XML Web Services: Air Force ESC/Mitre

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Office of Environmental Information
U.S. Environmental Protection Agency

October 23, 2002

Agenda

- 10:00 - 10:10: Welcome and Introductions - Paul Kim
- 10:10 - 10:40: CIO Council XML Web Services Initiative - Brand Niemann
- 10:40 - 11:20: Architecting Web Services for Government - Brand Niemann
- 11:20 - 12:00: Experience with Distributed Content Networking in Government - Brand Niemann
- 12:00 - 1:00: Lunch
- 1:00 - 1:30: NextPage Overview - Ed Scrivani
- 1:30 - 2:30: NextPage Triad Products Demo – Lin Cepele
- 2:30 - 3:00: Discussions - All

Welcome and Introductions

- Paul Kim
- Brand Niemann:
  - Ph.D. in Meteorology and Air Pollution Science from the University of Utah.
  - U.S. Environmental Protection Agency for 22 years.
  - Special Award for Innovation in the 2002 Federal CIO Showcase of Excellence for use of XML and VoiceXML.
  - Affinity Group Lead for the CIO Council's Architecture and Infrastructure Committee's new Web Services Initiative.
  - niemann.brand@epa.gov, 202-566-1657
- To Help Me:
  - Your Name.
  - Your Affiliation.
  - Your Interests in Web Services, etc.

CIO Council XML Web Services Initiative

- CIO Council’s Architecture and Infrastructure Committee.
- OMB Federal Enterprise Architecture Program Management Office.
- Federal Reference Models.
- Solution Architects Working Group.
- The E-Gov Initiatives.
- XML Web Services Initiative:
  - Mark Forman on Web Services.
  - Education and Outreach.
  - Participation in Standards Organizations.
  - Open Collaboration and Standards in e-Gov.
  - Brainstorming Session Priorities.
  - Combining XML Collaboration and Registry.
- Digital Talking Book Demonstration.

CIO Council XML Web Services Initiative

- The Federal CIO Council has reorganized its Architecture and Infrastructure Committee (AIC) to include the CTOs and provide more input into policy planning through three subcommittees:
  - Architecture – ongoing maintenance of the federal enterprise architecture.
  - Component Architecture – update and maintain the library of hardware and software components used by agencies.
  - Emerging technologies – evaluate and recommend new technologies, such as Web Services.

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- **The Federal Enterprise Architecture Program Management Office (FEA-PMO)** was established on February 6, 2002, in accordance with direction issued by the Associate Director for Information (IT) and E-Government, Office of Management and Budget (OMB). The lack of a Federal Enterprise Architecture had been cited by the 2001 Quicksilver E-Government Task Force as a key barrier to the success of the 24 Presidential Priority E-Government initiatives approved by the President's Management Council in October 2001.
- The FEA-PMO manages and coordinates activities surrounding:
  - **The Federal Enterprise Architecture (FEA).** Definition of the Federal Enterprise Architecture through a set of Government-wide reference models focusing on business, performance, services and components, technologies and standards, and data and information.
  - **Solution Architects Working Group (SAWG).** Assist Federal Agencies with activities surrounding the technical design and implementation of their initiatives and to promote and communicate the principles of Component-Based Architecture and reuse.

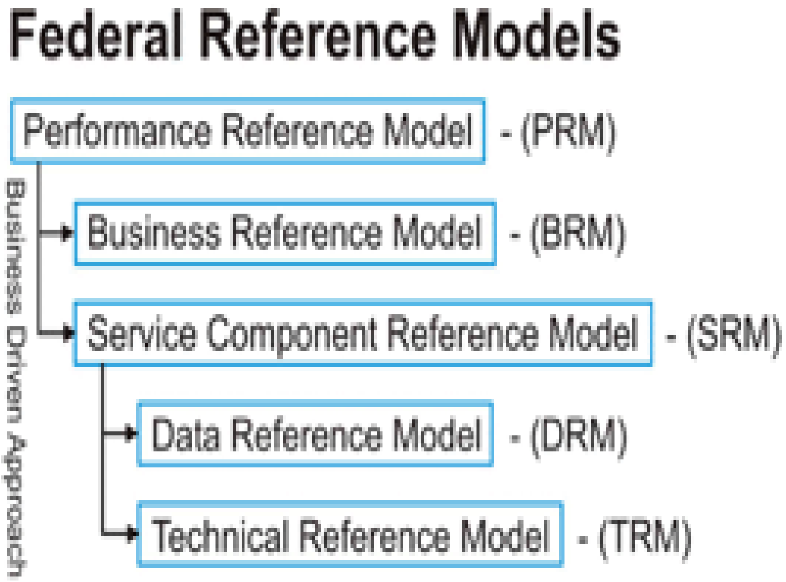
CIO Council XML Web Services Initiative

- FEA-PMO Supporting Activities:
  - Development of a core set of standardized Component-Based Architecture models to facilitate technology solutions and the development of a complete architecture (baseline, target, and transition) for each of the 24 Presidential Priority E-Government initiatives.
  - Assessment and identification - through high-level architectural, critical success factor, and Line of Business performance information - of new opportunities for business process and system consolidation to improve government efficiency and effectiveness.

CIO Council XML Web Services Initiative

To facilitate efforts to transform the Federal Government to one that is citizen-centered, results-oriented, and market-based, the Office of Management and Budget (OMB) is developing the Federal Enterprise Architecture (FEA), a business-based framework for Government-wide improvement.

The FEA is being constructed through a collection of interrelated "reference models" designed to facilitate cross-agency analysis and the identification of duplicative investments, gaps, and opportunities for collaboration within and across Federal Agencies. There are 5 models.


Federal Reference Models
Performance Reference Model - (PRM)
Business Reference Model - (BRM)
Service Component Reference Model - (SRM)
Data Reference Model - (DRM)
Technical Reference Model - (TRM)
Business Driven Approach

