration follow a similar process. With Microsoft Office SharePoint Server, the Microsoft Dynamics AX client acts as a platform for consuming Web services. Web services enable all parties to expose and consume information, and they enable existing technology assets to interoperate through adapters. As in previous scenarios, BizTalk Server and BizTalk Server Adapter for Microsoft Dynamics AX 2009 support data exchange in XML to simplify information exchange across systems in this scenario.

By offering extended visibility and automation across the supply chain, the VAN helps ensure that each individual has the information they need at the right time. It also communicates with diverse LOB systems with support for EDI.

Technologies

- AIF
- Web services
- BizTalk Server and BizTalk Server Adapter for Microsoft Dynamics AX 2009
- Microsoft Office
- SharePoint Server

Scenario: Add Business Value with Online Services

To stay ahead of the competition, businesses need new ways to add value to their products or services. For many, leveraging data from a third-party company offers an efficient way to simplify business processes and add greater value to the services they already provide. For example, by incorporating credit card functionality and address-verification information, businesses can improve internal productivity and enhance customer service.

By using online services, you can:

- Integrate additional information directly into Microsoft Dynamics AX.
- Extend and add value to products and services.
- Enhance security of the data exchanged.

Increasing efficiency with payment services

Microsoft Dynamics Payment Services (MDPS)¹ and Authorize.net use third-party information exchange to integrate credit card processing (authorization, data tracking, and returns) directly into Microsoft Dynamics AX. The automated process accepts approval requests from Microsoft Dynamics AX and returns results. MDPS communicates as a Web service, and Authorize.net via HTTPS protocol.

Similar to the other external integration scenarios, this scenario uses Web services to enable all parties to expose and consume information. The Microsoft Dynamics AX client, with SharePoint Server, acts as a platform for consuming Web services. BizTalk Server and BizTalk Server Adapter for Microsoft Dynamics AX 2009 support data exchange in XML to simplify the exchange of information with third-party systems.

Microsoft Dynamics AX communicates with MDPS and Authorize.net to gain credit card authorization. To reduce the risk of unauthorized users gaining access to credit card numbers on the Web, all Microsoft Dynamics AX code that processes full credit card numbers is executed in the AOS in AIF.

Technologies

- AIF
- Web services
- BizTalk Server and BizTalk Server Adapter for Microsoft Dynamics AX 2009
- Microsoft Office
- SharePoint Server
- Microsoft Dynamics Payment Services (MDPS)
- Authorize.net (ADN)

Conclusion

In the past, businesses often had to adapt their work and processes to fit software solutions, rather than the software adapting to their existing business practices. Now, with the streamlined integration made possible with Microsoft Dynamics AX 2009, you can use software that adapts to how your business works.

Microsoft Dynamics AX 2009 delivers the connectivity tools you need to build an integrated, agile business with improved collaboration and flexibility, both within the company and with external sources. With the ability to integrate legacy applications and line of business systems, Microsoft Dynamics AX delivers insight across the extended enterprise and throughout the supply chain, helping you to connect and enhance collaboration with employees, partners, vendors, and customers.

¹ MDPS is currently available only in the U.S.

For More Information

Microsoft BizTalk Server: <http://www.microsoft.com/biztalk/en/us/default.aspx>

Microsoft BizTalk Server documentation: <http://www.microsoft.com/biztalk/en/us/product-documentation.aspx>

Microsoft BizTalk Server Adapter Pack: <http://www.microsoft.com/biztalk/en/us/adapter-pack.aspx>

Real World Service-Oriented Architecture (SOA) white paper:
http://download.microsoft.com/download/1/7/5/175d4c0e-d94d-4288-8e53-4606a9197a0d/Microsoft_Dynamics_SOA_whitepaper.doc

Appendix

Delivered Web Services

These documents are available in Microsoft Dynamics AX 2009 out of the box:

Address	Free Text Invoice	Purchase Requisition
Agreement	General Journal	Return Order In
ASN	Inventory Color	Return Order Out
Asset Condition	Inventory Dimension Combination	RFQ Send
Asset Group	Inventory Item Group	Sales Electronic Invoice
Asset Location	Inventory Location	Sales Invoice
Asset Major Type	Inventory On Hand	Sales Order
Bills of Materials	Inventory Size	Sales Packing Slip
Cash Discount	Inventory Transactions	SMA Order
Chart of Accounts	Inventory Transfer Order Out	Transfer Journal
Configuration Table	Item	Trv PBS Maindata
Contact Persons	Payment Terms	Unit
Counting Journal	Picking List	Unit Convert
Custom Payment Journal	Price Discount Journal	Vendor Group
Customer	Price List	Vendor Payment
Customer Groups	Production Picking List	Vendor Table
Delivery Modes	Production Route Card	
Dimensions	Profit Loss Journal	
Exchange Rates	Project Electronic Invoice	
Expense	Project Hour Journal	
Fixed Asset	Purchase Invoice	

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