



By enabling applications to easily share data across different hardware platforms and operating systems, PEPID™ WEB Services provide many advantages:

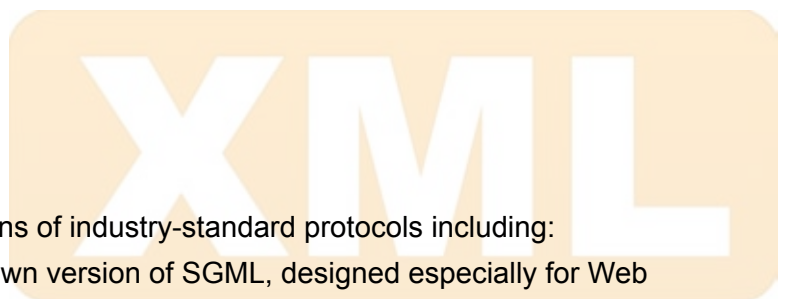
- API allows creators to customize all display and data outputs. Results in an application with a tailored look and feel.
- Based on standard XML send/receive.
- Create and supply custom applications via internet, wireless or stand-alone.
- Device independent—one interface is supported across all platforms.
- A unique product can be developed easily and quickly.
- Save development time for rapid deployment and lower costs.
- Its plug and play after your application is completed. Using our WEB Services, PEPID maintains all updates and enhancements on our production servers.
- Unique IDs maintained from update to update.

Healthcare institutions use PEPID WEB Services to develop their own information system enhancements for wired and wireless PCs; and wireless PDAs. IT companies also use our WEB Services to develop their own services and/or software products.

All businesses and institutions benefit from:

- New business opportunities created by new ways to connect with partners.
- Dramatically more personal, integrated experiences for users through the new breed of smart devices – including PCs.
- Increased revenue streams from easier distribution of their own Web services to others.
- No software installation is required on the client side.
- Zero maintenance cost.
- Faster response to marketplace changes and client demands.

PEPID™ WEB Services Technology



Web services are invoked over the Internet by means of industry-standard protocols including:

- XML (Extensible Markup Language) is a pared-down version of SGML, designed especially for Web documents. It allows designers to create their own customized tags, enabling the definition, transmission, validation, and interpretation of data between applications and between organizations.

- XSLT (Extensible Stylesheet Language) is a transformation language for XML documents.
- SOAP (Simple Object Access protocol) is a standardized light-weight XML-based messaging technology, which specifies all the necessary rules for locating Web services, integrating them into applications, and communicating between them. SOAP messages are independent of any operating system or protocol and may be transported using a variety of Internet protocols, including SMTP, MIME, and HTTP.
- WSDL (Web Services Description Language) is an XML-formatted language used to describe a Web service's capabilities as collections of communication endpoints capable of exchanging messages WSDL is an integral part of UDDI, an XML-based worldwide business registry. WSDL is the language that UDDI uses.
- UDDI (Universal Description Discover and Integration) is a public registry, offered at no cost where one can publish and inquire about Web service.

WEB Services Implementation

PEPID offers a wide range of components including Medical Content, Drug Interactions Generator (DIG), Medical Calculators, Drug Dosing Calculators, Drug Formulations and Illustrations. For an example, PEPID™ Drug Interactions Generator (DIG) is used below. Implementation requirements and methods include:

- Operation System should be Microsoft Windows 2000 or higher.
- Any high-level programming language can be used (VB.Net, C#, C++, Java)
- No software is required to be installed on the web service client site. Client application can be in the form of the Web or Windows application For creating an XML Web service, client needs to perform following basic steps:
 - Create a proxy class for the XML Web service;
 - Reference the proxy class in the client code;
 - Create an instance of the proxy class in the client code;
 - Call the method on the proxy class corresponding to the XML Web service method you want to use to communicate.
- A client application sends request in the XML format by calling one of the methods available on the Web services. Based on the request Web services retrieve the information from the database and returns response to the client in the XML format. See Figure 1 below.