See http://www.feapmo.gov

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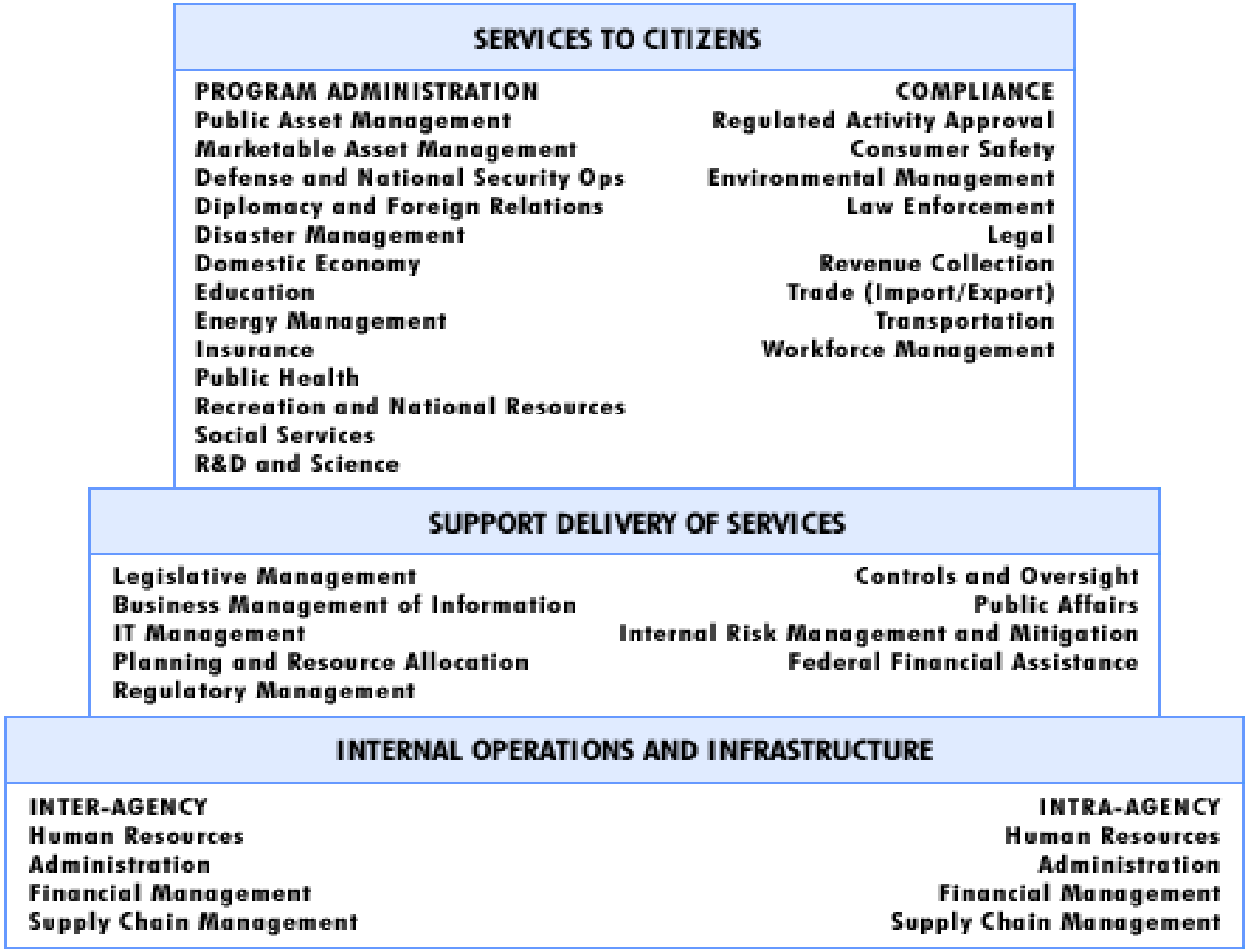
Business Reference Model (BRM)



SERVICES TO CITIZENS

PROGRAM ADMINISTRATION
Public Asset Management
Marketable Asset Management
Defense and National Security Ops
Diplomacy and Foreign Relations
Disaster Management
Domestic Economy
Education
Energy Management
Insurance
Public Health
Recreation and National Resources
Social Services
R&D and Science

COMPLIANCE
Regulated Activity Approval
Consumer Safety
Environmental Management
Law Enforcement
Legal
Revenue Collection
Trade (Import/Export)
Transportation
Workforce Management

SUPPORT DELIVERY OF SERVICES

Legislative Management
Business Management of Information
IT Management
Planning and Resource Allocation
Regulatory Management

Controls and Oversight
Public Affairs
Internal Risk Management and Mitigation
Federal Financial Assistance

INTERNAL OPERATIONS AND INFRASTRUCTURE

INTER-AGENCY
Human Resources
Administration
Financial Management
Supply Chain Management

INTRA-AGENCY
Human Resources
Administration
Financial Management
Supply Chain Management

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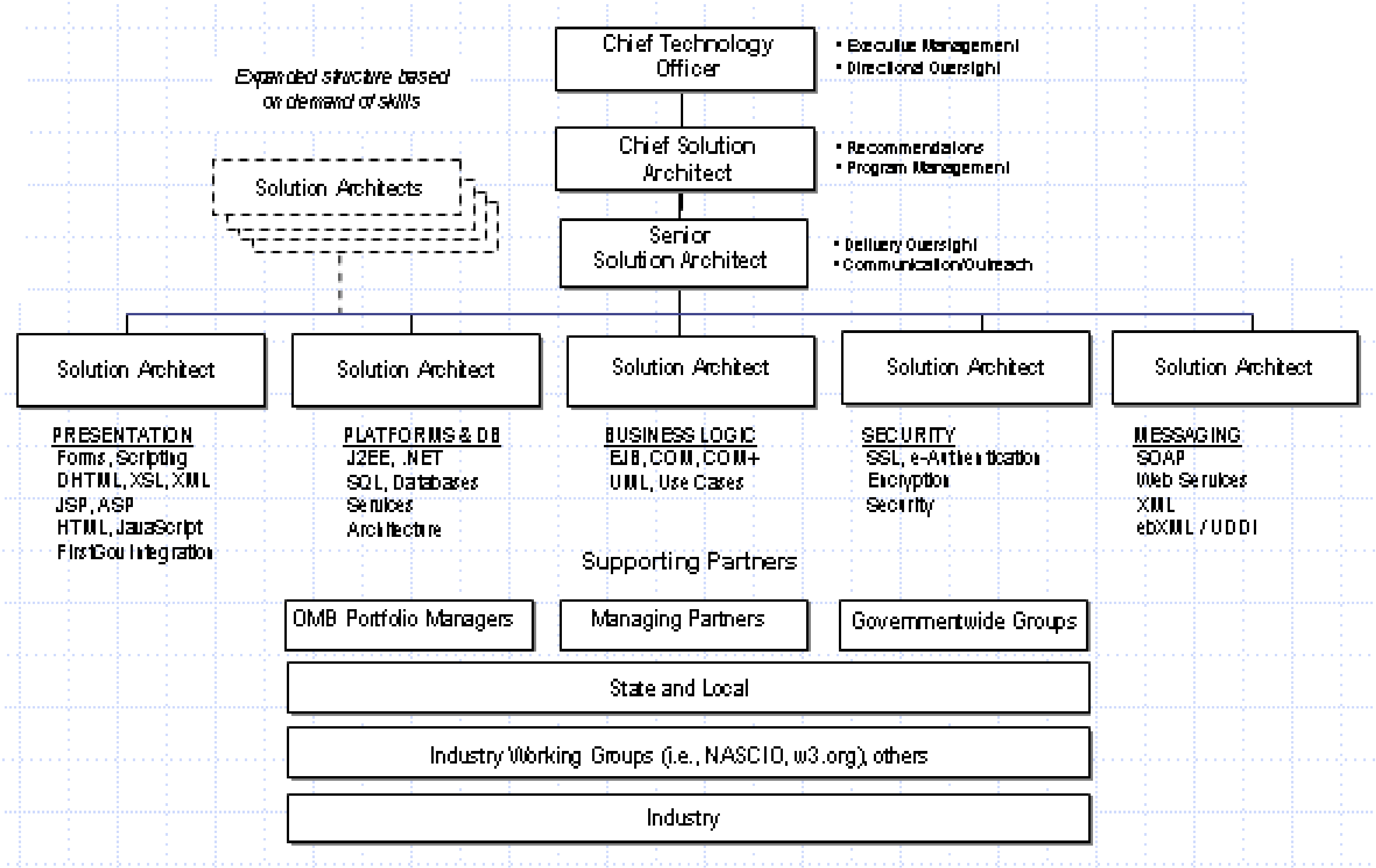
Solution Architects Working Group



