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Using XML and web services in web based application development

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Contents

- Introduction to web services (WS)
- With XML technologies
- Implications of WS
- Some examples of WS with MS.NET
- WS and business integration
- Conclusions

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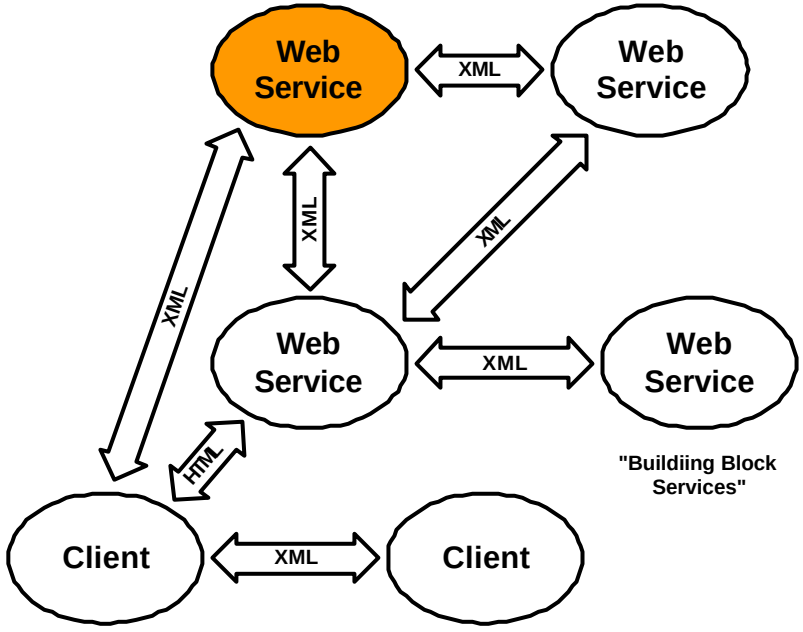
Usage of web services (WS) and XML

- XML, WS and three(!) revolutions for software engineering
- Web Services "standards" and their implementation
- Rethinking business



http://msdn.microsoft.com/webservices/

for ISPs

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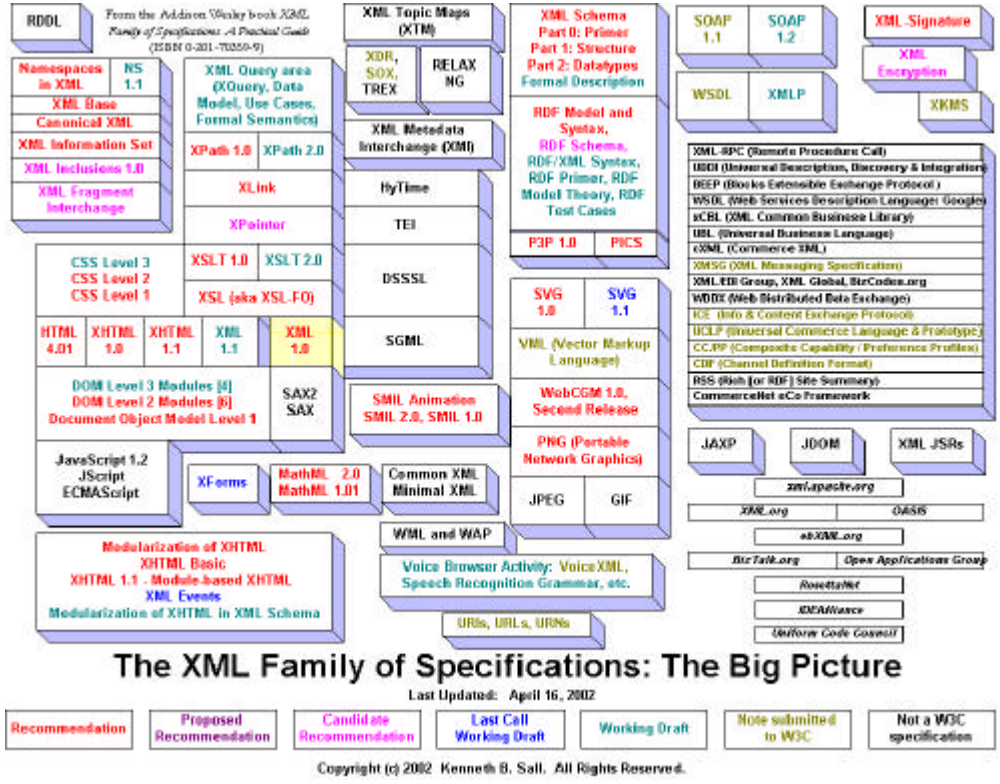
Standards behind WSs

- XML -- eXtensible Markup Language for structured data representation
- a near-universally agreed base specification (SOAP -- Simple Object Access Protocol) for structured message exchange
- a powerful vision for doing business online
- encompass the full spectrum of e-commerce



Ken Sall: Family of XML technologies: big picture

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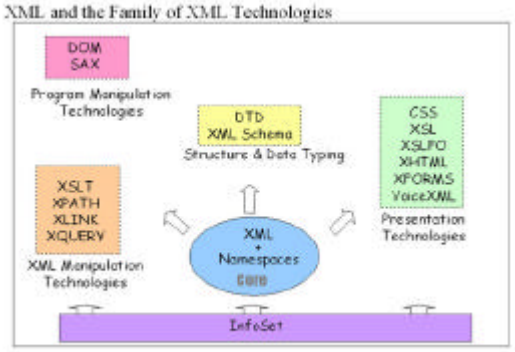
XML ground works

- XML
- XML based tools and technologies for data manipulation
- web services use XML based SOAP and WSDL to obtain web based software components



http://www.acm.org/ubiquity/views/f_coyle_1.html

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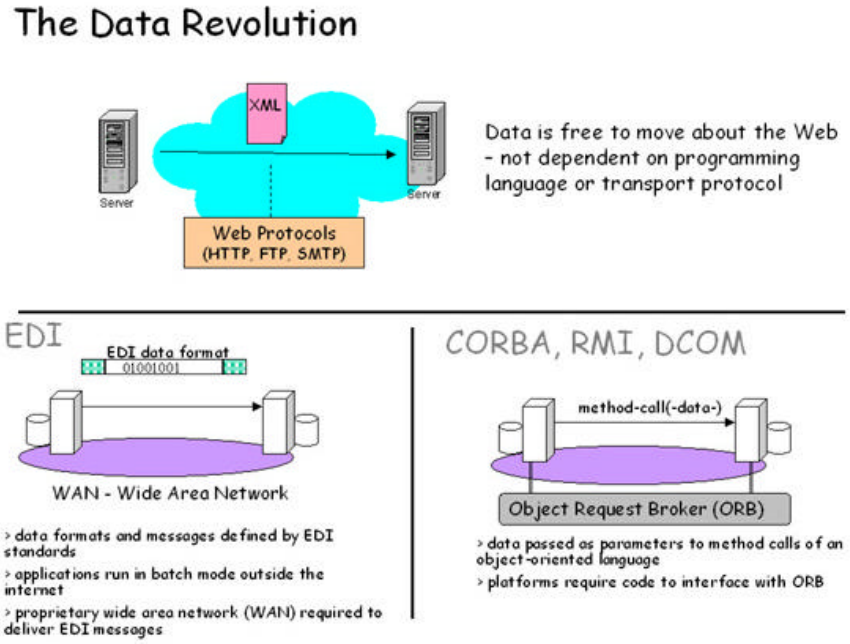
XML and data

- online transactions -- within a domain, across domains, intra-organization, inter-organization, as well as parties involved in the transactions in their different roles and in different contexts (to consider developments as culminating in specific killer apps is missing the point)



http://www.acm.org/ubiquity/views/f_coyle_1.html

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- XML is such an information presentation that is able to combine data and its meaning (data and semantics) and is relatively transferable with HTML, especially in XHTML, and hence it enables developing flexible web based applications
- XML applications transform web pages to a format that can also be understood by computers (“some” meaning of the data is coded in XML tags), and one can use information together with its meaning

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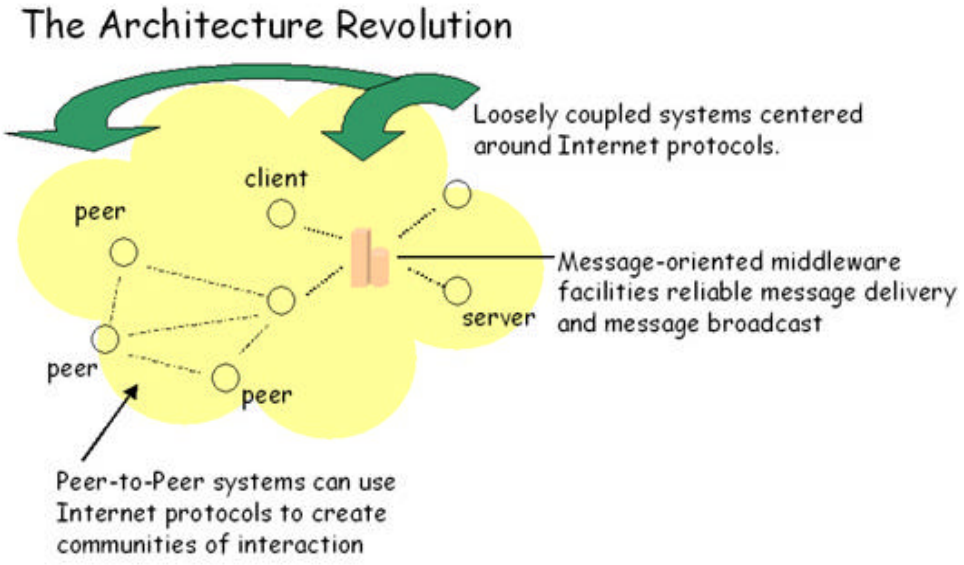
Development of WS

- Electronic Data Interchange (EDI)
- Enterprise application integration (EAI)
- The application service provider (ASP) model
- evolution of portals, as well as in peer-to-peer (P2P) applications



