



# Business Focused Technology Enhancements in Enterprise

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WHITE PAPER

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Today's business requires increasingly flexible means of interacting with customers, partners, and employees. Enterprise portals address these needs and have become extremely important to access personalized content, documents, data, and applications through an easy to use browser interface.

This white paper provides an overview of enterprise portals, their technology and how they improved over time to meet the growing business requirements of enterprises. Along with the future of enterprise portal technology, it covers the typical requirements and architecture of enterprise portals and explains how certain trends and technologies are increasingly used in development of enterprise portals. Specifically, the paper discusses Web services, multi channel delivery of content and usage of XML in portals and certain specific topics for each technology.

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## Introduction

### Overview of Portals

We refer to the term 'Portal' frequently, the term portal in its simplest form may refer to an aggregator of content bringing together news, weather, stock quotes and feature articles with lots of jump-off points and links for navigating to the desired information. For a medium to large organization, the portal might be something more than just an aggregator of content. It is often the best way to provide common access to resources useful for staff, partner companies and customers.

The enterprise or corporate information portal is typically the gateway to electronic information held by an enterprise and it is the core location to access and interact with the associated applications. This may be available only to the enterprise in the case of an intranet or to business partners and selected customers outside of the organizational firewalls in the case of an extranet.

The enterprise portal is designed to provide relevant information to users through a standardized user interface so that authorized users can easily access relevant information. This helps in increasing the productivity and efficiency of users as they have immediate access to the required information.

### Challenges for Portals

Portals have become an integral part of most organizations and an important means of communication and collaboration with their customers, partners and employees. Portals are the most effective delivery mechanism for enterprise e-business strategy. As the significance and usage of portals grows, it presents new challenges and opportunities for organizations seeking to leverage them.

Part of the challenge is the integration of various applications and data types under one common interface. Another difficulty is dealing with the issues of application serving, security, connectivity, content management, and performance. The key to successfully harnessing portals across your enterprise, is to productively consolidate portal management - the infrastructure, the content and the interactions that users have with these applications - using a comprehensive approach. This ensures that across all lines of business, users have access to the right information and processes to make informed decisions. It also makes sure that the applications scale to the needs of the entire organization [2].

The technology of portals is rapidly evolving to address the challenges they are confronting. Technologies like Web Services and XML address some of these issues and hence are finding increased usage and acceptance in portals.

## Requirements of Portals

To understand the need for the various technologies that are part or becoming part of enterprise portals, we should understand the key requirements of portals.

### Key Requirements of Portals

A portal might have several requirements which it should meet in order to be more useful for the end-users. Core requirements for Enterprise Portals solution would include:

- Application integration, including the ability to seamlessly integrate back office systems (which is possible through Web services and XML)
- User interface tools, to provide a highly customized and integrated view of all the applications

- Content management, including the ability to create, manage, and deliver a variety of structured and unstructured data types (which is possible through a content management system)
- Security and personalization across all of these areas

At one end of the spectrum, the challenges of the enterprise portal with stringent applications integration requirements are perhaps best served by a portal solution that emphasizes application integration, most likely leveraging the power of XML for exchange of information between the repositories. At the other end, the content-centric or content-heavy site likely needs a content management solution that emphasizes highly developed functionality for content creation, management, and delivery.

### **Content Management Requirements of Portals**

Content management might have an important role to play in some enterprise portals. The requirement for a content management system needs to be thoroughly studied. It is usually helpful to have a content management system in enterprise portals that involves a multitude of content passing through complex workflows involving several groups of people.