Chief Technology Officer
- Executive Management
- Directional Oversight

Chief Solution Architect
- Recommendations
- Program Management

Senior Solution Architect
- Delivery Oversight
- Communication/Outreach

Expanded structure based on demand of skills

Solution Architects

Solution Architect

PRESENTATION
Forms, Scripting
DHTML, XSL, XML
JSP, ASP
HTML, JavaScript
FirstGov Integration

Solution Architect

PLATFORMS & DB
J2EE, .NET
SQL, Databases
Services
Architecture

Solution Architect

BUSINESS LOGIC
EJB, COM, COM+
UML, Use Cases

Solution Architect

SECURITY
SSL, e-Authentication
Encryption
Security

Solution Architect

MESSAGING
SOAP
Web Services
XML
ebXML / UDDI

Supporting Partners

OMB Portfolio Managers

Managing Partners

Governmentwide Groups

State and Local

Industry Working Groups (i.e., NASCIO, w3.org), others

Industry

E-Gov Initiatives: Final Selections and Managing Partners

Government to Citizen

	Managing Partner
1. USA Service	GSA
2. EZ Tax Filing	TREAS
3. Online Access for Loans	DoEd
4. Recreation One Stop	DOI
5. GovBenefits (Eligibility Assistance)	Labor

Government to Business

	Managing Partner
1. Federal Asset Sales	GSA
2. Online Rulemaking Management	DOT
3. Simplified and Unified Tax and Wage Reporting	Treas
4. Consolidated Health Informatics (business case)	HHS
5. Business Compliance One Stop	SBA
6. International Trade Process Streamlining	DOC

Government to Government

	Managing Partner
1. E-Vital (business case)	SSA
2. E-Grants	HHS
3. Disaster Management	FEMA
4. Geospatial Information One Stop	DOI
5. Project Safecom (Wireless Networks)	Treas

Internal Effectiveness and Efficiency

	Managing Partner
1. e-Training	OPM
2. Recruitment One Stop	OPM
3. Enterprise HR Integration	OPM
4. e-Travel	GSA
5. Integrated Acquisition	GSA
6. e-Records Management	NARA
7. Payroll Processing	OPM

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- At 1st birthday, e-gov push toddles along, GCN, 10/07/02; Vol. 21 No. 30:
  - – http://www.gcn.com/21_30/news/20192-1.html
- A progress snapshot of the government’s 25 Quicksilver initiatives:
  - – http://gcn.com/newspics/G30newscht.pdf

CIO Council XML Web Services Initiative

- Mark Forman on Web Services (FGDC Steering Committee Meeting, October 9, 2002):
  - Some Fundamentals for Our Success in Applying Web Services:
    - 1. Identify common functions, interdependencies, interrelationships, and evaluate barriers to information sharing.
    - 2. Implement in a way that addresses both the opportunities and risks of a “networked” environment.
    - 3. Leverage technologies to achieve benefits of interoperability while protecting societal values of privacy and intellectual property rights, etc.

CIO Council XML Web Services Initiative

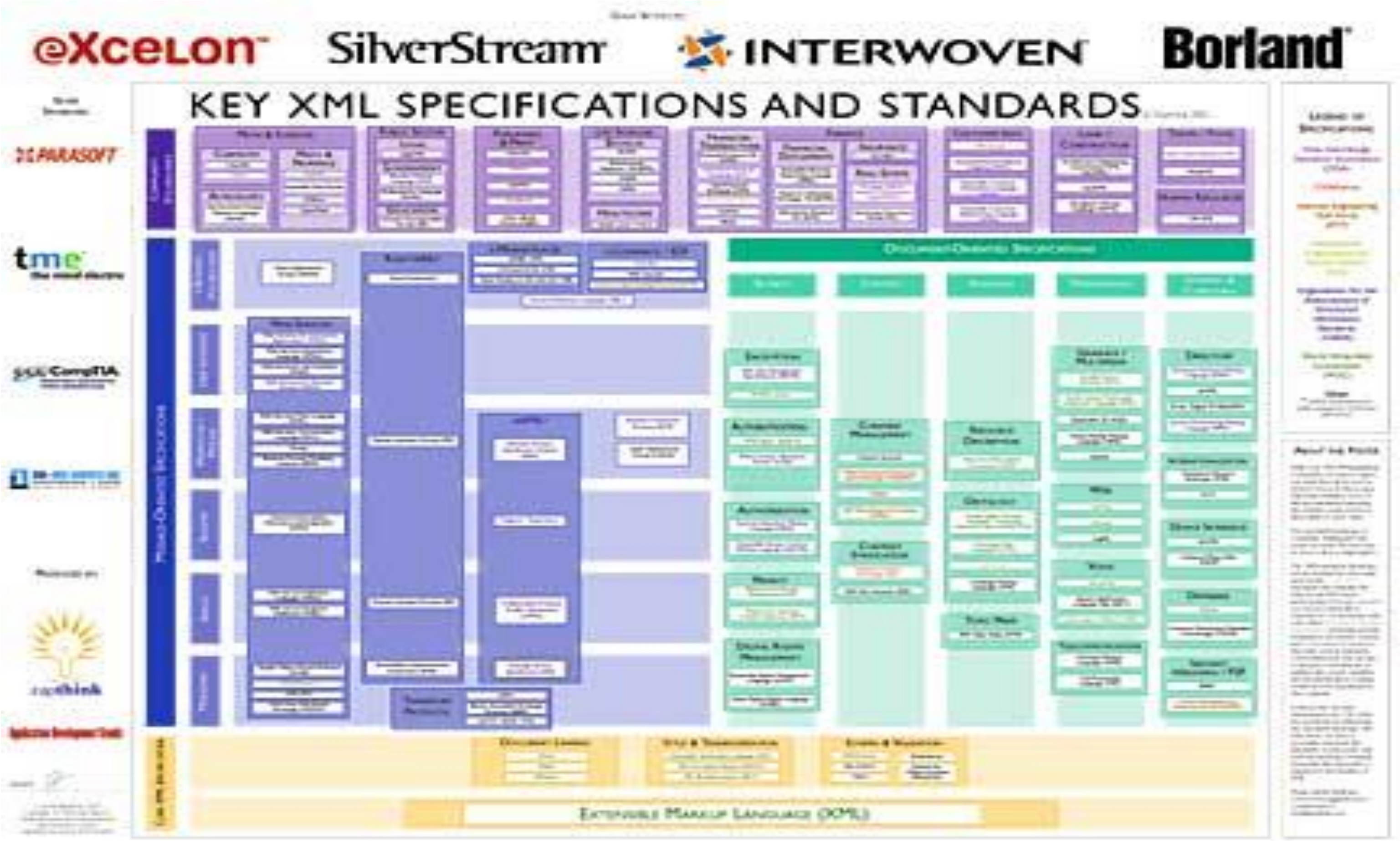
- Education and Outreach:
  - Creating Internet Content Networks for Environmental Health and Safety: Panel and Workshop, Information Sharing & Intelligence for Public Safety, Law Enforcement & Military, Sheraton National – Hotel Arlington, Washington, DC, October 25, 2002.
  - FedWeb Fall ’02 “Turning Web Sites into Web Services: Solutions for Government”, October 28-29, 2002, George Mason University, Arlington, VA (http://www.fedweb.org).
  - XML 2002 Conference and Exposition, December 8-13, 2002, Baltimore Convention Center, Opening Keynote (Bob Haycock, Manager of OMB’s Federal Enterprise Architecture Program Management Office) and Exhibit (http://www.xmlconference.org).

