

**Special Report**

# Web Services

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*Web Services will revolutionize computing, make it possible to quickly integrate disparate enterprise applications, and build new programs on the fly with pieces of code found and procured over the Web.*

*Or so says the hype machine.*

*There are grains of truth in all of these claims, but like any new technology, Web Services has to walk before it can run and only time will tell if the reality lives up to the early promise.*

*In fact, much work needs to be done on some of the fundamentals – the standards that will make it possible to stitch together a Web Services world. But nonetheless, early proponents are finding innovative ways to put Web Services to work.*

*This Network World Special Report takes a look at where we stand with Web Services, where we need to go and how some enterprise IT shops are already extracting value from this emerging technology.*

## Table of Contents

<b>UDDI is Yellow Pages of Web services</b> .....	<b>.3</b>
<i>By Greg Govatos, Network World, 05/27/02</i>	
<b>Industry group to define Web services</b> .....	<b>.4</b>
<i>By John Cox, Network World Fusion, 04/11/02</i>	
<b>Whirlwind of Web services work on tap</b> .....	<b>.4</b>
<i>By John Fontana, Network World, 05/20/02</i>	
<b>Web services making headway in large firms</b> .....	<b>.6</b>
<i>But Giga Information Group survey cites security concerns among users.</i>	
<i>By John Fontana, Network World, 01/14/02</i>	
<b>CASE STUDY: New formula for apps access</b> .....	<b>.8</b>
<i>Web services help chemical company send catalog updates in real time.</i>	
<i>By John Fontana, Network World, 04/15/02</i>	
<b>CASE STUDY: Galileo travels down Web services path</b> .....	<b>.9</b>
<i>New applications designed to provide customized information.</i>	
<i>By John Fontana, Network World, 04/29/02</i>	
<b>Related Links</b> .....	<b>.11</b>

## UDDI is Yellow Pages of Web services

BY GREG GOVATOS  
 NETWORK WORLD, 05/27/02

Web services can be defined as loosely coupled software components delivered over IP networks. The primary objective of Web services is to simplify and standardize application interoperability within and across companies, leading to increased operational efficiencies and tighter partner relationships.

A Web service architecture consists of three primary functions: discovery, description and transport. For each of these functions, there is an accompanying standard, all based on XML. Web services are discovered through Universal Description, Discovery and Integration (UDDI), described by Web Services Description Language (WSDL), and transported using Simple Object Access Protocol (SOAP). Web service transactions run over HTTP and TCP/IP networks.

The typical Web service transaction flow occurs after a Web service is built by a Web service provider, a description of the service is posted to a Web service registry. The registry is a searchable index of service descriptions through which Web services can be located and executed.

The Web service requester (the entity in need of a Web service) searches the service registry and finds the desired service description. Through the information the requester

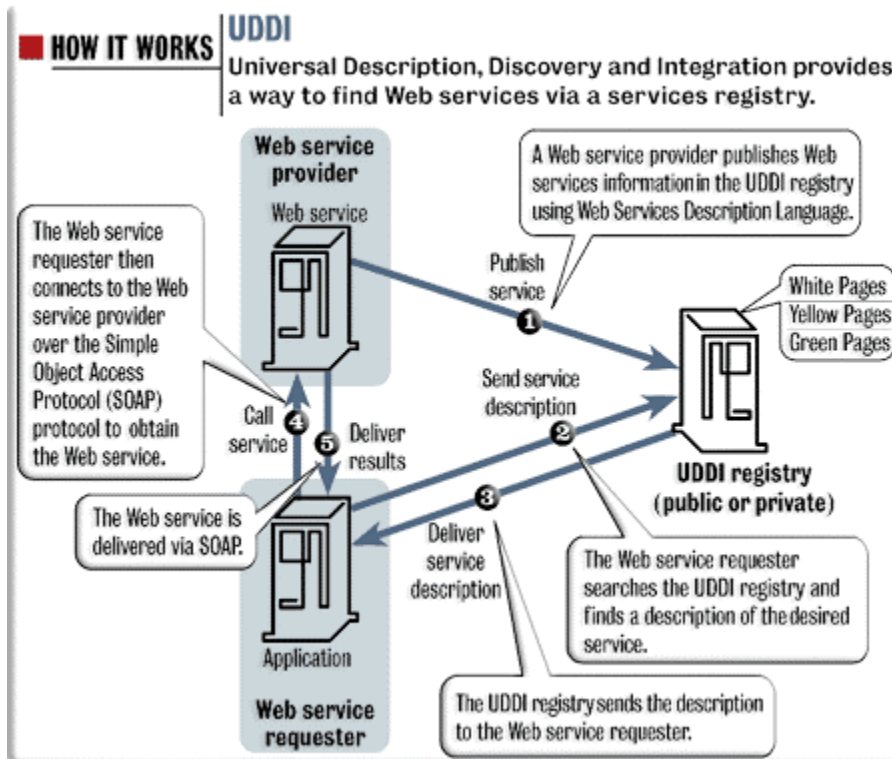
finds in the registry, the requester connects to the Web service provider and invokes the service.