Content management is a complex process, but it ultimately follows three phases: content creation, content management over its life cycle, and content distribution. Content management problem is aggravated by a wide variety of data which might be of the following types:

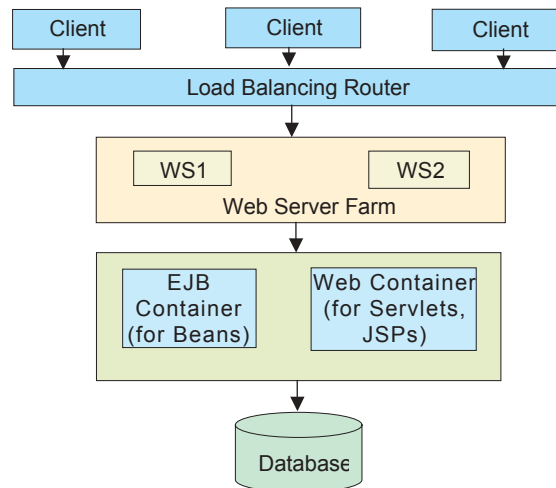
- Data in relational databases which is system / application specific data
- Office data like word, presentation data etc
- Structured data in the form of XML
- HTML data
- Multimedia files like audio, video and animation

Data from so many different sources and different formats needs to be managed to ensure that the right data is displayed to the end-user.

Meeting the requirements of enterprise portal solutions is challenging. There are certain technologies that help in overcoming these challenges. The subsequent chapters discuss the usefulness of few of these technologies and how they help in meeting the requirements of enterprise portals.

## Portal Architecture

We have understood the definition, need and key requirements of enterprise portals. It is important to understand the typical architecture of portals so that we understand how certain technologies fit in the architecture to meet the requirements of portals. There are several software components that run in the background in portal implementation. Each component plays an important role in the portal architecture. The various components that are usually part of enterprise portals and the roles that they play are depicted in the following diagram.



A typical portal comprises of the following components:

- 1) **Database Server:** The database server is where all the data related to the portal is stored. Data is stored in the form of tables in the database. The system information like metadata and the application specific data needs to be stored.
- 2) **Application Server:** Application server is the server which acts like a container for EJBs and servlets. Beans reside in the EJB container of the application server. The servlets and JSPs reside in the Web container of the application server.
- 3) **Portal Engine:** The portal engine provides the framework for building the portal. It has inbuilt styles, themes, grids etc. which are used for building sites. The styles and other attributes can be inherited from parent sites. The portal engine might support certain APIs that are used to customize the engine and build certain applications.
- 4) **Web Server:** The Web server is the server that receives the request from the client and sends back the response to the client using HTTP. The Web server may also send back cookies to the client. There might be several Web servers in a heavily used portal in a Web server farm.
- 5) **Load balancer:** Load-balancing is the act of distributing the incoming network traffic across a cluster of Web server machines. Load balancers are highly recommended for heavily used portals. They route the incoming request to the most suitable Web server based on certain parameters like network traffic or response time of the Web servers.

The above listed components are usually part of a typical portal implementation. Most portals comprise of them. However, the architecture of a portal may vary based on specific requirements of the portal.

## Trends and Technologies in Enterprise Portals

Portals are finding increased usage by public users, customers and employees. Portal technology is evolving with time to meet the various requirements of portals like application integration, content management etc. There are several technologies that have found a place of importance in building and maintaining enterprise portals. Few of these technologies which have gained an important place in enterprise portals are being discussed in the subsequent sections:

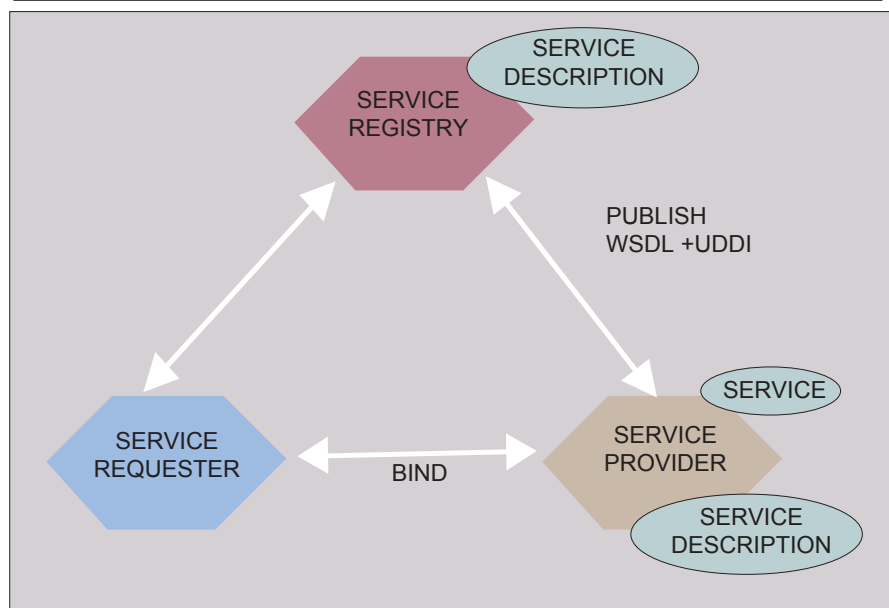
### Web Services

Web services, in the general meaning of the term, are services offered via the Web. In a typical Web services scenario, a business application sends a request to a service at a given URL using the SOAP protocol over HTTP. The service receives the request, processes it, and returns a response. An often-cited example of a Web service is that of a stock quote service, in which the request asks for the current price of a specified stock, and the response, gives the stock price [4].

A Web service is an interface that describes a collection of operations that are network-accessible through standardized XML messaging [6]. Web services have both a business and a technology perspective. From a business perspective, Web services are utilities that are bought and sold like other utilities such as electricity, telecommunication etc. From a technology perspective, Web services are about a set of specifications that need to be followed for packaging software to easily accessible components to be used by other applications/systems.

A service provider creates a Web service and its service definition and then publishes the service with a service registry based on a standard called the Universal Description, Discovery, and Integration (UDDI) specification. Once a Web service is published, a service requester may find the service via the UDDI interface. The UDDI registry provides the service requester with a WSDL service description and a URL (uniform resource locator) pointing to the service. The service requester may then use this information to directly bind to the service and invoke it. The following diagram depicts this process [6].

Figure 1 Web services actors, objects, and operations



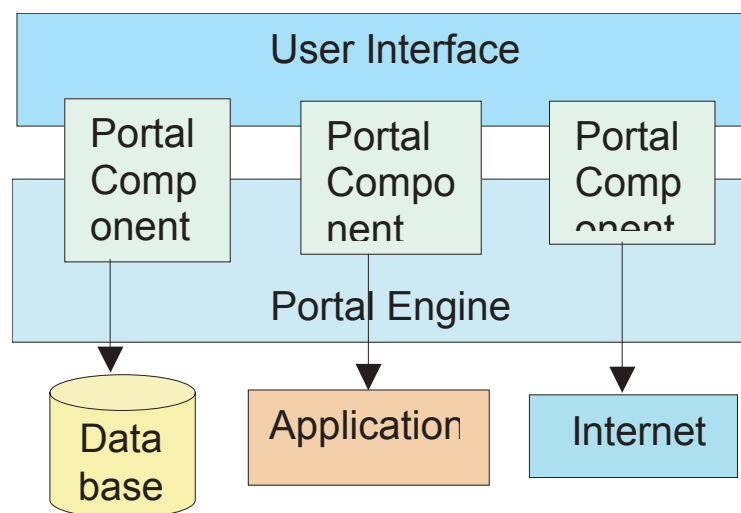
**Need for Web Services in Portals**

*Web services have a strong future in portals. According to Ovum (a leading research organization for emerging trends and technologies) Report on Portals & Web Services [3], they will become the default method for accessing content and applications within portals. Today's enterprise IT infrastructure needs are vast indeed – not only do internal IT systems such as inventory, accounting, manufacturing and customer support need to interact with each other, these systems are now being exposed so that business partners' and customers' systems interact with them. Exposing such services to partners and customers and allowing such services to communicate with each other (if required) is possible by implementing them as Web services.*

One of the distinct features of portals has been that they connect to a wide range of data and applications. It is possible through writing small pieces of code for portlets which contain code specific to portlets for providing connectivity. It provides a simple means of connecting the portal with the content or application. The main problem with this approach is that every content source or application requires a different connector. So a typical portal might have hundreds of such connectors. Maintaining such applications becomes a nightmare. This problem is best solved if the service providers are able to provide some form of common interface which is used to connect data and applications directly in portals. This functionality is achieved through Web services.