XML, Web Services and the Changing Face of

Distributed Computing by Frank P. Coyle,

ACM Ubiquity magazine online:
http://www.acm.org/ubiquity/views/f_coyle_1.html

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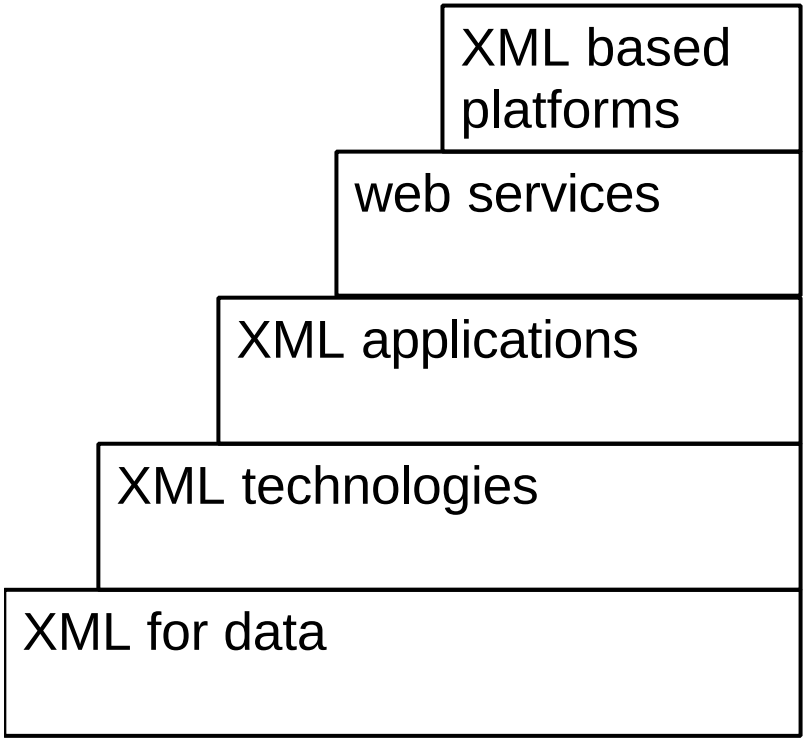
Advantages of web services

- Business services can be completely decentralized and distributed over the Internet and accessed by a wide variety of communications devices
- Businesses can be released from the burden of complex, slow and expensive software integration and focus instead on the value of their offerings and mission critical tasks



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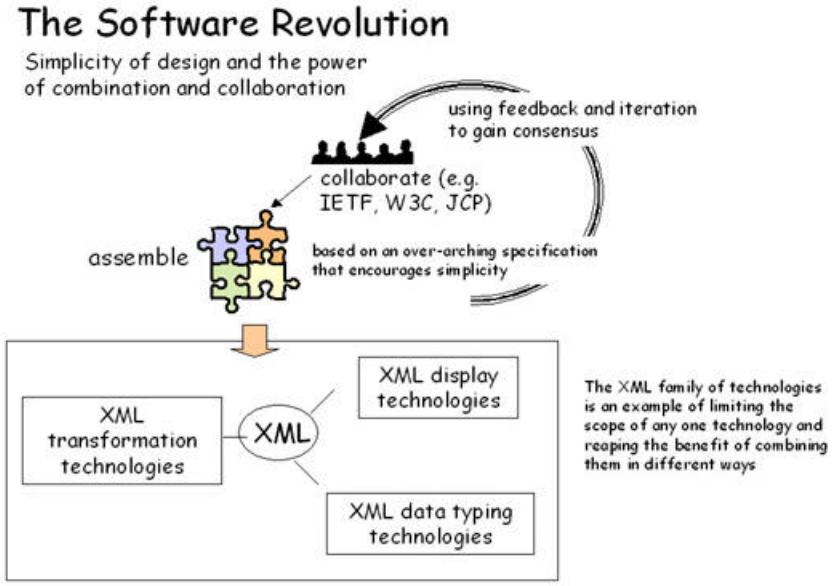
Full vision of web services

- Web Services can interact with each other ("be orchestrated") in an infinite variety of manners and through multiple iterations in order to deliver a particular task within any context
- Web Services are infinitely flexible, elastic to needs and, just like its foundation protocol XML, "extensible"



http://www.acm.org/ubiquity/views/f_coyle_1.html

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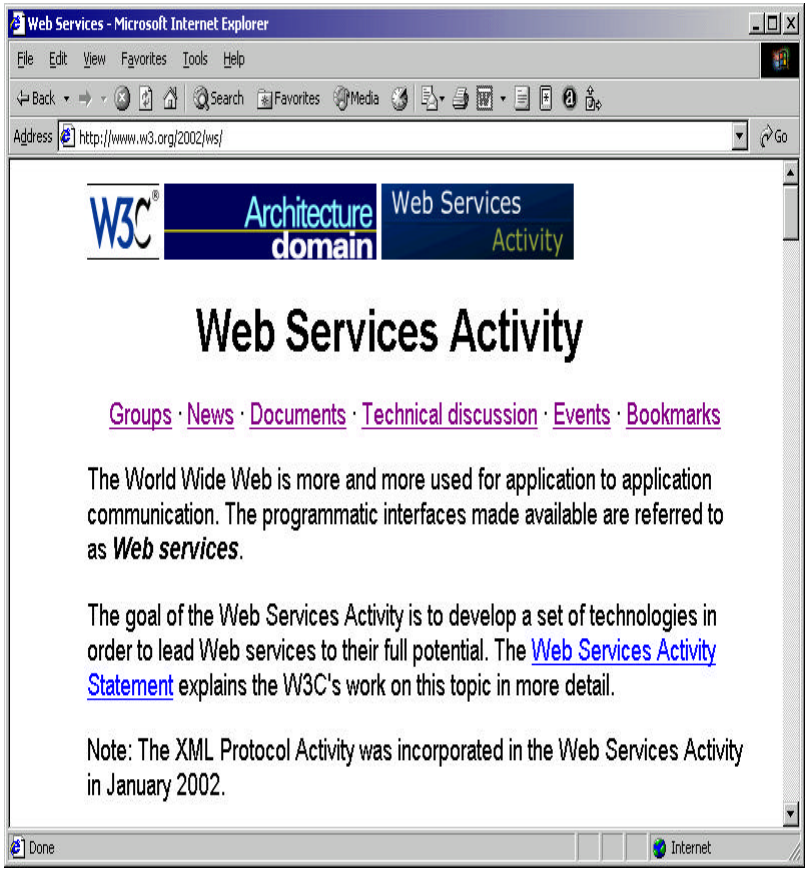
Technical WS definition...

- Web Services connect computers and devices...
- ...with each other using the Internet to exchange data and combine data in new ways
- A web service communicates with messages (in general!)



http://www.w3.org/2002/ws/

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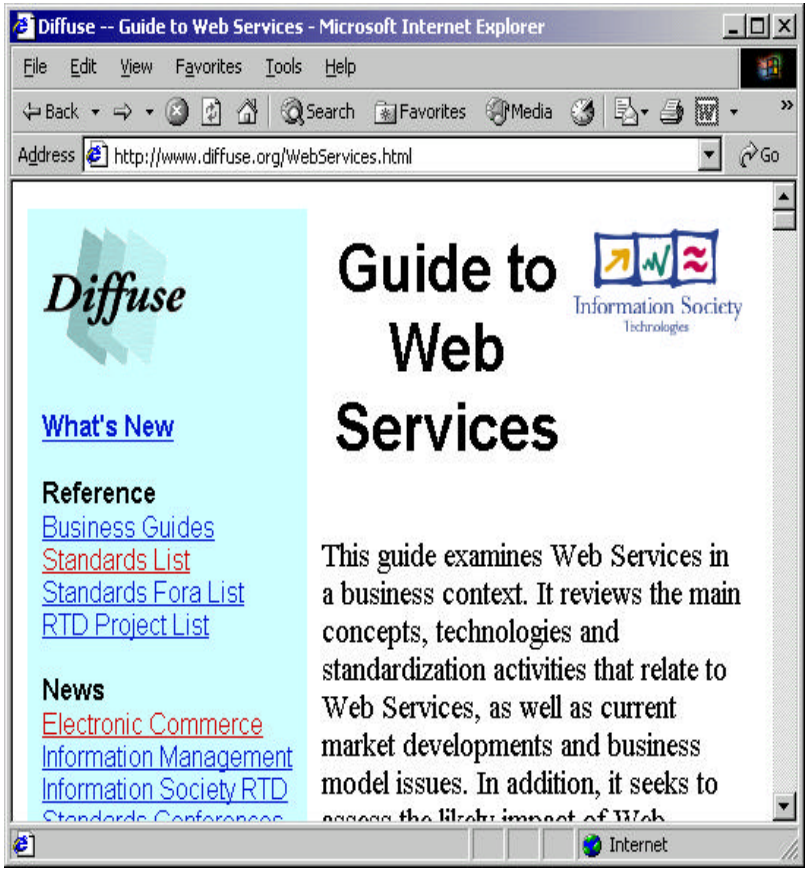
... from business point of view

- Web Services can be defined as software objects that can be assembled over the Internet...
- ...using standard protocols to perform functions or execute business processes



http://www.diffuse.org/WebServices.html

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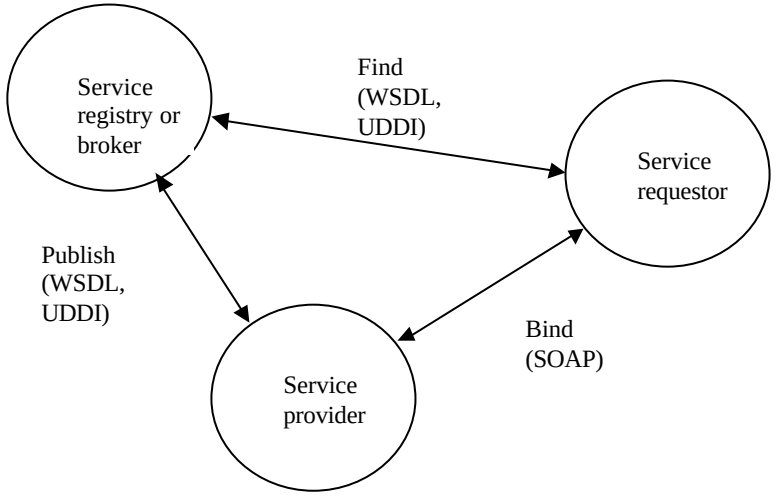
WS usage principle

- The key to Web Services is on-the-fly service creation through the use of loosely coupled, reusable software components. This has fundamental implications in both technical and business terms:
- Software can be delivered and paid for as fluid streams of services as opposed to packaged products



It is possible to achieve automatic, ad hoc interoperability between systems to accomplish business tasks