At its foundation, UDDI is a group of specifications that lets Web service providers publish information about their Web services and lets Web service requesters search that information to find a Web service and run it.

Under the covers, UDDI consists of an XML schema that defines UDDI's four core data structures - business, service, binding and programmatic interface - and a set of APIs that operate on those structures. UDDI was developed by IBM, Microsoft and Ariba, and is now under the stewardship of the UDDI Community, which has more than 200 member companies. UDDI is currently at Release Level 2.0; Version 3.0 is under development.

A Web service listing is created using WSDL and then sent to a UDDI registry. A listing is comprised of three elements. At the highest level there are White Pages, which contain basic information about the providing company and its services. Next are Yellow Pages, which organize services by industry, service type or geography. Finally there are Green Pages, which include the technical mechanics (such as interfaces and URL locations) about how to find and execute a Web service. An application requesting a service will use WSDL to electronically interact with the Green Pages section of that service's listing.

The architecture of UDDI allows for public and private registries, with private registries accessible by business partners across an extranet and within an organization over an intranet. Private registries are expected to achieve earlier adoption than public registries, because Web services are first being deployed by



corporations inside the firewall. For corporations, UDDI registries provide a key advantage over standard software release management practices. As new or updated versions of a Web service are released, a UDDI registry lets the service be put to use immediately by the requesting application without any recoding or reintegration work.

While UDDI registries appear to offer for Web services what search engines did for the World Wide Web, a few problems are hindering their broad rollout. First, the UDDI specification has not been finalized, which is causing companies to pause before committing resources. Also, the categories of a registry have not been standardized, making searches tedious. Further, UDDI lacks the authentication features needed to restrict access to trusted applications. Companies will not expose business-sensitive Web services in a nonsecure environment. Finally, there are not enough production-level Web services available to warrant the widespread use of registries.

*Govatos is the vice president of Chutney Technologies, which develops software for optimizing Web service infrastructures. He can be reached at greg@chutneytech.com.*

## Industry group to define Web services

BY JOHN COX

NETWORK WORLD FUSION, 04/11/02

Work is now officially underway by the World Wide Web Consortium to hammer out a formal framework for Web services.

In its first face-to-face meeting last week, the recently formed W3C Web Services Architecture Working Group began crafting a paper that will, among other things, describe what Web services are, the technologies needed for them, how they'll interact with each other, and how to address privacy and security. The paper is due out by year-end.

Eventually, when approved by the W3C, the architecture specified could be adopted by vendors of development tools, application servers, databases and packaged applications. For enterprise network shops, this should translate into Web services that are easier to create and that can easily work with each other.

Last week, some 60 representatives from more than 40 vendors and corporations met in person, after about two months of telephone conferences, which were designed to give the assembled working group a starting point for discussion.

Corporate members include Boeing, ChevronTexaco, DaimlerChrysler Research and Technology, and W.W. Grainger. Vendors include BEA Systems, Compaq, Contivo, IBM, Intel, Microsoft, SAP, and Sun Microsystems.

Initially, the group is defining a Web service as an application identified by a URL, that has an interface that can be defined, found, and used by XML-based objects, and that works directly with other similar applications using XML-based messages over Internet protocols.