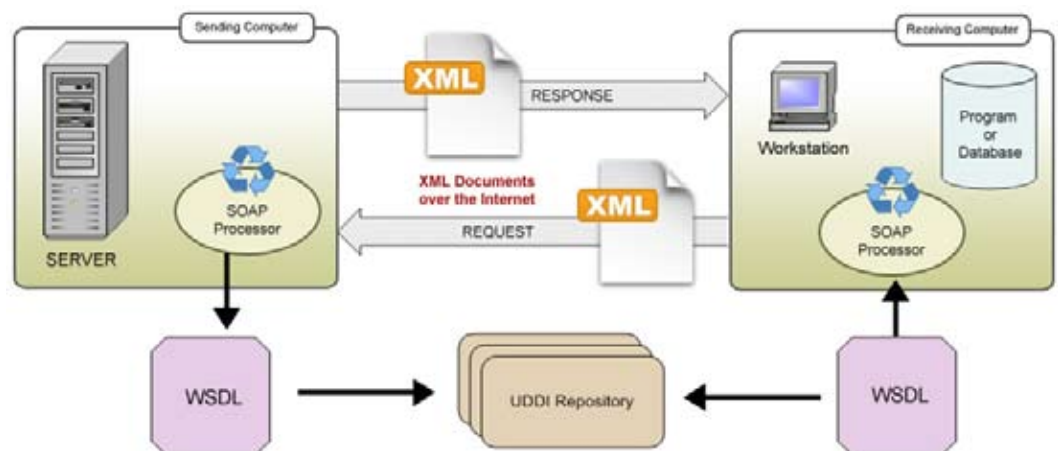


Fig.1-PEPID WEB Services use standard XML documents to transmit data

- Some methods include:
 - **GetAvailableServices** (int CompanyID) – returns all available/allowable service codes, and their descriptions.
 - **FindExactDrugName** (int CompanyID, int DrugID) – returns information about drug existence.
 - **GetAllDrugs** (int CompanyID) – returns all available drugs name, drugs descriptions and unique ID.
 - **GetSingleDrugInteractions** (int CompanyID, int DrugID) – returns all interactions for the DrugID. Interactions information includes list of drugs, interaction's levels, interaction's effects, directions and comments.
 - **GetMultipleDrugInteractions** (int CompanyID, int DrugID1, ..., int DrugID50) – method accepts up to 50 DrugIDs as parameters and returns all interactions for these drugs.
 - **GetDrugForm** (int CompanyID, int DrugID) – returns drug formulation.
 - **GetAllProducts** (int CompanyID) – returns all available/allowable product codes and product names.
 - **GetContentList** (int CompanyID, string ProductCode) – returns list of content pages, unique ID and title for specified product.
 - **GetContentByDrugID** (int CompanyID, int DrugID) – returns content based on the drug ID in XML format.
 - **GetContent** (int CompanyID, int ContentID) – returns content based on content ID in XML format.
- See Figures 2 and 3. The drugs Biaxin and Coumadin are used as an example.

```

<?xml version="1.0" encoding="utf-8" ?>
- <ArrayOfInteractionsDetails
  xmlns:xsd="http://www.w3.org/2001/XMLSchema"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xmlns="http://www.pepid.com/webservices/">
- <InteractionsDetails>
  <InteractionInfo>3-Biaxin XL: Incr Coumadin-
  pk</InteractionInfo>
  <Details>Biaxin XL(CLARITHROMYCIN) will increase
  the level or effect of Coumadin(WARFARIN) by
  hepatic enzyme CYP3A4
  metabolism.<BR>Possible serious or life-
  threatening interaction. Monitor closely. Use
  alternatives if available.</Details>
</InteractionsDetails>
- <InteractionsDetails>
  <InteractionInfo>3-Biaxin XL:Coumadin-
  other</InteractionInfo>
  <Details>Biaxin XL(CLARITHROMYCIN) increases
  effects of Coumadin(WARFARIN) by decreasing
  metabolism.<BR>Possible serious or life-
  threatening interaction. Monitor closely. Use
  alternatives if available.</Details>
</InteractionsDetails>
</ArrayOfInteractionsDetails>