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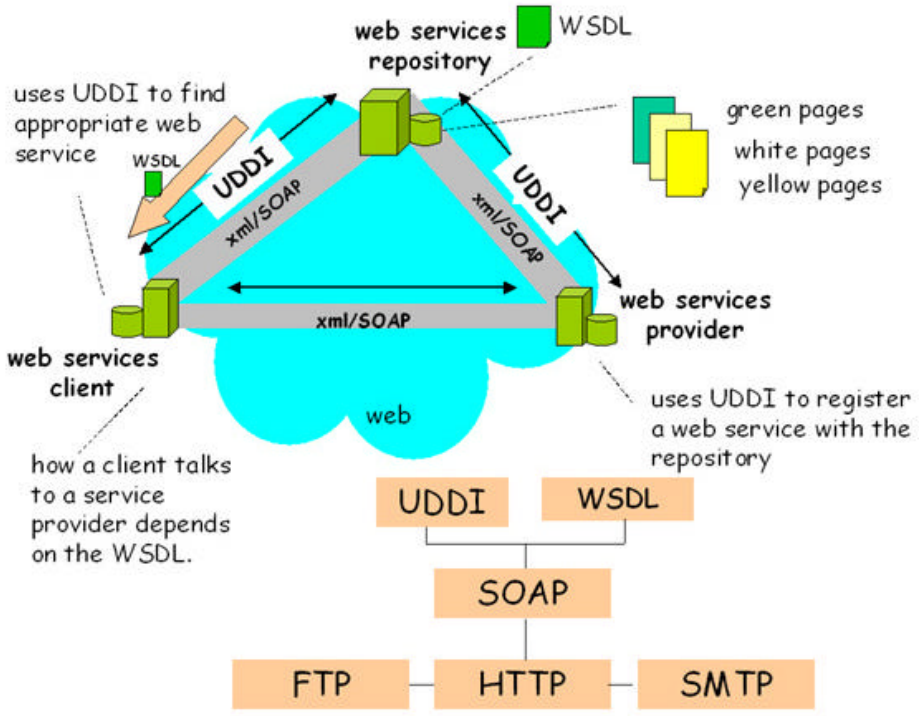
WS technical usage

- SOAP and
- Web Services Description Language (WSDL) is for enabling a common description of Web Services particularly their interfaces and functions
- Universal Description, Discovery & Integration (UDDI) is for the aggregation and identification of WSDL documents by providing registry capabilities



http://www.acm.org/ubiquity/views/f_coyle_1.html

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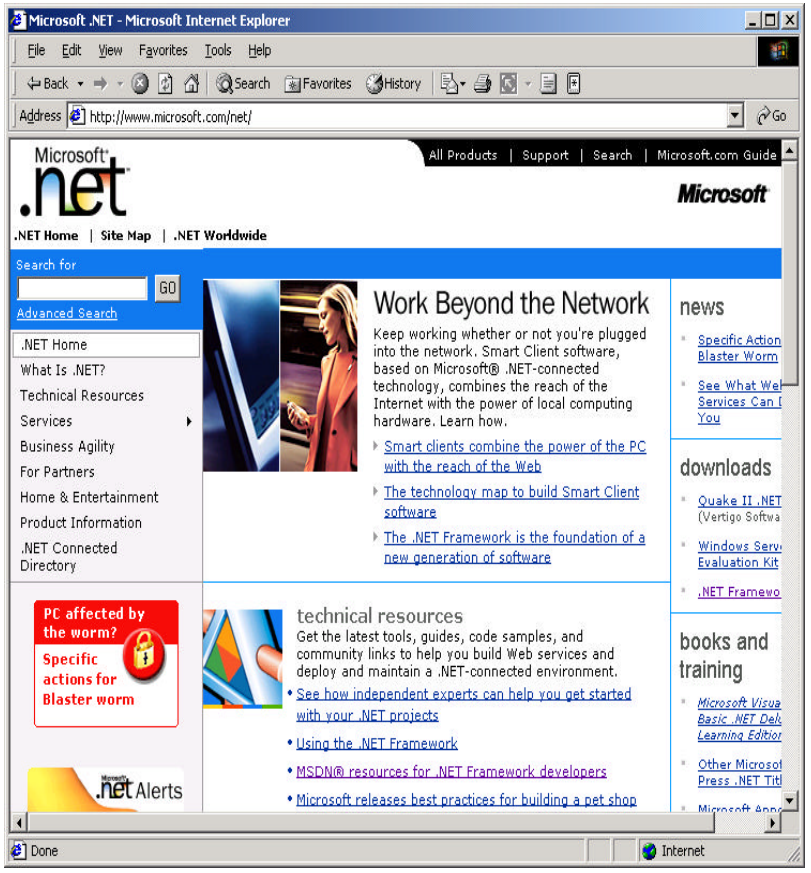
Main IT vendors of WS

- Microsoft's .NET (in Windows Server 2003)
- runtimes for many environments like PDAs and mobile phones
- Sun Microsystems' Sun Open Net Environment (Sun ONE)
- IBM's Web Services offering which is aligned with its e-business WebSphere products



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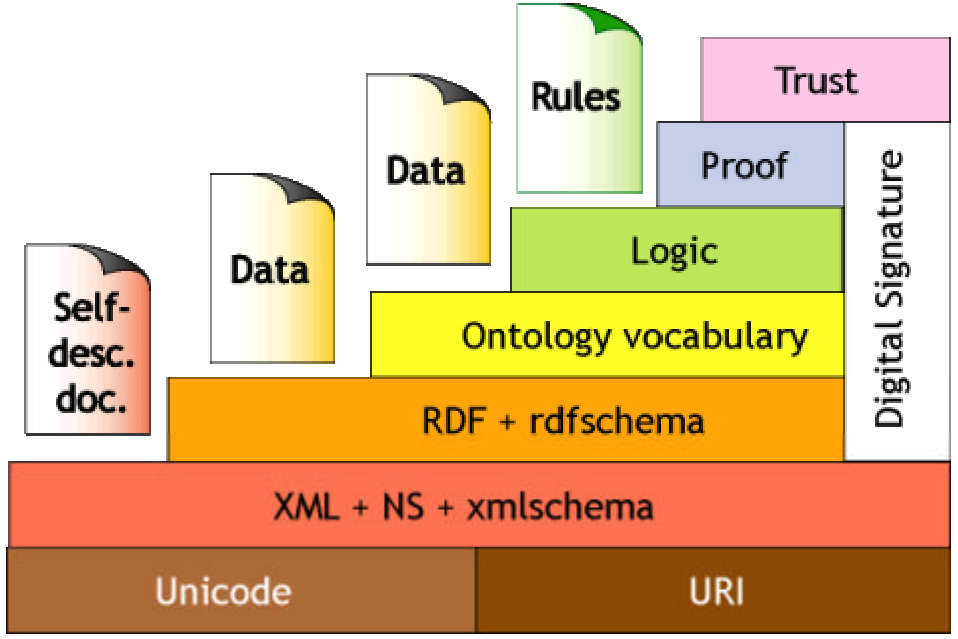
Web architecture by W3C

- service model as opposed to the traditional technically oriented model (e.g. "discovery" rather than "directory", "orchestration" rather than "messaging" and "transaction processing", "usage" rather than "distributed computing", "personalization" rather than "agent technologies", and so on)



http://www.w3.org/2000/Talks/1206-xml2k-tbl by Tim Berners-Lee, http://www.w3.org/People/Berners-Lee

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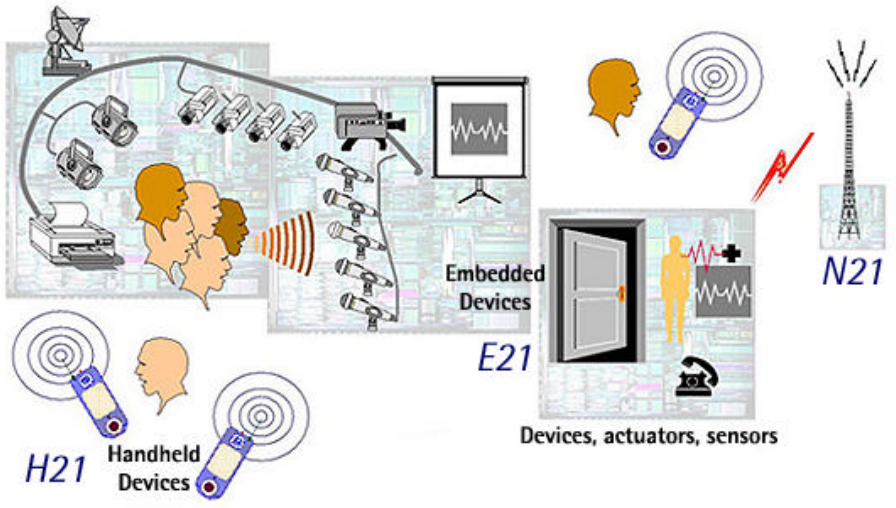
Pervasiveness of Web Services

- Machine-to-machine communications is insufficient for the full vision of the Web Services. Machines need to "understand" the relevant processes in any particular interaction between Web Services



MIT Oxygen and HP Cooltown projects

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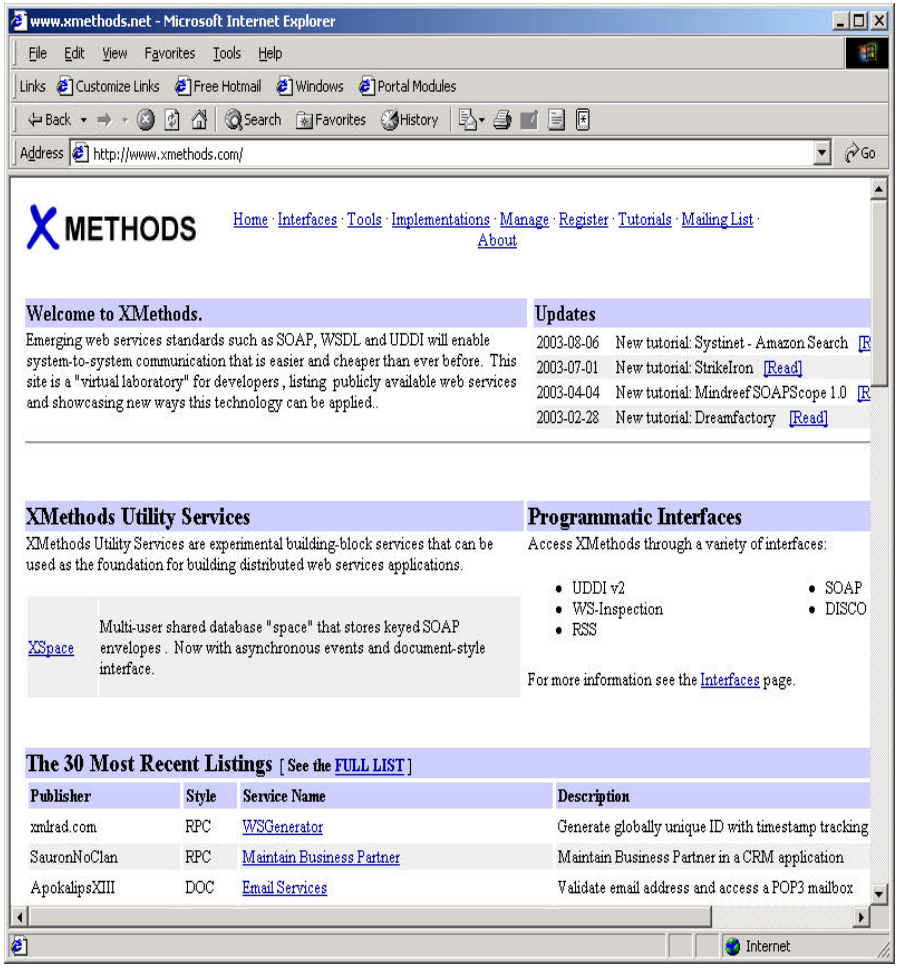
Some online examples of WSs

http://www.xmethods.com

- A listing of publicly accessible Web Services is provided by XMethods
- The Web Services listed in these directories indicate the enormous variety and scope of service offering, from simple calculators to messaging to games to different mechanisms and parameters for information search (or "discovery" where the search is not domain specific