An array of W3C groups are addressing various Web services technologies, such as XML, the Web Services Definition Language (WSDL) and Simple Object Access Protocol (SOAP), says Dave Hollander, CTO of data integration software maker Contivo and a member of the architecture group.

"This new group will let us define the architecture requirements for Web services, so these other projects won't go out and create incompatible results," he says. "What's been happening until now is that we've been getting the [Web services] transport layer stuff to the point where it's 'good enough.'" Now, attention can be focused on what's needed so that Web services don't simply connect to each other, but understand each other and work together in complicated ways.

As the architecture draft is created, drawing heavily from work being done in other W3C groups, it will be fed back into these groups for review and comment. The W3C has created a special coordinating group to keep all the projects in step with each other.

That coordination, and the active participation of key vendors, could lead to product implementations of at least some architecture elements by early 2003.

## Whirlwind of Web services work on tap

BY JOHN FONTANA

NETWORK WORLD, 05/20/02

A dizzying array of specifications being produced this year by standards bodies and other groups will fill glaring security and reliability gaps in nascent Web services technology.

In rapid-fire succession over the next six to eight months, network executives could see up to 30 new protocols emerge designed to advance Web services as a way to support secure

## Special Report

and reliable interconnection of transaction-based business applications.

The protocols will help mitigate risk, enforce access and use policies, ensure nonrepudiation and guarantee execution and exception handling by defining authentication, authorization, trust, reliable messaging, transactional integrity and workflow. Standards for XML-based digital signatures and encryption already exist.

Standards bodies focused on XML include the Organization for the Advancement of Structured Information Standards (OASIS) and the World Wide Web Consortium (W3C). Vendor alliances such as the IBM, Microsoft and VeriSign trio, developed the recent WS-Security proposal.

The groups will be heavily active in the coming months on standardizing recommendations, introducing new specifications, hammering out guidelines for security requirements and focusing on creating consistency across a palette of security initiatives.

Getting the work done is imperative to providing the kind of security network executives need when they develop or deploy sophisticated Web services, which typically involve computers talking to one another without human intervention.

"This year is going to be pretty overwhelming in terms of standards," said Bob Sutor, director for e-business standards strategy at IBM at a meeting with Network World editors last week. "Standards will be coming at a fast and furious pace. Last year standards development was focused on connections. This year it will be focused on security, reliability, transactions and workflow. Soon it's going to be very difficult to keep track of what does what." He says there will be 20 to 30 specifications relatively soon. Currently there are six major security protocols either approved or in the draft stage. The WS-Security alliance has proposed seven others.

Network executives are bracing for the onslaught but say they hope it will not erode the simplicity of Web services.

"I would hate to see Web services get lost in the security forest," says John Studdard, senior vice president and CTO for the Virtual Bank in Palm Beach Gardens, Fla. "We are hoping for a simple security model as opposed to something that sounds good but has no chance of ever being implemented."

Studdard runs a dozen Web services internally to integrate banking systems, but says because of security concerns he has yet to run them outside his organization.

"Web services security is still the wild, wild West," Studdard says. "What we are seeing now is a reaction more than a well thought out security plan."

That may be true, according to a recent Hurwitz Group study, which among other issues showed that security was the No. 1 inhibitor to Web services adoption.

"We were surprised to see how quickly people were adopting the Web services development tools, but there is an immaturity level that is quickly being realized as people seek security, reliability and quality of service," says Tyler McDaniel, director of application strategies for Hurwitz. "As a result, there is a pressure on vendors and standards bodies to get security moving faster."

Existing security standards from the W3C - XML Signature (XML-Sig) and XML encryption, protocols for ensuring integrity and authorization - are creating the support for that movement. The W3C also is working on the XML Key Management Specification for distributing and registering public keys.

At OASIS, the Security Assertion Markup Language (SAML), Services Provisioning Markup Language (SPML) and the XML Access Control Markup Language (XACML) are all security proposals in line for approval.

"Security today is being done willy-nilly," says Terri Kouba, a systems developer at the University of California at Berkeley. "But as a whole under Web services it needs to be defined. Not just the transport but the whole authentication and reliability piece."