CIO Council XML Web Services Initiative

- Participation in Standards Organizations:
  - Key XML Specifications and Standards (ZapThink 2002) - Over 450 standards in existence with 135 key specifications categorized by Core XML, Document-oriented, Message-Oriented, and Community Vocabularies representing eight standards organizations. See http://www.zapthink.com/reports/poster.html
  - Attended W3C's Web Services Architecture (WSA) and Description (WSD) Working Groups (September 9-13, 2002).

ZapThink XML Standards Poster!

Over 135 XML and Web Services Standards At-a-Glance


eXceLon
SilverStream
INTERWOVEN
Borland
KEY XML SPECIFICATIONS AND STANDARDS
PARASOFT
tme
CompTIA
zapthink
Document-Oriented Specifications
Extensible Markup Language (XML)

CIO Council XML Web Services Initiative

- Open Standards - Some Definitions:
  - Opposite to the word proprietary (closed to outside development and viewing, closed minded, not customer-centric, and slow to change), which many consider to be pejorative.
  - Better: “out in the open”, “open process”, softwares that can be replaced, and softwares that “play well” with each other.
  - Open Source – A Case for E-Government Conference, Washington, DC, October 16-18th, 2002:
    - Peter Gallagher, President of DevIS: “Open Source? Who cares? Open Standards? Yes! Yes!

CIO Council XML Web Services Initiative

- Open Collaboration and Standards in e-Gov:
  - Collaboration Expedition Forums:
    - Monthly Open Workshops (November 12, December 10, and Janauary 14, 2003, planned so far)
    - Lotus QuickPlace: http://ioa-qpnet-co.gsa.gov/UA-Exp)
  - XML Web Services:
    - Let's make sure the e-Gov projects implement enough XML Web Services so they are universally accessible and interoperable with one another so we don't end up with 24 better portals, but still "stovepipes".
    - Regular meetings to select leads for the "top 20 priorities" and pilot projects and have them report progress.
      - The XML Collaborator is the first pilot project (see next slides).
    - Support from the Industry Advisory Council for vendor involvement in the pilot projects (http://www.iaconline.org).
    - Support from the Web Services Interoperability (WS-I) Organization with usage scenarios and test tools (http://www.ws-i.org).

CIO Council XML Web Services Initiative

- CIOC Web Services Initiative Brainstorming Session, July 25th, Priorities (top ten):
  - 1. Provide direct support on implementing Web Services to 24 e-Gov initiatives.
  - 2. Maintain registry of WS-related projects or efforts, to avoid duplication and promote information sharing.
  - 3. Implement a registry of available Web Services (a “loose” registry of human-researchable information at first, but later supporting automated services location).
  - 4. Survey existing or planned Federal Web Services, via on-line survey or via letter from CIOC to CIO’s.
  - 5. Promote dissemination to Federal agencies of Web Services best practices (from private sector or within Government).
  - 6. Develop a model of how Web Services should be integrated into the emerging “component-based” TRM.
  - 7. Develop an interoperability matrix for Web Services, helping agencies spot interoperability issues between various W-S implementations.
  - 8. Develop on-line Web Services “want ads”, where businesses, agencies or state and local governments could post requests for specific Web Services.
  - 9. Provide on-line collaboration facility for exchange of sample business cases, templates, and other info related to Web Services.
  - 10. Promote the rapid evolution of security functionality in Web Services standards and implementations.

CIO Council XML Web Services Initiative

- Combining XML Collaboration and Registry:
  - The results of the collaboration process (finalized structures and/or interfaces) are themselves published as work products in a registry.
  - The architecture provides a core metadata tracking database and a series of XML Web Service interfaces to that information (see next slide).
  - The features provide for:
    - Collaboration
    - Flexibility and ease of use
    - Management of the design process
    - Registry
    - Planned enhancements in future releases

See XML Collaborator: XML Design Collaboration and Registry Software, White Paper, September 2002, 11 pp. at http://www.blueoxide.com/files/xmlcollaborator_wp.pdf