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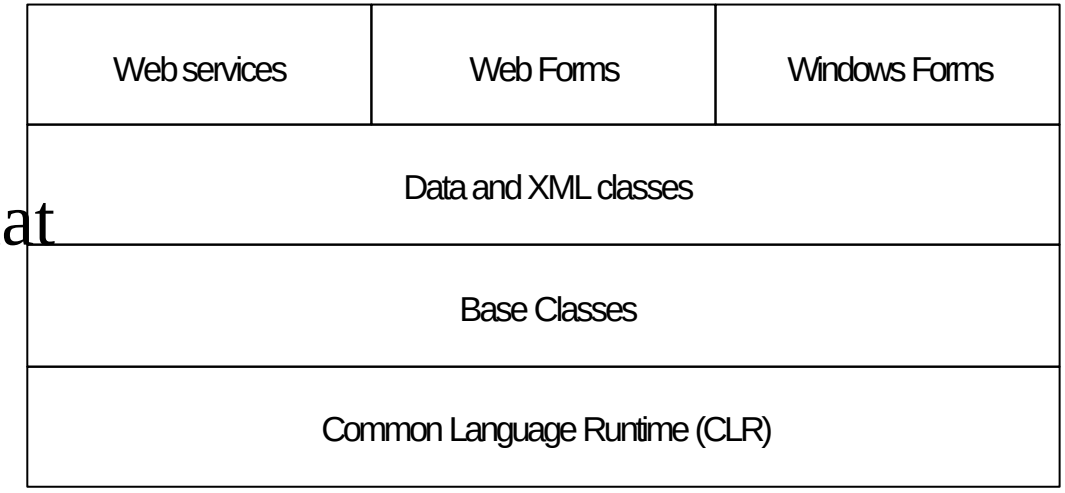
Microsoft .NET

- There is not even a general common understanding of what is behind the increasingly ubiquitous Web Services label



The ASP charging model would not apply (and if it were applied, would be unlikely to be sustainable), in that no Web Services provider can have a degree of control over his offering which is even remotely close to that of his ASP counterpart.

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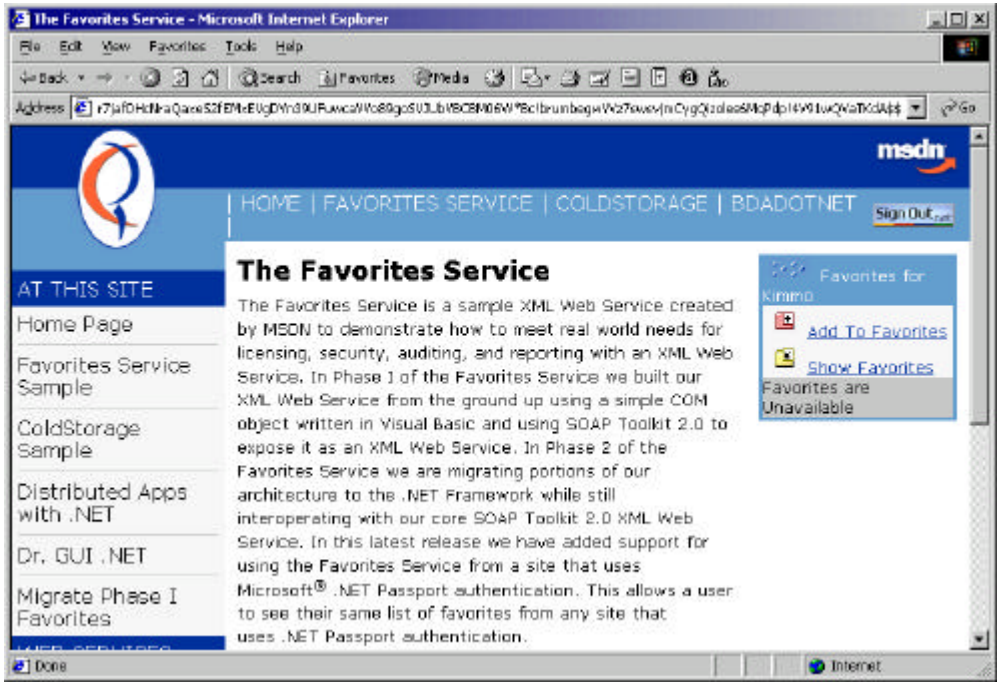
Examples from Microsoft



http://www.coldrooster.com/favorites.aspx

http://www.gotdotnet.com/

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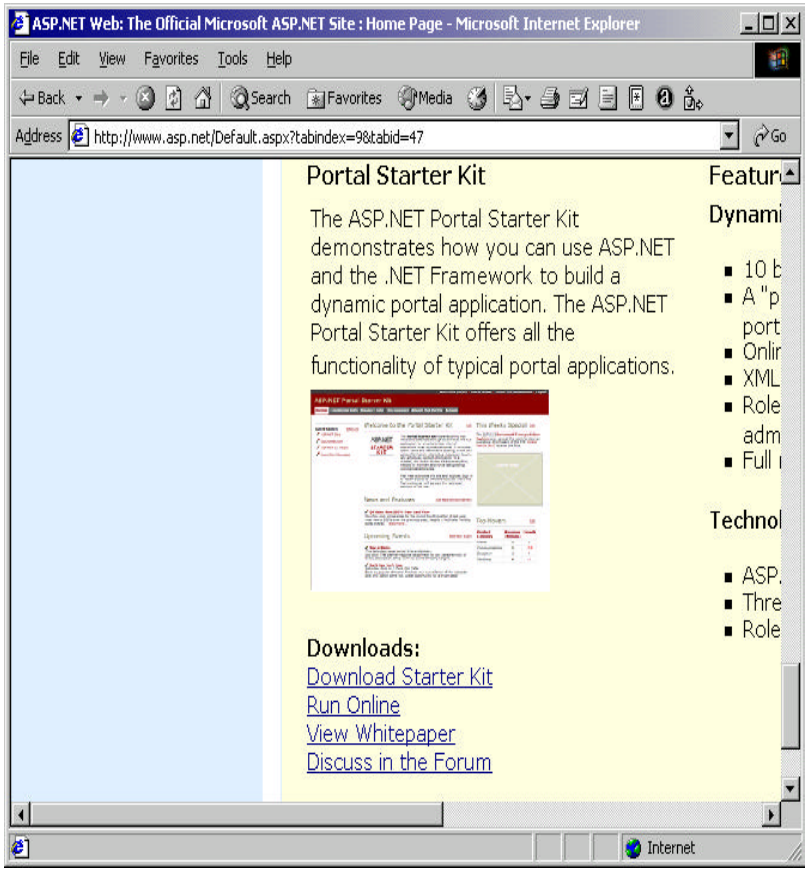
Portal Starter Kit with ASP.NET

- 3 tier structure: data, business and GUI
- several downloadable versions (C#, VB, JS) with inline and code behind versions
- for tutorial and real world usage
- allows customization (without software coding)
- configuration in a XML file



http://www.asp.net/Default.aspx?tabindex=9&tabid=47

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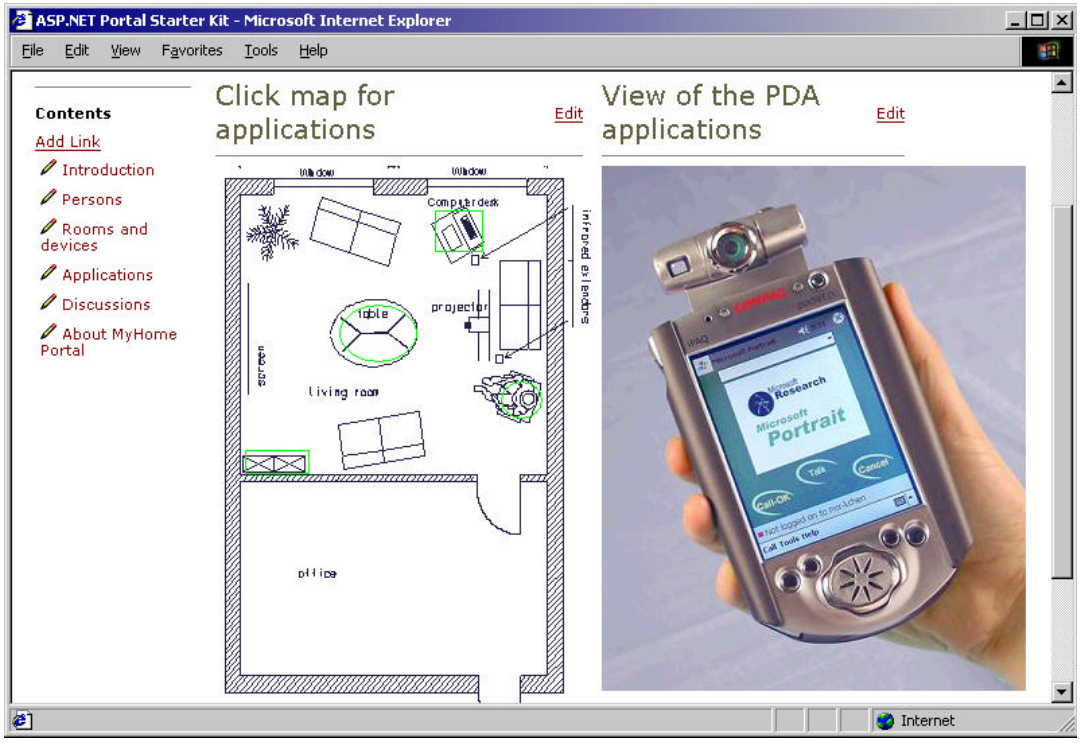
Digital living room laboratory