Work is under way to tie it all together for use in Web services development tools and other software.

Last week, OASIS created the Security Standards Joint Committee (SSJC), an oversight group to ensure consistency among its security working groups. Next month, OASIS will begin work on final approval of SAML and XACML. The SPML specification is set for standards review at year-end, and a fourth focused on digital rights management had its first committee meeting last week.

"If you can show me a PowerPoint slide that describes how security standards tie together, I'll give you a million bucks," says Darran Rolls, director of technology for Waveset and the

## Special Report

co-chair of the SSJC. "We need common terms and a way to prevent overlap in the specs."

The W3C last month published the first draft of its Web Services Architecture Requirements, including a foundation for security based on accessibility, authentication, authorization, confidentiality, integrity and nonrepudiation. The final draft is due early next year, and the group is working on a proposal to create an umbrella security group that would work on security extensions to SOAP and examine new security proposals, says Philippe Le Hégaré, a member of the W3C technical staff.

One such effort to create new protocols is being led by IBM, Microsoft and VeriSign, which by year-end plan to introduce six specifications to extend the WS-Security specification they introduced last month (see graphic). The trio says it hopes to submit WS-Security, which is built on XML-Sig and XML encryption, to a yet-to-be determined standards body this fall.

IBM and Microsoft are at work independently on specifications - Web Services Flow Language and Xlang, respectively - for standardizing workflow, the process of managing the execution of Web services in business processes. IBM's Sutor says the company also is working on a specification for guaranteed delivery of messages, although he would not provide details.

But no matter how fast such efforts develop, securing Web services will be a complex undertaking for network executives.

"To think the complexity in the designing, developing, deployment and maintenance of secure distributed applications will go away with Web services is a cardinal sin," says Bernhard Borges, managing director of the advanced technology group at PricewaterhouseCoopers Consulting.

Others say Web services security is just a new set of protocols to address tried and true security tenants of today: Secure data where it resides, and secure it as it moves between two or more end points.

"The scary part is that we are starting to talk about linking up the whole Internet," says Pete Lindstrom, director of security strategies for the Hurwitz Group. But Lindstrom says the basics for getting started are there today.

*Senior Writer Ann Bednarz contributed to this report.*

## Web services making headway in large firms

**But Giga Information Group survey cites security concerns among users.**

BY JOHN FONTANA  
NETWORK WORLD, 01/14/02

Interest in Web services, primarily for integrating disparate corporate applications, is picking up in many large corporations. But users are keeping projects simple in light of the nascent technology's shortcomings in areas such as security, according to IT executives and analysts.

Many large companies are finding that Web services, which are built using a variety of emerging standard protocols based on XML, are perfect for creating interfaces that link legacy applications regardless of the platform. But users are taking a cautious approach, and most Web services projects are being conducted internally or with a few trusted partners, according to a recent Giga Information Group study.

The study also found users are leery about developing Web services-based applications, which natively support XML Web services protocols, because protocols for security and transactional integrity are not yet available.

The study concluded that users don't view Web services as revolutionary, but as incremental refinements that represent the evolution of existing application platforms.

"More than half of the enterprise Web service usage is around integration," says Mike Gilpin, a Giga analyst and author of the study. "Web services is really just an interface mechanism. It's the ability to present one simple interface to a complex business process inside a company."

Gilpin likens Web services to a McDonald's drive-through. "A lot of stuff happens inside the restaurant you don't see or want to see." He says customers interact with the order system and pick up the results at the window without any knowledge of the series of processes needed to fill the order.

With Web services interfaces, data can be translated from native formats into XML documents and vice versa, and transported using XML-based protocols, such as the Simple Object Access Protocol (SOAP), over the Internet or an intranet. The idea is to help clean up the integration mess in heterogeneous environments.

## Special Report

"Web services let us present our services in a nonproprietary way and provide standard access as opposed to private connections," says Tim Hilgenberg, chief technology strategist for management consulting firm Hewitt Associates. Later this month Hewitt will flip the switch on a Web service that provides access to its mainframe-based benefits system.