CIO Council XML Web Services Initiative

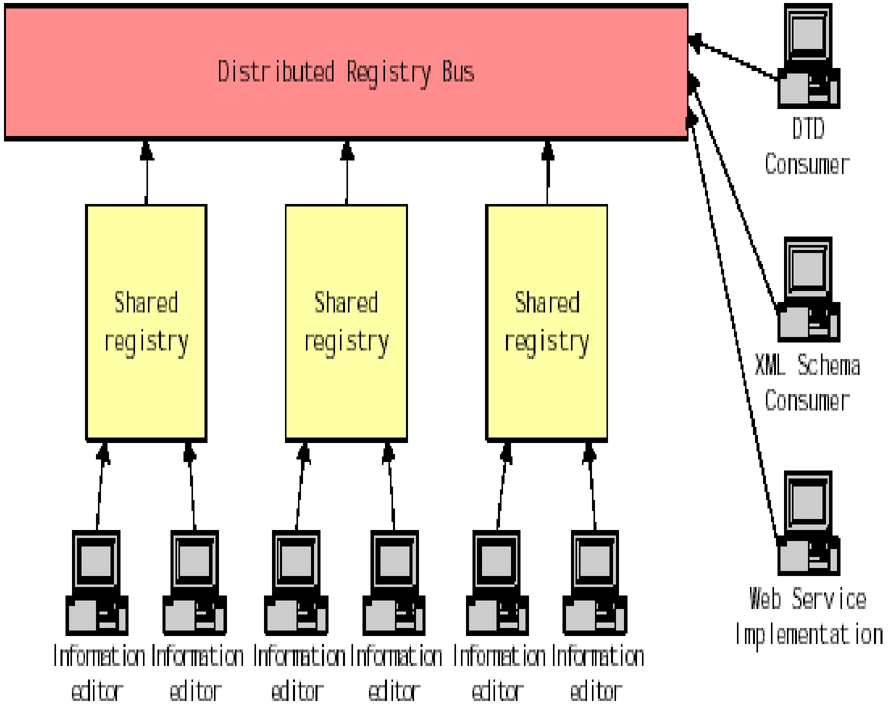


Figure 5: Peer-to-peer XML registries

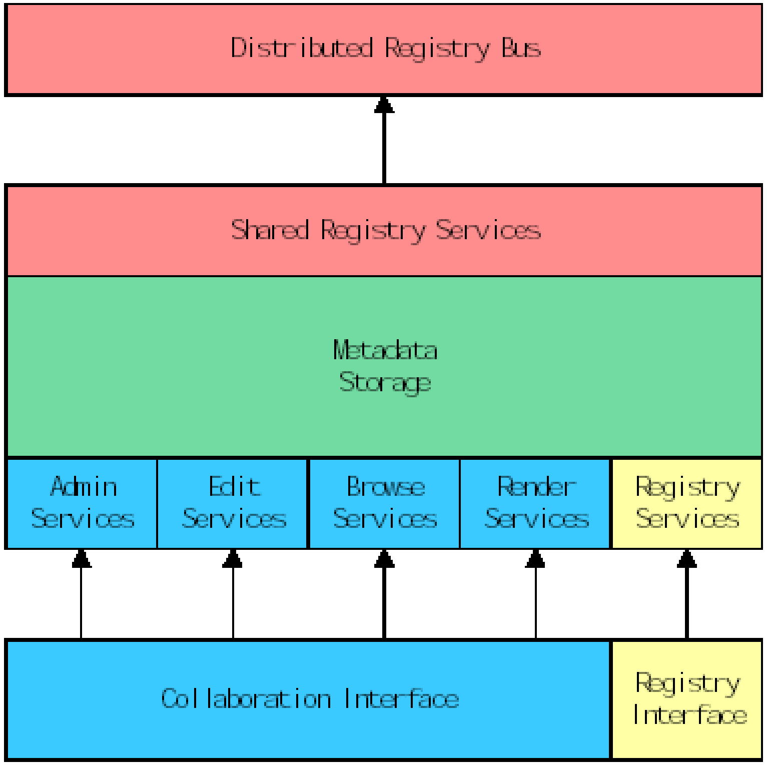


Figure 6: XML Collaborator architecture

XML Collaborator: XML Design Collaboration and Registry Software

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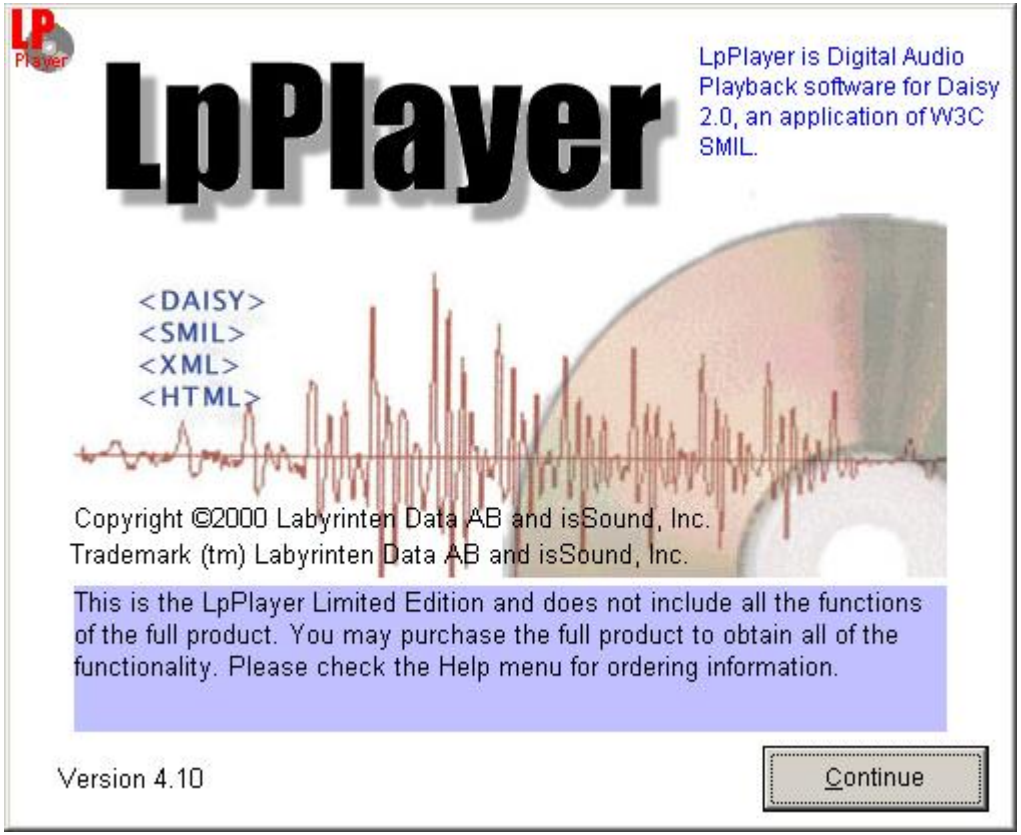
- Digital Talking Book Demonstration:
  - See the familiar words as text on screen or in Braille, synchronized with the narrator’s voice. Navigate forward and backward in the speech using computer keystrokes. We have moved from standardizing the alphabet to standardizing book formats!
  - Also called DAISY or NISO Books for the DAISY (Digital Audio-based Information SYstem) Consortium and National Information Standards Organization.
  - Well-organized collections of computer files produced according to specifications published by DIASY and NISO.
  - Medium-independent information access based on open standards (W3C’s XML and SMIL):
    - eXtensible Markup Language.
    - Synchronized Multimedia Integration Language.