- Digital living room laboratory in Technobothnia
- Apply Portal Starter Kit of Microsoft .NET
- add web services for the database administration, automation of the application, device and user activities



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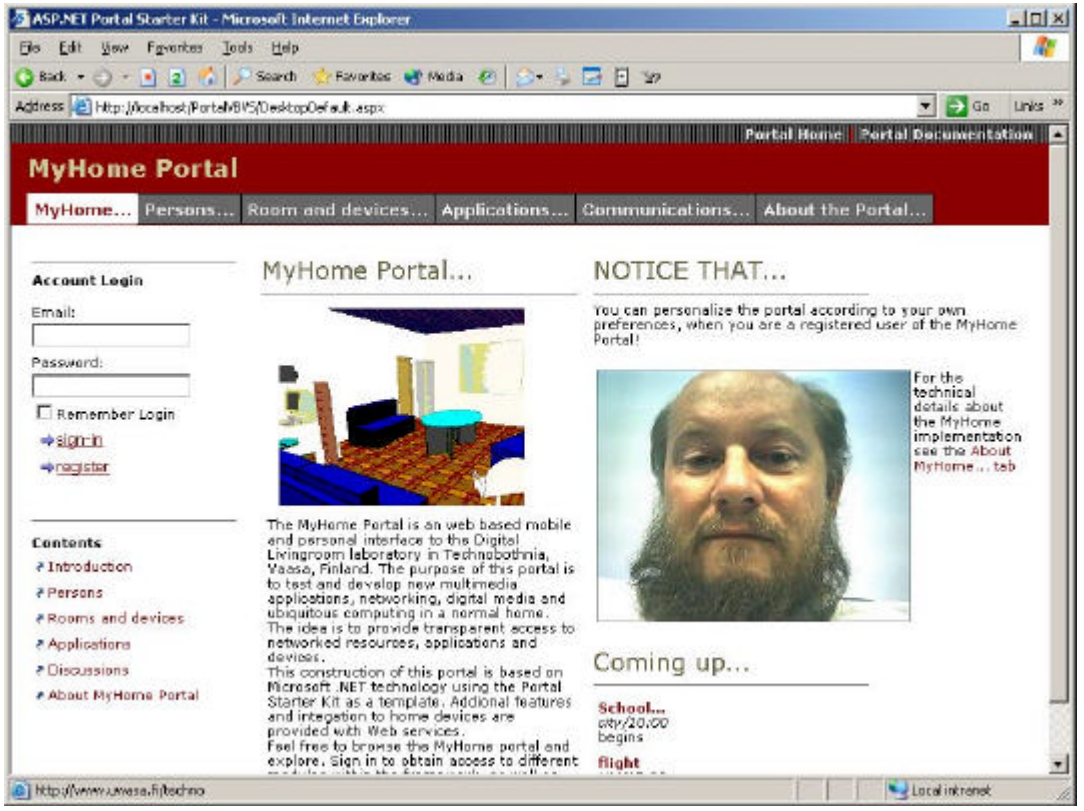
MyHome Portal

Content adapted to

- DLR space
- users: communication and applications
- contains both desktop and mobile access



http://193.166.112.94/portalvbvs/DesktopDefault.aspx

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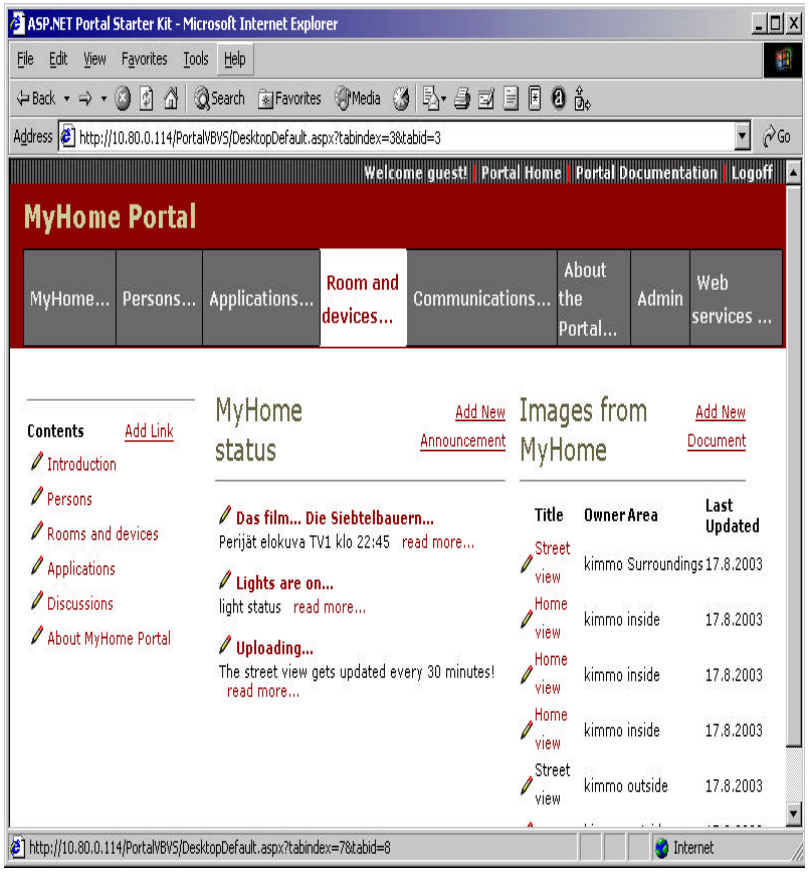
DLR space

- networks and end devices
- applications



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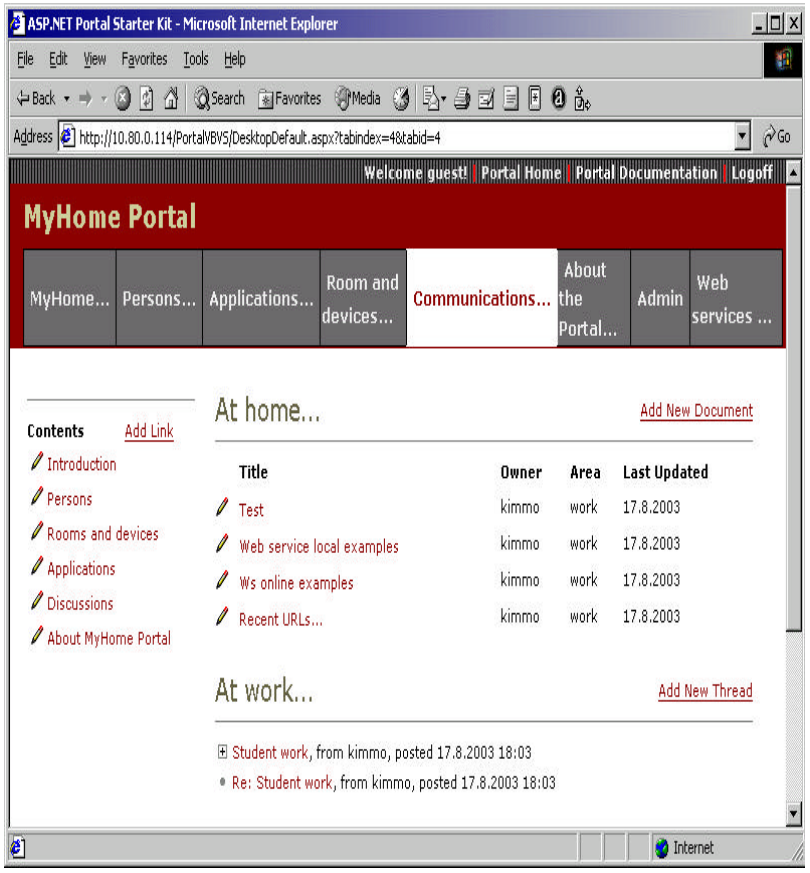
MyHome portal users

- users with registration
- communication and applications



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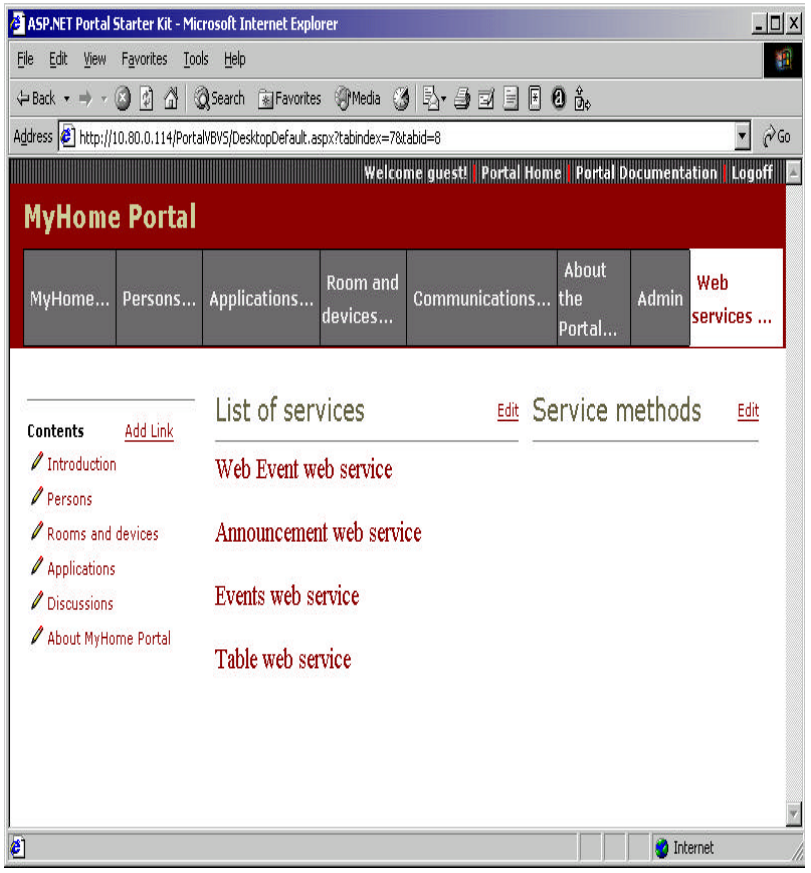
Example web services

- TableService
- principles of MS.NET web services
- EventService



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TableService

- Automates Portal database management (without MS Enterprise Manager) from web
- program code only for the service tableservice.asmx (=class and methods via web)
- client, documentation, SOAP and WSDL automatically from .NET!!