```

Fig. 2-PEPID WEB Services: Drug Interactions Details Response output in XML format

```

<?xml version="1.0" encoding="utf-8" ?>
- <DataSet xmlns="http://www.pepid.com/webservices/">
- <xs:schema id="NewDataSet" xmlns="" xmlns:xs="http://www.w3.org/2001/XMLSchema" xmlns:msdata="urn:schemas-microsoft-com:xml-msdata">
- <xs:element name="NewDataSet" msdata:IsDataSet="true">
- <xs:complexType>
- <xs:choice maxOccurs="unbounded">
- <xs:element name="Content">
- <xs:complexType>
- <xs:sequence>
- <xs:element name="DrugID" type="xs:int" minOccurs="0" />
- <xs:element name="PageTitle" type="xs:string" minOccurs="0" />
- <xs:element name="HeadHTML" type="xs:string" minOccurs="0" />
- <xs:element name="BodyHTML" type="xs:string" minOccurs="0" />
- </xs:sequence>
- </xs:complexType>
- </xs:element>
- </xs:choice>
- </xs:complexType>
- </xs:element>
- </xs:schema>
- <diffgr:diffgram xmlns:msdata="urn:schemas-microsoft-com:xml-msdata" xmlns:diffgr="urn:schemas-microsoft-com:xml-diffgram-v1">
- <NewDataSet xmlns="">
- <Content diffgr:id="Content1" msdata:rowOrder="0">
- <DrugID>2234</DrugID>

```



```

<PageTitle>Clarithromycin (Biaxin, Biaxin XL)</PageTitle>
<HeadHTML><meta name="generator" content="HTML Tidy for Windows (vers 1st June 2002), see www.w3.org"> <title>Clarithromycin (Biaxin,
Biaxin XL)</title> <link rel="stylesheet" type="text/css" href="/includes/content.css"> <script language="javascript">var
bRebuild=false;</script> <asp:Label id="jsScroll" runat="server"> <script language="javascript" type="text/javascript"
src="/includes/virtualScrollingPause.js"></script></asp:Label> <script language="javascript" type="text/javascript"
src="/includes/common.is"></script></HeadHTML>
<BodyHTML>
<li>&lt;&gt;1-10%
<ul>
<li>&lt;&gt;abdominal pain (adults 2%, children 3%)&lt;/li>
</ul>
</li>
<li>&lt;&gt;&amp;lt;1%
<ul>
<li>&lt;&gt; anaphylaxis, anorexia, anxiety, AST increased, bilirubin increased,
clostridium difficile colitis, dizziness, dyspnea, glossitis, hallucinations,
hepatic dysfunction, hepatitis, hypoglycemia, incr. alk phos, jaundice,
leukopenia, manic behavior, neuromuscular blockade (case reports), neutropenia,
pancreatitis, psychosis, QT prolongation, seizures, serum creatinine increased,
Stevens-Johnson syndrome, thrombocytopenia&lt;/li>
</ul>
</li>
</ul>
<p>&lt;&gt;Kinetics/Dynamics&lt;/p>
<li>&lt;&gt;&lt;a href="/content/content.aspx?url=dot/dot455.htm"&gt;Pregnancy Category&lt;/a>: C&lt;/li>
<li>&lt;&gt;Lactation: excreted in breast milk&lt;/li>
<li>&lt;&gt; Absorption: highly stable in presence of gastric acid (unlike erythromycin);
food delays but does not affect extent of absorption &lt;/li>
<li>&lt;&gt; Distribution: widely into most body tissues except CNS&lt;/li>
<li>&lt;&gt; Metabolism: partially hepatic (P450 enzyme &lt;a href=
"/content/content.aspx?url=dot/dot975.htm"&gt;CYP3A4&lt;/a>); converted to 14-OH clarithromycin (active

```



Fig. 3-PEPID WEB Services: Drug Content Response output in XML format

PEPID™ WEB Services Solutions

PEPID WEB Services help users create and implement more tailored, more capable applications. As a result, institutions and individuals can achieve greater efficiencies, be more productive; and deliver better services to clients and partners.