"We can't dictate platforms to customers so our Web service makes us platform independent, gives us ubiquity in connectivity [via the Internet], and with XML and SOAP we avoid proprietary formats," Hilgenberg says.

Customers access Hewitt's Web service from their own human resources portals. An XML data packet wrapped in a SOAP envelope is sent over HTTP to Hewitt's IBM WebSphere application server, where a Java servlet unwraps the envelope and initiates a CICS transaction on the mainframe. The mainframe returns XML-based data to WebSphere, where it is wrapped in SOAP and sent back to the customer.

"To create a benefit summary, it is so much easier to have a programmatic interface than to screen scrape off a Web site," says Hilgenberg, who will present a case study at this week's Next Generation Web Services Conference in San Francisco.

Hewitt also has added its own security using digital signature technology built with IBM's XML Security Suite and a certificate system to authenticate users.

But Hilgenberg admits that security for Web services "is not as mature as we would like it to be."

Security is a glaring deficiency that is holding back the development of more sophisticated Web services with greater business value, such as integrating supply chains and procurement systems across business partners, the Giga survey found.

That may change as security mechanisms evolve to allow for more sophisticated applications. The World Wide Web

Consortium is working on XML Encryption and XML Signature protocols. Microsoft has proposed WS-Security, and IBM is working on HTTP-Reliable. The Organization for the Advancement of Structured Information Standards is working on the Security Access Markup Language and the Access Control Markup Language, as well as a Web Services Component Model for building electronic business applications based on Web services.

"It is clear that the security standards are not fully baked," says Andre Hill, chief technology officer of Plural, a professional services company. "Enterprises have to really think about do I want to adopt this now. The big question now is how do I get some return-on-investment out of Web services and integration is clearly one area where Web services can help."

Peter Osbourne, group manager for advanced technology and decision support systems for Dollar Rent-a-Car, has already found that out.

Dollar has been using a Web services interface for its reservation system that allows partner Southwest Airlines to reserve cars right from its own internal applications. Dollar says it generated \$10 million in revenue in 2001 through that link alone. Osbourne says the Web service works so well, the company tied it into its Web site, eliminating CGI-Perl code in the process.

"It was relatively easy and we're using the exact same Web service," Osbourne says.

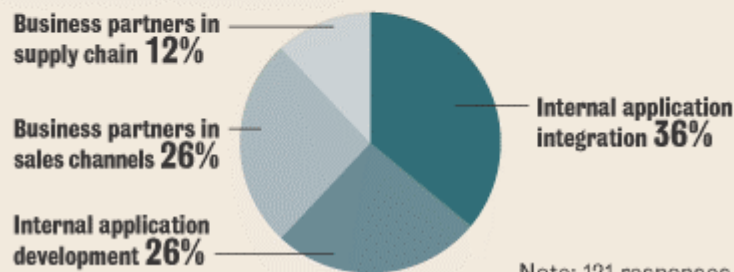
And last week, the company went live with Microsoft's BizTalk Server, which converts reservations sent as EDI files from travel agencies into XML documents that

can work with the reservation system Web service. And Osbourne is now working on a Web service to expose Dollar's rate engine, which generates price quotes for customers, so it will be accessible by a wide number of clients.

## Evaluating Web services

**A survey by Giga Information Group shows that most corporations initially plan to use Web services internally as they work to understand the technology.**

What is the primary target for your Web services development?



"We feel we are in a position to integrate once other companies get up to speed and we think that is a great business advantage."

## EARLY ADOPTERS

### New formula for apps access

#### Web services help chemical company send catalog updates in real time.

BY JOHN FONTANA  
NETWORK WORLD, 04/15/02

KINGSPORT, TENN. - In his role as "hype buster" for Eastman Chemical, Carroll Pleasant has been called upon to put Web services under his magnifying glass. So far, he likes what he sees, though concerns about performance and security have him moving cautiously.

Eastman is trying out Web services to give partners and customers speedier and more targeted access to applications, such as a product catalog of more than 400 chemicals, fibers and plastics. If Web services prove successful, the company will offer a range of them in hopes of generating new revenue.