http://localhost/portalvbvs/tableservice.asmx

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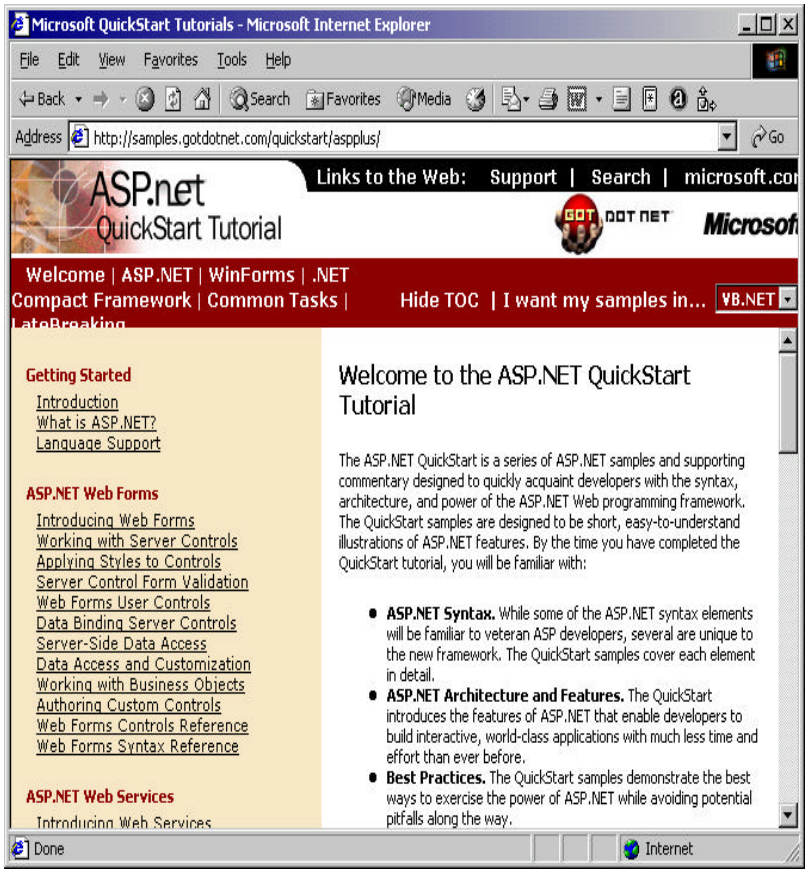
Usage of MS.NET web services

- can be coded in Notepad (or Visual Studio.NET)
- compiles changes of the tableservice.asmx file automatically (intermediate language MSIL) via web
- easy (online!) debugging via .NET



http://samples.gotdotnet.com/quickstart/aspplus/

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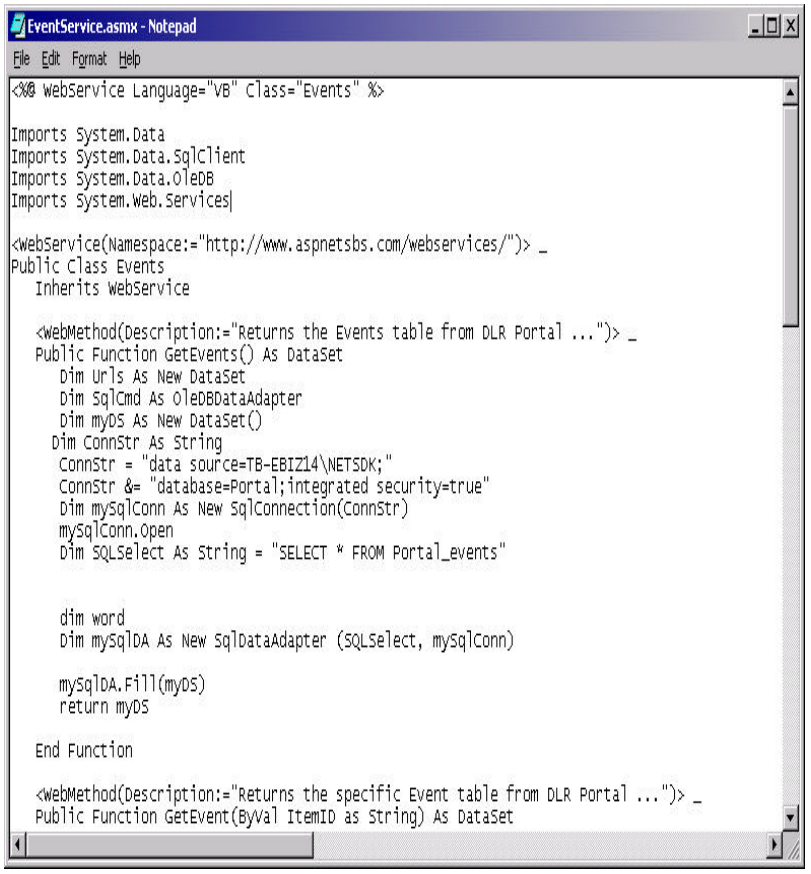
EventService

- manipulates events in the Portal database that can also be manipulated via the portal
- with Visual Basic, using a class hierarchy of .NET classes
- communicates in SOAP



http://10.80.0.114/portalvbvs/eventservice.asmx

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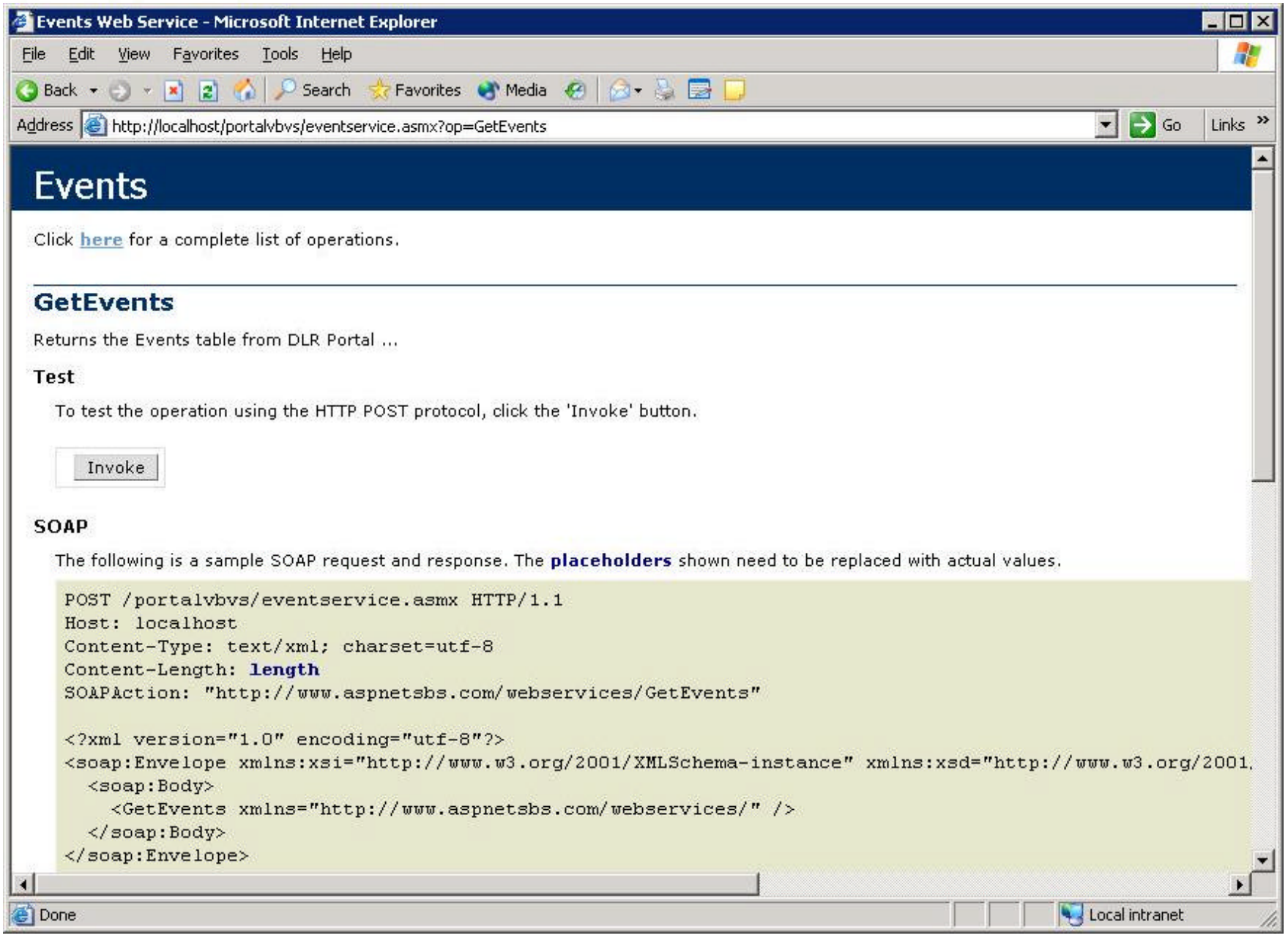
Call for a service:



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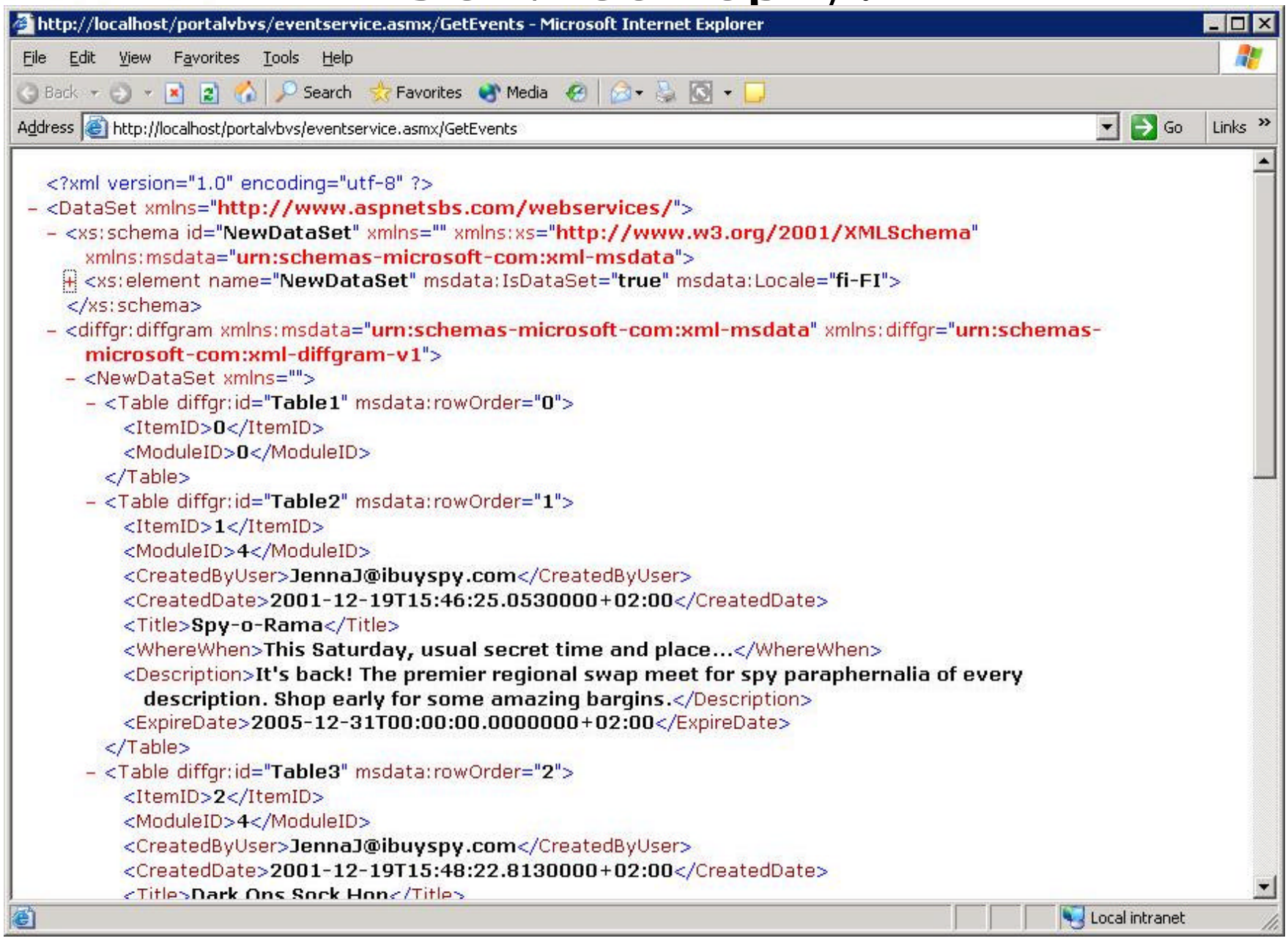
Service reply:



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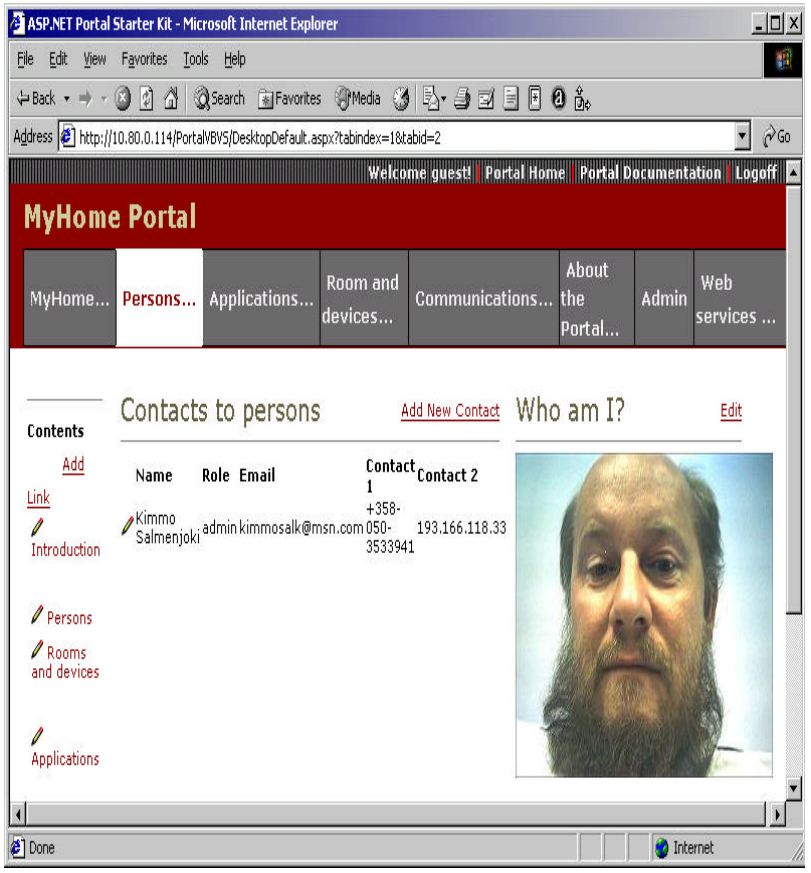
Next in MyHome Portal

- mobile access and devices...
- more devices...
- more embedded automation of applications...
- with interacting web services..
- much work in progress



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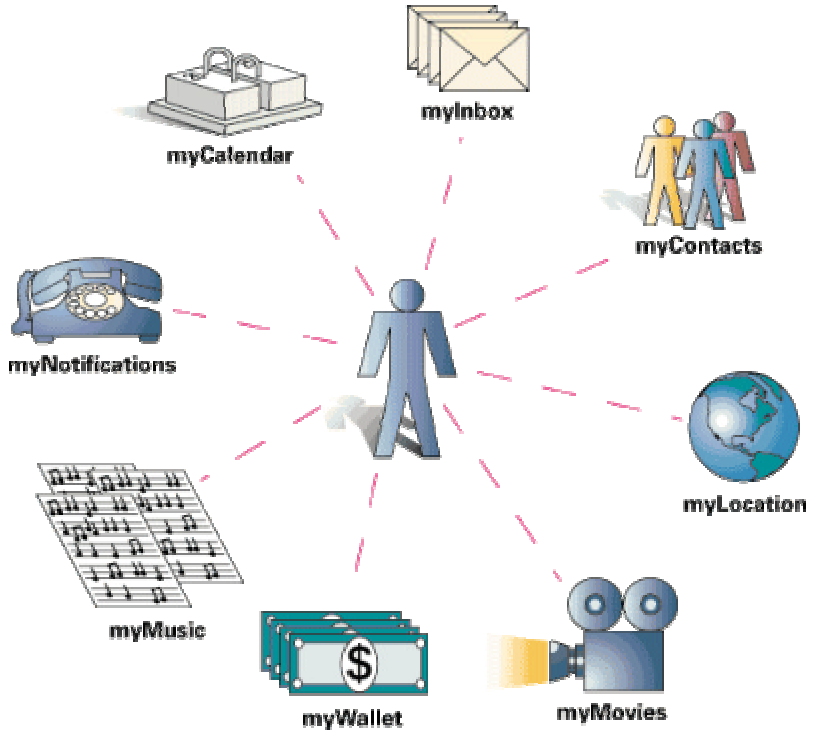
MyServices

- For example, Microsoft's My Services is ultimately intended to be a person's single point of access to all online services



XMLMag.com S. Johnston: Special report on pervasive computing
http://www.xmlmag.com/upload/free/features/xml/2001/09sep01/sj0109/sj0109.asp

http://www-106.ibm.com/developerworks/library/ws-gotcha/?n-ws-7252

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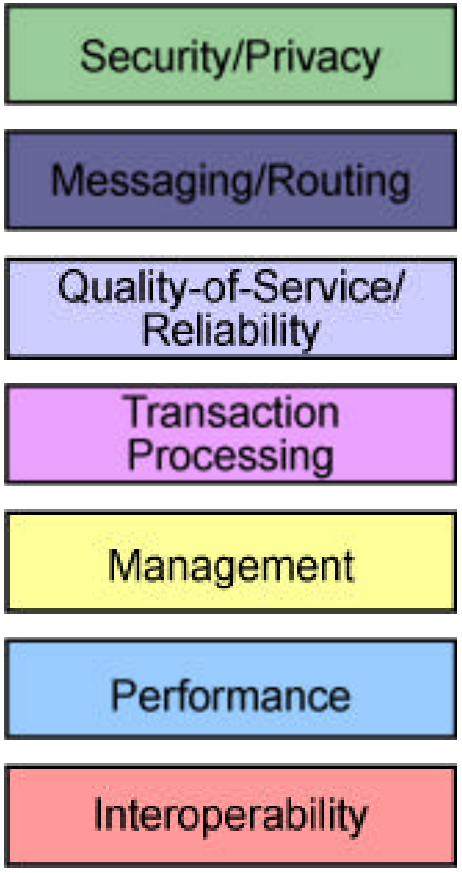
Where do Web services "need improvement"?

1. Security/privacy
2. Messaging/routing
3. Quality-of-service/reliability
4. Transaction processing
5. Management
6. Performance
7. Interoperability



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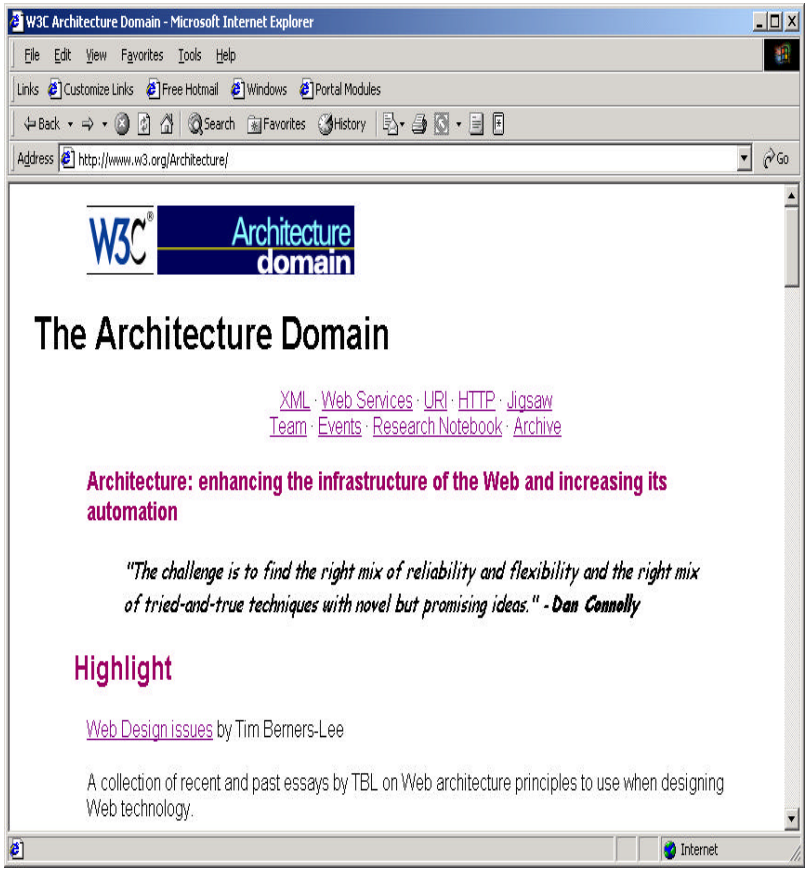
W3C work continues on …

- *Architecture* -- the security framework in Web services architecture focuses on six elements: accessibility, authentication, authorization, confidentiality, integrity, and non-repudiation.