**Web Services in Portals**

Web services have revolutionized the way remote applications are used in portals. The common approach to portals has been to connect to a source of content and deliver it through a user interface. This principle has been followed by early Web portals which were primarily content aggregators. Using this approach, delivering functionality that spans multiple content and application sources is difficult. It has also led to an umpteen number of different portlets being created by portal vendors. This architecture is depicted in the following figure wherein portal components aggregate content from databases, applications and Internet resources and display the aggregated content to the end-user through a common user interface.



*Fig - Portal without Web services*

The problem with the above approach is creation of various connectors for the different portlets and integration of the applications across multiple information sources. There might be a situation wherein change in data in one window should correspondingly change data

in another window of the portal automatically. Data might be dropped from one portlet to another portlet causing a series of automatic actions. For example, order processing number from an order processing system might be dropped into a parcel tracking system to track the parcel with that order number. This requires integration across the order processing system and the parcel tracking system which is possible through Web services.

At a simple level, it is possible to use Web services to access content and applications. At a more complex level it is possible for portlets to allow access to data in other portlets through Web services. At an even more complex level, portal engine will allow building of complex business processes using workflow and execution of multiple Web services. The following diagram depicts the usage of Web services in portals wherein the portal components (portlet) access the content and applications through Web services and not directly as depicted in the previous diagram.

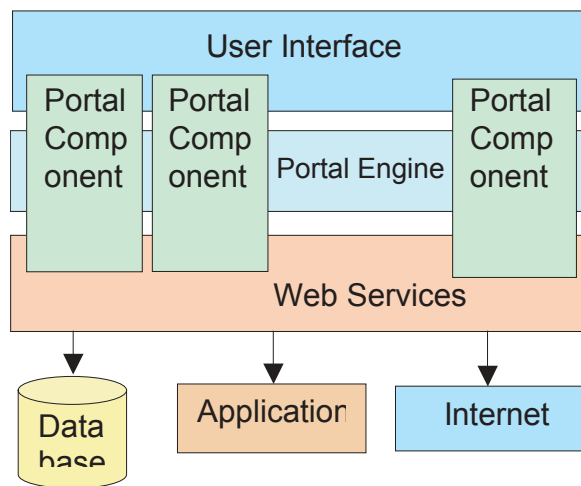


Fig-Portal with Web Services

According to Ovum Report [3] there are certain trends in the way Web services will be used in portals in the near future. Two of these important trends are:

- WSIA (Web Services for Interactive Applications): This initiative intends to take Web services out of its machine to machine communication environment and deliver directly to the end-users. This is being built on the original WSUI (Web Services User Interface) initiative which was started by Epicentric which is a leading solution provider for enterprise portals in 2001
- WSRP (Web Services for Remote Portals): WSRP is a specification, based on SOAP, which defines SOAP operations that enable a Web service to return an HTML fragment that can be embedded in a HTML page. This focuses primarily on portals rather than the generic delivery mechanism of Web services. This is designing a standard for interactive, user facing Web services that plug and play with portals

**Benefits of Web Services in Enterprise Portals**

Web services have several benefits when used in portals. The significant benefits of web services in portals are:

- Easy integration of services in the portal: If a particular service e.g., inventory management system of a company is implemented as a Web service, it is easily integrated into the portal. It is possible to request and get information in real time, and transform it to your particular format. This will allow you to deliver individualized software and services

- Easy integration of the services with other services: If there are two applications that are integrated in a portal and they need to communicate with each other based on user action, Web services make it possible
- The maintenance burden of the portal is greatly reduced because these services are centralized and usually provided by external agencies that run and maintain them.
- Web services allow users to get the information in the same browser window without having to navigate to an external URL. Users find this feature friendlier and hence their loyalty towards the portal grows as they do not have to navigate to other resources for information they need
- Web services are simple and universally agreed packaging technology accessible over the Internet and do not need technology tied to vendor's platform. They provide output data in XML format which gives lot of flexibility in using and sharing the data which is discussed in detail under section 6.3

## Multi Channel Delivery

*Portal sites looking to survive on the Internet have to harness increasing consumer expectations, growing Internet usage and mobile penetration [8]. The end-result will be the transformation of surviving portals into multi-access portals, which are portals that can be accessed via two or more delivery networks or devices such as PC, mobile phone, PDA, TV or voice. Whatever the medium, a similar "look and feel and functionality" should be available.*