"Web services are an [application] interface technology for us," says Pleasant, Eastman's principal emerging technologies analyst. "What's different is the idea that you can wrap up intellectual property in an object that can actually respond to different requests. It is not just: 'Send all the data you've got.' "

He compares Eastman's Product Catalog Web Service to a dictionary service on the Internet. "Would you rather have a service where I download the whole dictionary to you, or would you rather have a service that says you give me a word and I'll send you back the definition?"

Currently, distributors get catalog information from Eastman in many ways, such as by visiting the company's Web site and copying data, by "screen scraping" the Web site or by having Eastman e-mail them files. However, because the catalog is updated regularly but never on a scheduled basis, distributors often are left with dated information.

Using Web services, Eastman has created a way for distributors to access its product catalog and for them to push that access to their customers so everyone sees the same catalog in real time. Without Web services, every partner in the chain

would have needed an identical application-integration server to gain such access, and Pleasant says that wouldn't have been practical.

"It doesn't take much technology just to consume our Web service," he says.

Eastman's partners are supplied with lightweight code that sits on their intranet servers and lets them send catalog requests via messages based on Simple Object Access Protocol (SOAP), an XML protocol. SOAP creates a standard interface to activate the Microsoft Component Object Model Plus (COM+) interfaces used in Eastman's catalog application, called Saqqara. The COM+ interfaces remain on the Saqqara application server but are accessed through SOAP interfaces running on Eastman's WebMethods server, which provides a link to the Internet. The WebMethods server creates the SOAP interfaces and generates the Web Service Description Language files, which describe the capabilities of the Web service. It all runs on Windows 2000 using a variety of dual and quad servers from Dell.

The catalog Web service includes four functions: It can return a list of products by family code or by category code, and return a technical data sheet for a specific product. The fourth function is the creation of an Extensible Stylesheet Language stylesheet for data presentation on the end user's side.

"We had these COM+ interfaces that you could call from inside the firewall using standard COM+ technology," Pleasant says. "But to open it up to our customers we had to be able to move outside of our firewall. And that is where Web services makes a big change."

Also key is that all those Web services components can be reused in other applications, something not possible with COM+, he says.

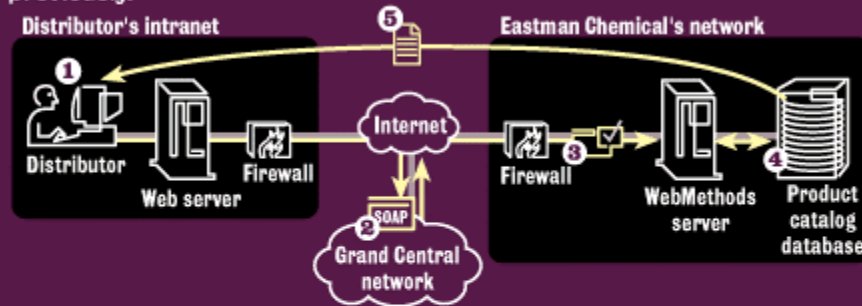
Programming flexibility also was a plus because Eastman has committed to Java for its Web-based environment but often uses Microsoft tools for internal application development. Pleasant used WebMethod's Java tool kit to create the Web services that call for the COM+ objects Eastman built using Microsoft's Visual Studio development tools.

While Pleasant is impressed by the potential of Web services, he's starting slowly because of the technology's limitations regarding security, transactional integrity and nonrepudiation.

## Special Report

## Web services at work

Eastman Chemical is using Web services to give distributors access to more specific and up-to-date product catalog information than was possible previously.



- 1 A distributor requests information about a chemical listed in an Eastman Chemical product catalog.
- 2 The distributor's intranet server, which runs code supplied by Eastman, sends the request as a SOAP message over HTTP to service provider Grand Central's network.
- 3 Grand Central authenticates the end user, makes the connection to Eastman's WebMethods server and audits the connection.
- 4 Eastman's Web service for catalog access runs on the WebMethods server. The server accepts the SOAP message, which activates a COM+ interface that in turn requests the chemical information from the catalog database.
- 5 The requested information is delivered to the end user.

So while Eastman will develop and run its own Web services, it is using a hosted middleware service from Grand Central Communications, which validates Web services users and logs their transactions. (Grand Central's service starts at \$150,000 per year, though the company has not yet determined the number of Web services or connections Eastman will use.)