CIO Council XML Web Services Initiative

Playback software for SMIL-based DAISY multimedia books



LpPlayer is Digital Audio Playback software for Daisy 2.0, an application of W3C SMIL.

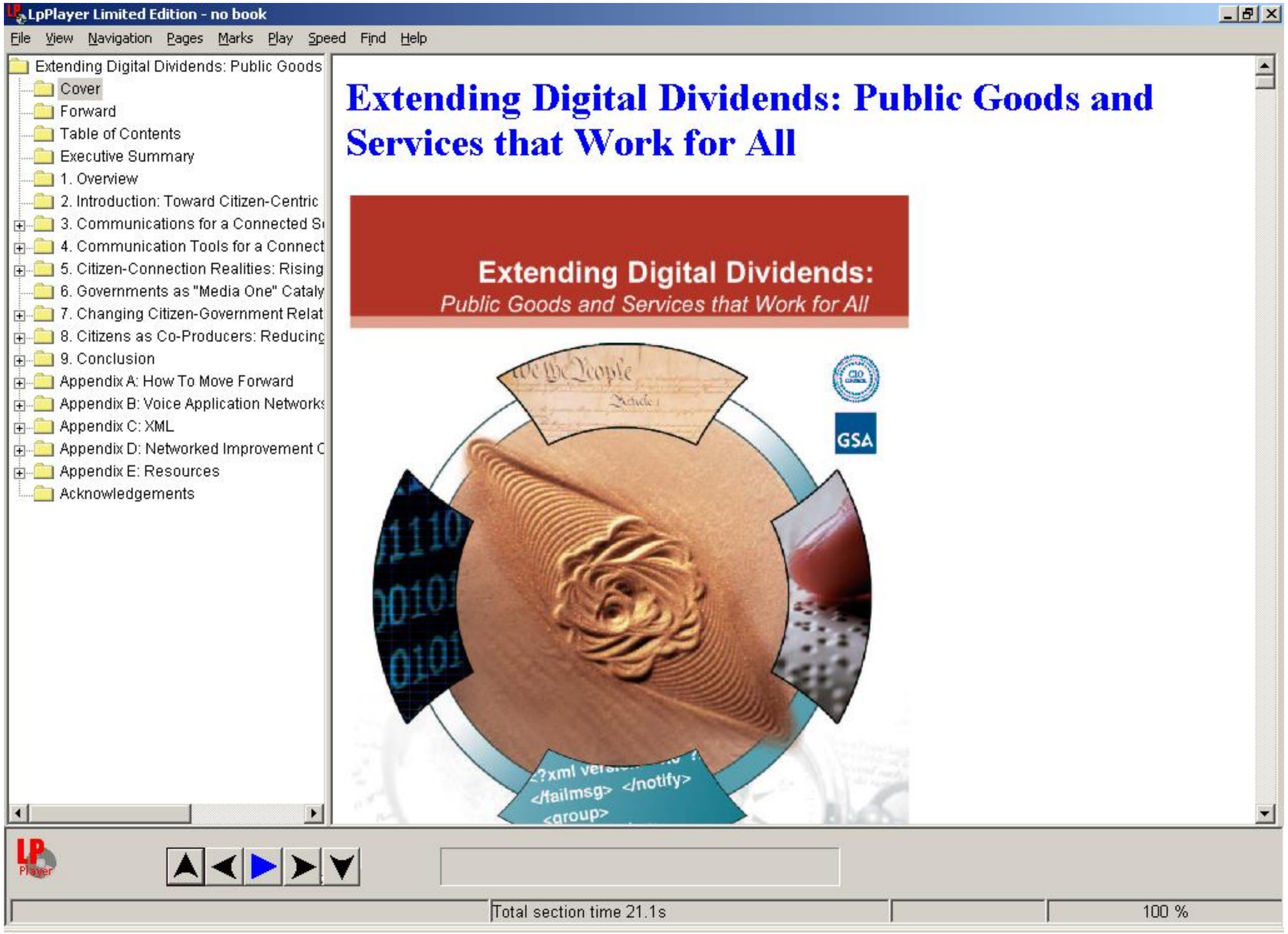
Copyright ©2000 Labyrinten Data AB and isSound, Inc.
Trademark (tm) Labyrinten Data AB and isSound, Inc.

This is the LpPlayer Limited Edition and does not include all the functions of the full product. You may purchase the full product to obtain all of the functionality. Please check the Help menu for ordering information.

Version 4.10

CIO Council XML Web Services Initiative

Digital Talking Book: *Extending Digital Dividends* guide



LpPlayer Limited Edition - no book
File View Navigation Pages Marks Play Speed Find Help

- Extending Digital Dividends: Public Goods
  - Cover
  - Forward
  - Table of Contents
  - Executive Summary
  - 1. Overview
  - 2. Introduction: Toward Citizen-Centric
  - 3. Communications for a Connected S
  - 4. Communication Tools for a Connect
  - 5. Citizen-Connection Realities: Rising
  - 6. Governments as "Media One" Cataly
  - 7. Changing Citizen-Government Relat
  - 8. Citizens as Co-Producers: Reducing
  - 9. Conclusion
  - Appendix A: How To Move Forward
  - Appendix B: Voice Application Network
  - Appendix C: XML
  - Appendix D: Networked Improvement C
  - Appendix E: Resources
  - Acknowledgements