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Conclusions

- XML is a standard appreciated by many
- XML standards provide ways for data storage, management, manipulation and communication
- ...with web services one gets methods (and software compoments) on the web
- ...many implication for web usage

"On the Internet, nobody knows you're a dog"

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References for WS

- Web services by W3C, http://www.w3c.org/2002/ws/
- XML, Web Services and the Changing Face of Distributed Computing
  by Frank P. Coyle, ACM Ubiquity magazine online:
  http://www.acm.org/ubiquity/views/f_coyle_1.html
- Daum, Merten: System Architecture with XML, 2003
- Diffuse project, http://www.diffuse.org/WebServices.html

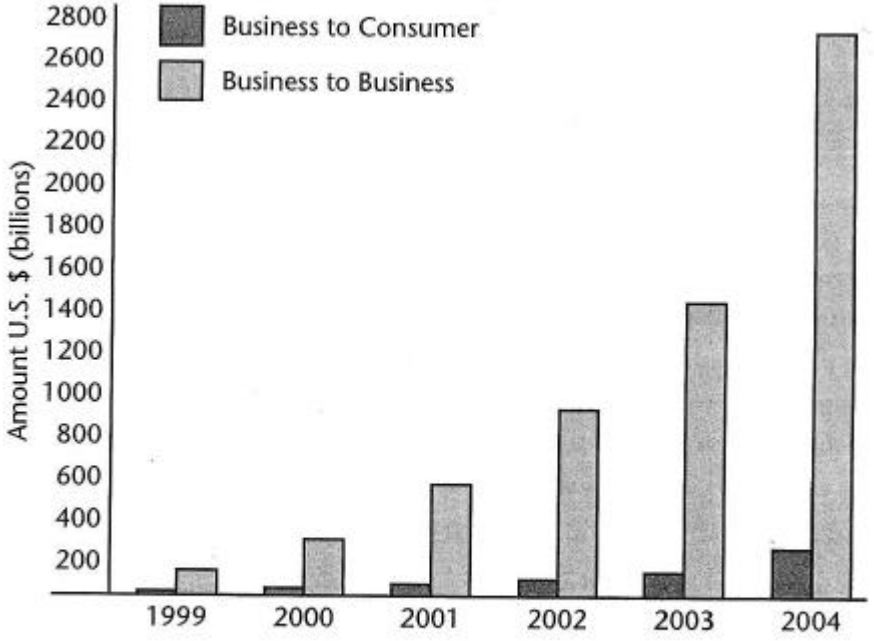

Figure P.2 A forecast showing the phenomenal growth of U.S. electronic business, especially in the area of business-to-business (B2B). (Source: Forrester Research.)

Daum, Merten: System architecture with XML book, 2003

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1. The 11th WWW conference, with online presentations in http://www2002.org/, 7-11.5.2002, (http://www10.org/,...)
2. Ken Sall: XML Family of Specifications: A Practical Guide, Addison –Wesley, 31.5.2002
3. C. F. Goldfarb, P. Prescod: The XML handbook, 2001
4. Clive Finkelstein, Peter Aiken: Building Corporate Portals with XML, McGraw-Hill, 1999

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Middleware and WS

- Up to now, conventional wisdom suggests that organizations need to implement an "open middleware" to enable scalability and future-proofing and the businesses of large segments of the software industry are based on this premise

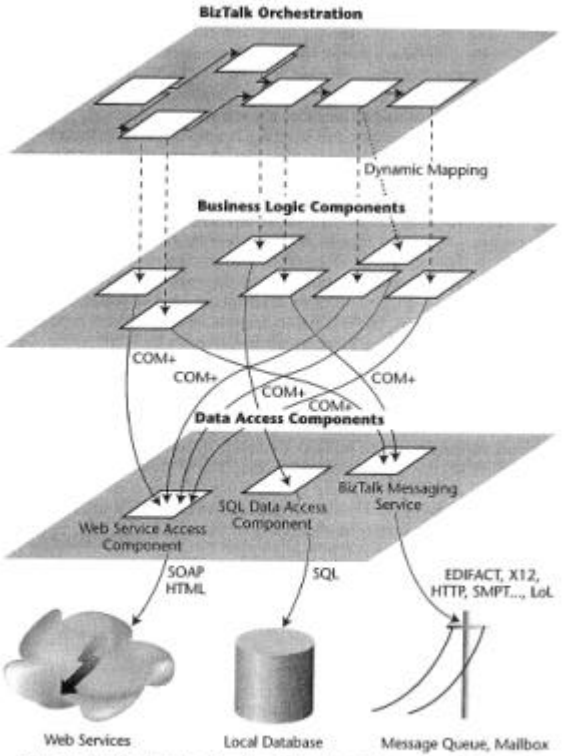

Figure 11.3 The layered architecture of BizTalk. Orchestration is defined on an abstract level. The abstract tasks are dynamically mapped onto concrete implementations—business logic components. These make use of data access components to access Web services, databases, and messaging services.

Daum, Merten: System architecture with XML book, 2003

Daum, Merten: System Architecture with XML book, 2003

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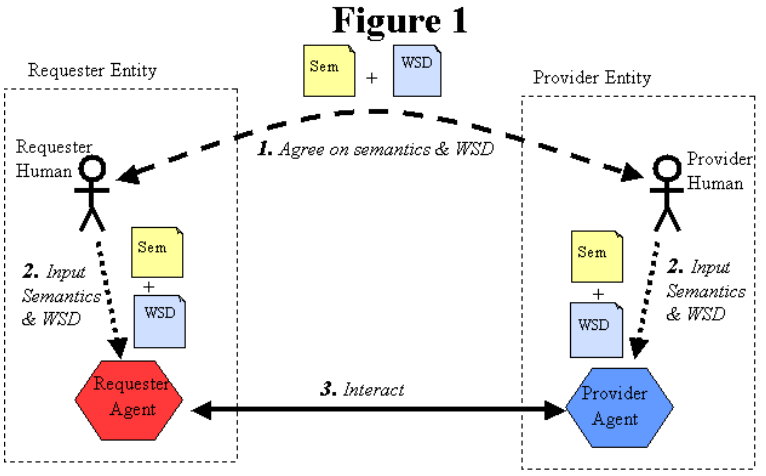
Publishing metadata

- Software agents and mediators can construct their own “mind map” of the information sources and to perform searches and transformations efficiently
- The relationship between information elements must be defined independently of the application.



Daum, Merten: System Architecture with XML book, 2003

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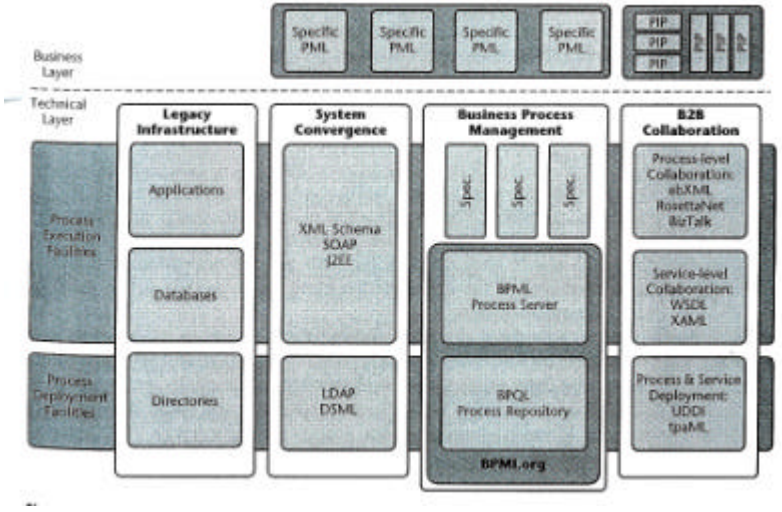
Process concepts

- Traditional intermediaries whose businesses were based on information are replaced by those who focus on advice and other more customer oriented services



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Horizontal and vertical businesses

- The Internet and the Web have already transformed vertical sectors such as travel and personal financial services

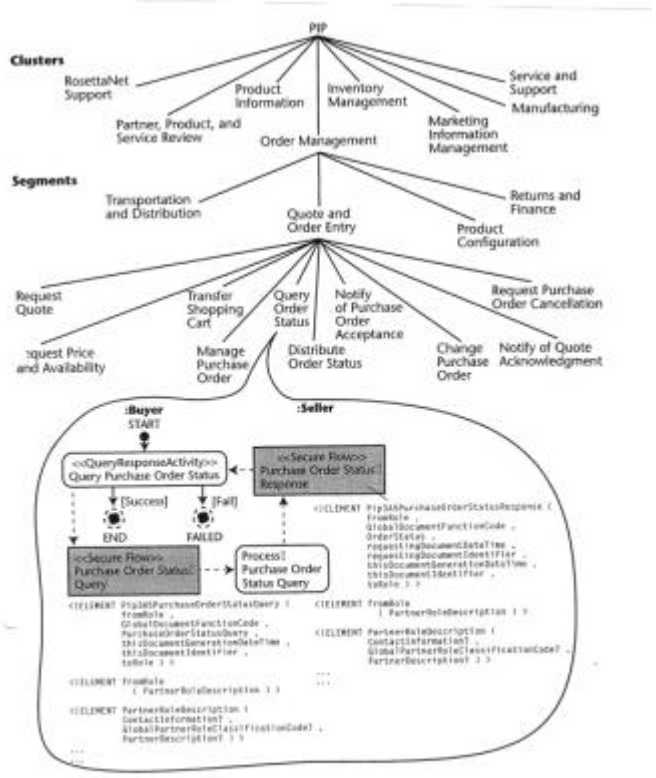

Figure 11.1 Hierarchy of predefined PIPs in RosettaNet (Version 2.0). Each PIP describes a specific collaborative process between partners. Here, we have drilled down into the busir object view of the PIP `QueryOrderStatus`. We have also listed the beginnings of the DTDs the two business documents exchanged in this process: `PurchaseOrderStatusQuery` and

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Developing web service platforms

- XML Schemas and DTDs can be shared in XML repositories like XML.org or Biztalk.org
- Sun ONE and JAX Pack for Java from Sun
- Global XML web service architecture by Microsoft and IBM (vision presented in W3C)
- Global XML web service specifications: WS-Inspection, WS-Referral, WS-Routing, WS-Security
- RosettaNet combines three vertical industries: IT+Elec. Circ.+Semic. Man. (by DTDs and XDRs)