Pleasant prefers for someone else to be responsible for authentication services because it is not an Eastman forte and it insulates the chemical company from the evolution of security standards and identity-management systems such as Microsoft's Passport and the Liberty Alliance Project started by Sun. Grand Central also provides authorization services that feature a Web-based application that Eastman uses to manage who has access to what and when on its network.

"We want Grand Central to take care of the volatility we expect to see around security," Pleasant says.

"We want them to worry about the maturation of the standards," he adds.

And there are other services that Pleasant needs.

"As you do more complex transactions, especially multiparty transactions, this business of keeping track of whose system said what and when is pretty important. Grand Central has those kinds of nonrepudiation services. When a transaction does break and you need to do a postmortem, having an independent third party to do that is really, really important," he says.

While it's easy to get carried away with the potential of Web services, Pleasant says Eastman is right about where he'd like to see it in terms of adoption.

"One of the things that I keep telling people is we are not late to this party," he says. "We are fashionably early."

## Galileo travels down Web services path

**New applications designed to provide customized information.**

BY JOHN FONTANA  
NETWORK WORLD, 04/29/02

DENVER - Galileo International is cracking open the proprietary systems and networks it has run for 30 years, a move aimed at revolutionizing and personalizing the way it does business.

The preeminent distributor of fare and booking information for the travel industry is deconstructing its entrenched applications, such as those for handling airline fare inquiries and ticket booking, into Web services components with interfaces based on Simple Object Access Protocol (SOAP). The intent is to turn what is today a one-size-fits-all approach to dispensing travel information into a pliable environment where customers can stitch together Web services components into customized applications that can be accessed from any platform.

Galileo is testing four Web services with major customers and hopes to deploy them soon. These include services for creating itineraries, booking travel, encoding and decoding airport and destination information, and providing updates on plane status after takeoff. In the future, Galileo plans to create as many Web services as customers demand.

"The first four are the very biggest blocking and tackling components," says Todd Dubner, vice president of product innovation for Galileo. One example is the Itinerary Inquiry, a Web service - or what Galileo calls a SOAP service - that returns flight, car and hotel availability based on a given destination and date.

The data has always been available from Galileo, but to get it out of its proprietary systems and network, customers had to endure a series of steps including authentication to the various sets of data, and individual processes to query pricing and availability related to airlines, car rentals and hotels.

Galileo has built services around all the necessary itinerary transactions and aggregated them into a SOAP service that is activated via a Web server (see graphic).

"We have 30 years of [application] development locked up in our systems that perform all sorts of functions for the travel distribution space, and they have been captive functions for Galileo that we distribute through our proprietary network," Dubner says.

The company maintains a private frame-relay network for connectivity to its travel agent customers and travel company data suppliers.

"With the inception of Web services, we can let our customers access us the way they want over whatever network they want," Dubner says. "We will modularize our global distribution system functions so a travel agency or corporate customer can arrange our business objects in such a way that they meet their specific business needs."

## Big decision

But it's been no small decision for the company to tinker with its global distribution system (GDS), which is the heart of Galileo's business.

The GDS is updated constantly with fare and reservation information from 500 airlines, 227 hotel operators, 32 car rental agencies, 368 tour operators and all the major cruise lines. It handles 350 million requests for information per day and 92 billion transactions per year, and boasts an uptime of 99.95%. Last year, more than 345 million travel reservations were booked through Galileo's systems from more than 178,000 terminals in 115 countries, which generated an estimated \$55 billion in travel-related services.

Galileo has spent nearly two years devising and testing its plan to roll out Web services so it enhances that operation, even though it says creating the actual Web services interfaces can take as little as a few hours. Currently, Galileo has a team of 28 people devoted to developing Web services, but that is expected to grow over time.

After all that planning, Galileo is convinced Web services isn't a risky investment.

"In terms of our capital plan for this year, while we see this as a significant growth initiative, it does not represent a significant portion of capital, so we see this as a relative low-risk investment for us," Dubner says.

In terms of development, Galileo says creating Web services has not increased its costs because new development tools automatically generate much Web services code used as interfaces to existing business logic.