Extending Digital Dividends: Public Goods and Services that Work for All

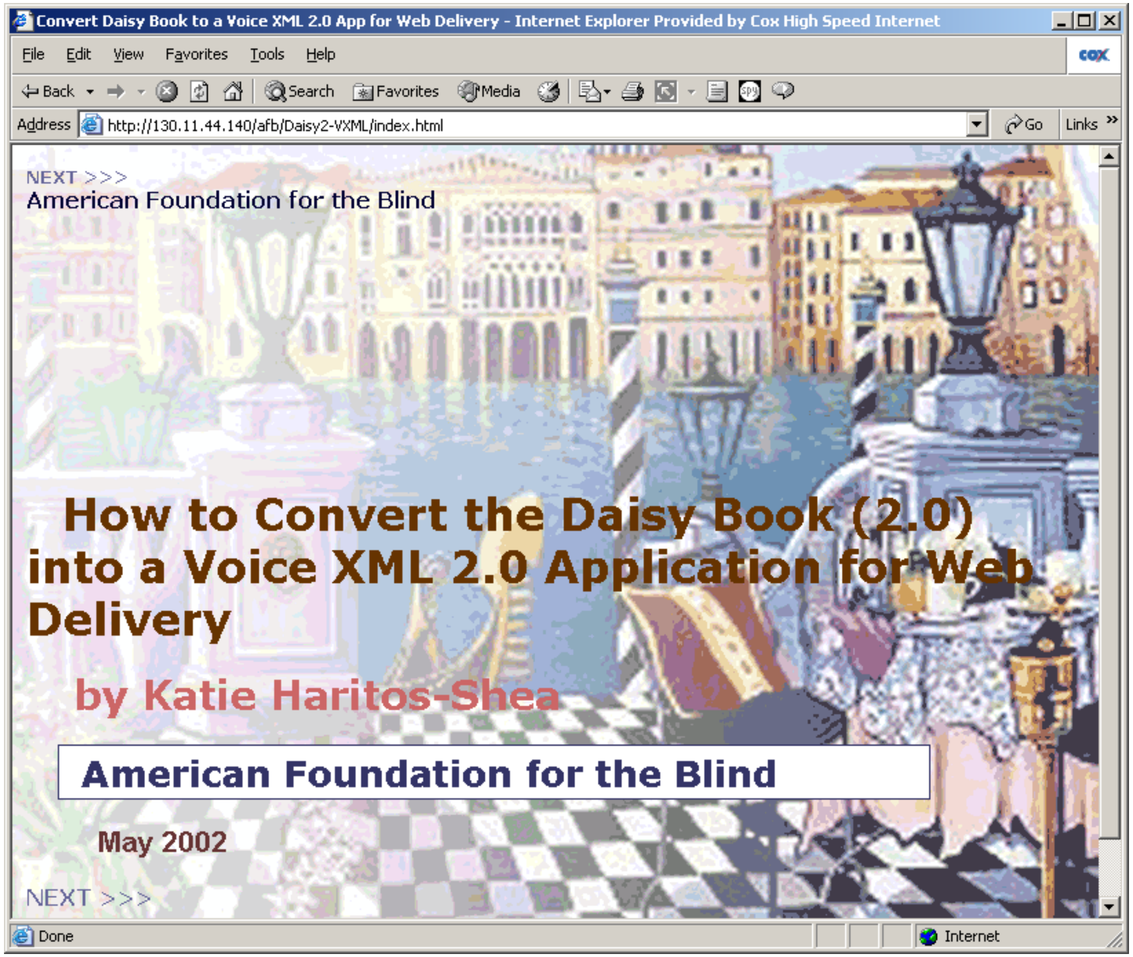
Extending Digital Dividends:
Public Goods and Services that Work for All

Total section time 21.1s

100 %

CIO Council XML Web Services Initiative

Making a Digital Talking Book a VoiceXML Web Service


Convert Daisy Book to a Voice XML 2.0 App for Web Delivery - Internet Explorer Provided by Cox High Speed Internet
File Edit View Favorites Tools Help
Back Search Favorites Media
Address http://130.11.44.140/afb/Daisy2-VXML/index.html
Go Links
Done
Internet

NEXT >>>

American Foundation for the Blind

How to Convert the Daisy Book (2.0) into a Voice XML 2.0 Application for Web Delivery

by Katie Haritos-Shea

American Foundation for the Blind

May 2002

NEXT >>>

CIO Council XML Web Services Initiative

- Questions and Answers.
- 5 Minute Stretch Break.

Architecting Web Services for Government

- Interesting Perspective.
- MC2C/Multi-Sensor C2 Constellation: Enabling Horizontal Integration Efforts.
- Guiding Principles.
- The Data Model is the Key!
- Navy-Marine Corps Intranet.
- Microsoft .NET Report Card.
- Textbook Stuff.
- First Incubator Pilots.

Architecting Web Services for Government

- Interesting Perspective:
  - "What most managers don't know is that all the Web application projects of the past 5 years are about to become legacy applications because they are not based on the new standard, XML. Make sure you look into this with your Internet applications group."

Architecting Web Services for Government

- MC2C/Multi-Sensor C2 Constellation: Enabling Horizontal Integration Efforts:
  - Stovepipes-to-integrated capability.
  - Common standards integrate the enterprise.
  - Publish-and-subscribe information management layer.
  - Business systems hierarchy:
    - Systems may be defined as nested compositions of components.
    - Components are units of application software that can be combined to produce larger units of functionality.

Web Services!

Architecting Web Services for Government

- Guiding Principles:
  - Use Open Standards: W3C, OASIS, etc.
  - Use SCOTS: Standards-based Commercial Off-the-Shelf Software.
  - Use Open Standards Process: W3C, OASIS, etc.
    - Community vocabulary and XML documents.
    - 2 or more successful pilot implementations.
    - Recommendation for standardization and operationalization.
  - Use virtual centralization of distributed content with “publish”, “find”, and “bind” for content, directory, and description, respectively.

Architecting Web Services for Government

- The Data Model is the Key!:
  - Application integration is only part of the problem - fundamental data analysis and modeling needs to be done to integrate mixed data types - unstructured and structured; relational and non-relational (e.g. native XML databases).
  - The real challenge is to develop a more unified and comprehensive data model that includes a new and complex dimension on an existing problem, namely XML.

Architecting Web Services for Government

- Navy-Marine Corps Intranet:
  - "Navy Project Buffeted", Washington Post, October 17, 2002:
    - The Navy's out-of-date computer systems have created a confusing and inefficient patchwork that has made it difficult to share electronic information.
    - The new $6.9 billion intranet is to carry a broad range of information – things as sensitive as classified communication and as mundane as budget projections.
    - The largest federal information technology project ever attempted is a year behind schedule and some in Congress are concerned that it won't stay within its budget.
    - A problem discovered – instead of tens of thousands of software applications, its systems actually housed a staggering 100,000, some of which (862) cannot be moved to the new system and some of which were illegal.

Architecting Web Services for Government

- Report Card - Microsoft Chairman Bill Gates graded his company's .Net progress as follows:
  - Rallying the industry around XML and Web services protocols.
    - Grade A
  - Visual Studio .Net tools and runtime infrastructure that support the building and deployment of Web services.
    - Grade A
  - Progress in "building-block services" that would enable a company to "call out" to get storage capabilities or access a common schedule.
    - Grade C

Architecting Web Services for Government

- Report Card - Microsoft Chairman Bill Gates graded his company's .Net progress as follows (continued):
  - Progress in promoting the idea of software as a service, "paid for on a yearly basis and being automatically updated and improved across all your different devices“.
    - Grade C
  - Federation—the idea that disparate systems, such as authentication services, can connect in trusted fashion between consenting companies or groups of organizations.
    - Grade I
  - Microsoft's work on "transformative user experiences" that happen as a result of "rich XML coming down to your system“.
    - Grade I

Note: I stands for Incomplete.