### Need for Multi Channel Delivery in portals

*With access to information, anytime and anywhere, increasingly being taken for granted by consumers, the portal will evolve into a new form. According to Ovum Research [10], multi-access will become core to the portal concept and, in the years to come, all portals will include at least an element of the multi-access approach. Portals are trying to become multi-access so that their consumers have access to all the desired information anytime and through a device of their choice, not necessarily a Web browser.*

### Multi Channel Delivery in Portals

*Let us try to understand how multi channel technology fits into portals. Portals have different look, feel and functionality for different devices. This is possible through certain technologies, one of which is 'Multi-Channel Access XML (MAXML)' as explained in [9]. MAXML is evolving as an XML application which "fully supports HTML, XHTML, XML, WAP (HDML and WML), Palm PQAs, VoiceXML and Java and will support new channels as they emerge"[9]. MAXML is "an XML-based definition language that enables a developer to create one application definition and have it instantly accessible. MAXML is designed specifically for the growing need to deploy applications on not just one, but many access channels simultaneously. This and other wireless technologies are being increasingly used for multi channel delivery of content from portals.*

### Benefits of Multi Channel Delivery in Portals

Multi channel delivery is becoming increasingly popular in portals because there are certain distinct advantages that the users and the portals derive from it. Some of the key benefits of multi channel delivery in portals are:

- The users can access the desired information at any time through a device of their choice. They need not always access the information online through a Web browser; they can do so wirelessly through other types of devices
- Portal vendors can use same data to publish differently on different devices. This avoids creation of different data for different devices and avoids redundancy. It promises better revenues from increased usage of the portal as the portal is

- accessible from multiple devices and not just Web browsers
- Employees of the organization need not be wired all the time to access vital organizational information. This leads to easier access of data and better planning of activities within the organization

## XML

XML stands for eXtensible Markup Language. It has become a standard way of representing data in a structured format that is processed without much human or machine intelligence [7]. Information formatted in XML is exchanged across platforms, languages, and applications, and might be used with a wide range of development tools and utilities. Like HTML, XML makes use of tags (words bracketed by '<' and '>') and attributes (of the form name="value"). While HTML specifies what each tag and attribute means, and often how the text between them will look in a browser, XML uses the tags only to delimit pieces of data, and leaves the interpretation of the data completely to the application that reads it.

### Need for XML in Portals

There are few applications more obviously well-suited than XML in portals as stated in O'Reilly's XML.com [5]. Portals aggregate information from diverse sources and present it in a uniform user interface. Portals have evolved with time. They have come a long way from the days when they used to draw content from single source.

The content in a typical portal now comes from a variety of sources. The big challenge in front of portals is to be able to aggregate all this information from diverse sources of content and present it to the end user-through a uniform user interface. XML makes it possible to implement this functionality. Another important feature of XML is its inherent extensibility. Companies and organizations will be able to extend XML to meet new challenges and requirements.

Another important change that has happened with the advancement of technology is that the same content might be required to be displayed in more than one format e.g. for a PDA, web browser, print etc. This is possible through the use of another technology with XML called XSLT. It is used to take the source XML file and transform it to different formats suitable for different purposes. E.g, XSLT might transform the same XML data to a plain, non graphic version that is suitable for display in PDAs, and a fancier graphical version that is suitable for use with desktop computers and modern browsers.

Alternately, you might want to take the data and convert it to non HTML format e.g., into a text file of tab-separated values for import into a spreadsheet or database program. You might want to convert it into a PDF or into any other useful format. Transformation of XML data into formats suitable for different devices/purposes is possible through usage of XSLT with XML.

### XML in Enterprise Portals

In enterprise portals, XML provides a great way to efficiently aggregate and present content. It provides a lot more flexibility in using and sharing the data. The following diagram explains how XML is used in enterprise portals wherein data is supplied to the portal from databases and also from XML streams. There might be several of these XML streams and they are integrated into the portal.