Web services promise Galileo component and code reuse, foster new services such as Itinerary Inquiry, and open new sources of revenue.

The Web services also will be used for travel services on Trip.com and CheapTickets.com, two Web sites that Galileo's parent company, Cendant, runs.

Galileo also will use Web services to build components such as from Highwire, its self-booking tool for corporations, to those for profile maintenance, policy management and calendars.

"All of these things are functions that can become Web services so we build them once for one of our products and then make them available to our other customers, and in the process it saves us tremendous dollars in terms of development of new products," Dubner says.

## A new world

In this new world, Galileo will host the Web services on its network, freeing itself from having to update software at client sites.

"The travel agents are no longer interacting with software inside their shop. They are interacting with Galileo via a SOAP interface and XML," Dubner says. "It gets us away from the tyranny of a release cycle."

Galileo had required users to run a Windows-based server to interact with a data language Galileo developed three years

## Special Report

ago called XML Select, a standard way to describe concepts such as a car or hotel. XML Select converted Component Object Model components used in client-side applications into XML documents. Those documents were fed to adapters in Galileo's network that converted the XML into triggers that would touch off transactions on the mainframe.

While the adapters remain, customers no longer need the Windows-based server running in their environment.

"With Web services we are not demanding that our customers function on any specific platform," Dubner says.

Everything is executed on the Galileo network. It's a big shift but it has not meant big changes to the company's computing infrastructure except for security.

"When we exposed our product through a central point such as the host system and our own client products before, we had a much tighter control on how our users were authenticated," says Glen Zwart, principal engineer for Galileo. "Now as we start to expose that product in different ways, we have to change those models."

Zwart says Galileo is closely following standards work in Web services, but for now has created its own authentication and security mechanisms similar to what is available on the Web today.

Galileo doesn't have to scrap any of its computing platforms - including mainframes running the Transaction Processing Facility operating system and its 30-year-old processes, Windows and assorted flavors of Unix - or its IBM WebSphere application servers, Microsoft Internet Information Servers and code written with Java tools and Microsoft's Visual Studio.Net.

## Related Links

**Web services information site:**

<http://www.webservices.org/>

**Online professional journal:**

<http://www.webservicesarchitect.com/>

**IBM May 2001 paper on Web services (author is a member of the W3C architecture group):**

<http://www-3.ibm.com/software/solutions/webservices/pdf/WSCA.pdf>

<http://www.nwfusion.com/news/2002/0121webservices.html>

**Top Web services worry: Security**

**By John Fontana**

**Network World, 01/21/02**

**SAN FRANCISCO - The absence of security and reliability is proving to be a major stumbling block in convincing companies that Web services can thrive outside of corporate firewalls.**

<http://www.nwfusion.com/columnists/2002/0819blum.html>

**Intranet Advisor:**

**Plan on SAML for identity mgmt.**

**By Daniel Blum**

**Network World, 08/19/02**

**The Security Assertion Markup Language interoperability bake-off and release of an eagerly awaited specification from the Liberty Alliance last month mark historic steps forward for Web services, security and distributed applications.**

**An XML-based standard, SAML provides a means for applications or security servers to exchange portable identity assertions that authenticate or authorize users.**

<http://www.nwfusion.com/primers/xml/xmlprimer.html>

**Audio primer: XML**

**Extensible Markup Language (XML) can be used to store and share data across platforms and applications. Learn the technology's history, benefits and drawbacks in this 10-minute primer. Network World Fusion.**

[http://www.nwfusion.com/news/2002/129295\\_01-21-2002.html](http://www.nwfusion.com/news/2002/129295_01-21-2002.html)

**The Home Depot's latest project: XML, Web services**

**By Ann Bednarz**

**Network World, 01/21/02**

<http://www.nwfusion.com/ecommerce/2002/winner/winner.html>

**Assembling a top-of-the-line Web services model**

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**By Beth Schultz**

**Network World, 02/18/02**

<http://www.nwfusion.com/news/2002/0422webservices.html>

**XML: The glue for unified messaging**

**By John Fontana**

**Network World, 04/22/02**

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