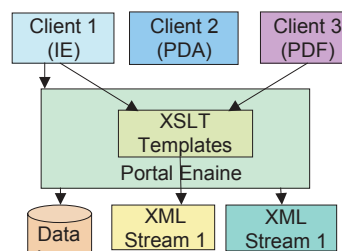


Fig-XML in Portals

XML data is integrated into the site using the following means:

- Through certain APIs that the portal engine supports (as seen for XML stream 2 in the above diagram). The XML stream 2 is parsed by a XML parser to retrieve the data. The data is displayed using a presentation layer (JSP) which builds the user interface that is displayed in a Web browser.
- Through XSLT (as seen for XML Stream 1 in the above diagram), the same data is transformed into various formats suitable for usage in various types of devices/interfaces like Web browsers, PDAs, PDFs etc.

### **Benefits of XML in Enterprise Portals**

XML offers several benefits when used in portals. Hence it is gaining importance in enterprise portal technology. The benefits of XML in enterprise portals are summed up as follows:

- XML provides an effective means of aggregating content which may be coming from diverse sources. We do not have to worry about the platform from which data is coming, if data is available in XML format
- It provides a means for easier development and integration of search functionality in the portal. This is possible because the XML data is organized into a tree like structure with elements having sub elements. It is logically possible to reach any data item in any element by navigating through the tree
- XML with XSLT allows the same data to be presented in different formats suitable for different types of devices/interfaces. This avoids data redundancy and helps in easier and better maintenance of data

### **Conclusion**

The enterprise portal technology is undergoing sea changes. Enterprises are intending to use their portals in the most effective and efficient manner to satisfy the needs of their employees, partners and customers. They aim at reducing maintenance cost & time of deployment and integration of applications. A plethora of technologies are evolving to meet the ever increasing needs of businesses and consumers. Some of these technologies like Web services, multi channel delivery of content and XML have been discussed in the white paper. There are other technologies which are finding increased usage in enterprise portals such as Business Process Management, Silent Commerce to name few. They have not been considered for the white paper as they are still evolving and will take time to mature.

Each of these technologies has emerged in portals based on certain needs. These technologies are finding increased usage and have defined the trends in portals. Implementers need to take a detailed look at the requirements for their portal. These requirements should be documented, and then compared against candidate technology. How many of the requirements are met with the candidate technology – is a question that the implementers and portal owners need to ask before implementing the technology in the portal. The portal should be based on the kind of solution that best meets the requirements and allows the organization to continually build on in the future. It should allow continuous improvement in the portal, providing for an increasingly valuable experience for the end-users.

Being unaware of the in-depth requirements of the business and the latest trends and technologies in enterprise portals could lead to choosing a Portal technology that might offer more problems than solutions. This is a challenging problem, and perhaps the one most critical to the success of a portal implementation.

**Acronyms**

<b>Abbreviation</b>	<b>Expansion</b>
<b>XML</b>	eXtensible Markup Language
<b>XSLT</b>	eXtensible Stylesheet Language Transformations
<b>UDDI</b>	Universal Description, Discovery, and Integration
<b>WSDL</b>	Web Services Definition Language
<b>WSIA</b>	Web Services for Interactive Applications
<b>WSRP</b>	Web Services for Remote Portals
<b>SOAP</b>	Simple Object Access Protocol
<b>HTTP</b>	Hyper Text Transfer Protocol
<b>URL</b>	Uniform Resource Locator

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Saurabh Singh holds a Bachelor’s degree in Mechanical Engineering, from Bangalore University. In his career spanning around 5 years, he has worked globally with a solutions and services company focusing on enterprise middleware/Internet technologies and also with a startup. He has worked on challenging assignments with various fortune 500 clients and is currently working as a Module Leader in his group at Wipro Technologies

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## Wipro in Portal & Content Management

With the glut of information enterprises have, effective Content Management and the use of Portals have become very crucial in maintaining a uniform flow of relevant information. Keeping this in mind, Wipro has established a Competency Center to offer e-business Solutions for Enterprise Portals, Content Management, Document Management, Workflow and Knowledge Management.

[www.wipro.com/itservices/ecommerce/portal.htm](http://www.wipro.com/itservices/ecommerce/portal.htm)

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