Architecting Web Services for Government

- Textbook Stuff:
  - Chapter 14: Architecting Web Services, in XML and Web Services Unleashed, 2002, Sams, Ron Schmelzer, et. al., pp. 592-628.
  - Chapter 8: Implementing Web Services, in Understanding Web Services, 2002, Eric Newcomer, Addison-Wesley, pp. 255-308.

Architecting Web Services for Government

- Textbook Stuff:
  - Web Services signal a paradigm shift in distributed computing with the potential to change the way distributed systems interact:
    - Most of the work going on involves new ways of solving old problems.
    - Our challenge is to apply Web Services to new problems!

Architecting Web Services for Government

- Textbook Stuff (continued):
  - Web Services are loosely coupled, contracted components that communicate via XML-based interfaces:
    - Loosely coupled – Web Services and the programs that invoke them can be changed independently and are platform independent.
    - Contracted – a Web Service’s behavior, its input and output parameters, and how to bind to it are publicly available.
    - Component – encapsulated (hidden) code.
    - XML-based interfaces – described using a standard XML notation called its service description.

Architecting Web Services for Government

- Textbook Stuff (continued):
  - In other words, Web Services are self-contained applications that can be described, published, located, and invoked over the Internet (or any network).
  - The Web Services model promises to deliver business solutions by addressing complexity and costs, providing a common language for B2B e-commerce, and enabling the vision of a global e-marketplace.

Architecting Web Services for Government

- Textbook Stuff (continued):
  - Current research on complex systems contradicts the conventional wisdom* – it is possible to build powerful systems with simple components (such as Web Services) that are smart enough to organize themselves into large, powerful systems.
  - The Web Services model addresses the Tower of Babel problem by providing for dynamic service descriptions – individual Web Services can describe their interfaces at runtime, allowing for dynamic interpretation of the semantics of the XML that underlies the messages Web Services send and receive.

*Powerful systems are necessarily complex, and simple systems are necessarily of limited use.

Architecting Web Services for Government

- Textbook Stuff (continued):
  - Business requires a way for companies to locate, identify, contact, and transact with other companies around the world on a “just in time” basis – that is, without having to establish a technical relationship beforehand.
    - Does this apply to government agencies and programs now and in the future or is our situation different because the government defines relationships between agencies and programs?

Architecting Web Services for Government

- Textbook Stuff (continued):
  - Business modelers seek to represent business concepts with business components to limit complexity and costs, to support reuse of business components, speed up the development cycle, etc.
  - The Web Services model can be thought of as the next step in the evolution of business components – whereas business components are large, recursively defined collections of objects, Web Services should be relatively small, self-organizing components with well-defined, dynamic interfaces.

Architecting Web Services for Government

- Textbook Stuff (continued):
  - Web Services loose coupling is the key to flexible, inexpensive integration capabilities and it usually makes more sense to take an agile approach to components by including only the functionality needed right now. (JIT-Just in Time integration.)
  - The true power of Web Services comes from the fact that all its activities can take place at runtime – Web Services can figure out how to work with each other, without having been designed to do so specifically.
  - A Service-Oriented Architecture (SOA) means that the architecture is described and organized to support Web Service's dynamic, automated description, publication, discovery, and use.

Architecting Web Services for Government

- Textbook Stuff (continued):
  - – The SOA organizes Web Services into three basic roles:
    - The service provider (publish)
    - The service requestor find)
    - The service registry (bind)
  - – The SOA is also responsible for describing how Web Services can be combined into larger services.

Architecting Web Services for Government

- Textbook Stuff (continued):
  - At the lowest level, Web Services can be “hardwired” at design time. This option essentially mimics a tightly coupled distributed architecture such as client-server or n-tier architecture. The developer handles the discovery manually and codes the interface to the desired service into the service requestor (e.g. FileMaker).

Architecting Web Services for Government

- Textbook Stuff (continued):
  - At the next level, the desired Web Service is also identified beforehand, but the service requestor is smart enough to bind to it dynamically at runtime.
  - The third level indicates JIT integration to the service provider. The service requestor can search a registry dynamically for a provider and then bind to the one it selects. That is the only level that requires the participation of a service registry.
    - If you try to build Web Services that support JIT integration today, you'll likely be disappointed, because service registries are still be defined and populated.
    - So create Web Services at the first two levels, the first level being the "training" level and the second level providing a new level of functionality beyond existing architectures.

Architecting Web Services for Government

- Textbook Stuff (continued):
  - The SOA has four key functional components:
    - Service Implementation:
      - Build from scratch, provide a wrapper, or create a new service interface for an existing Web Service.
    - Publication:
      - Author the WSDL document, publish the WSDL on a Web Server, and publish the existence of your WSDL in a Web Services registry using a standard specification (UDDI).
    - Discovery:
      - Search the registry, get the URL, and download the WSDL file.
    - Invocation:
      - Author a client (SOAP) using the WSDL and make the request (SOAP message) and get the response (SOAP message).

Architecting Web Services for Government

- Textbook Stuff (continued):
  - Imagine an Internet full of Web Services that grows and changes organically – there is no master architect or executive committee who is responsible for maintaining the system.
  - It’s the global self-organizing power of technology based on simple, open protocols that puts the “Web” into Web Services.

Architecting Web Services for Government

- Textbook Stuff (continued):
    - Some issues:
        - Semantics and Taxonomies:
            - Ontologies establish a joint terminology among members of a particular community of interest.
            - A taxonomy is a hierarchical representation of a set of concepts – the simplest taxonomy used in UDDI registries is geographical.
        - Security and Quality of Services Issues:
            - Web Services security is still a bleeding-edge topic. Today, SSL affords the best security, in spite of its limitations.
            - HTTP lacks most of the features of reliable messaging. More work must be done to use Web Services over the Internet reliably.

Architecting Web Services for Government

- Textbook Stuff (continued):
  - – Some issues (continued):
    - Composition and Conversations:
      - – The ability to use collections of Web Services is being describe in an XML-based description languages:
        - » The IBM Web Services Flow Language (WSFL) – a bleeding-edge topic
        - » The Hewlett-Packard Web Services Conversation Language (WSCL) – on the bleeding-edge as well.
    - Things we haven’t thought of or discovered yet.

Architecting Web Services for Government

- Textbook Stuff (continued):
  - Software architects need to understand the paradigm shift of Web Services and communicate it to their teams as well as their management.
  - The 4+1 View Model of Software Architecture popularized by Philippe Kruchten of Rational Software:
    - The architect has clear vision seeing the elephant from all four views, not the four separate views of the four blind men. The architect has a comprehensive picture of the elephant.
    - Each of the four main views takes the perspective of key stakeholders in the development process. The fifth view overlaps the other views and plays a special role.

Architecting Web Services for Government

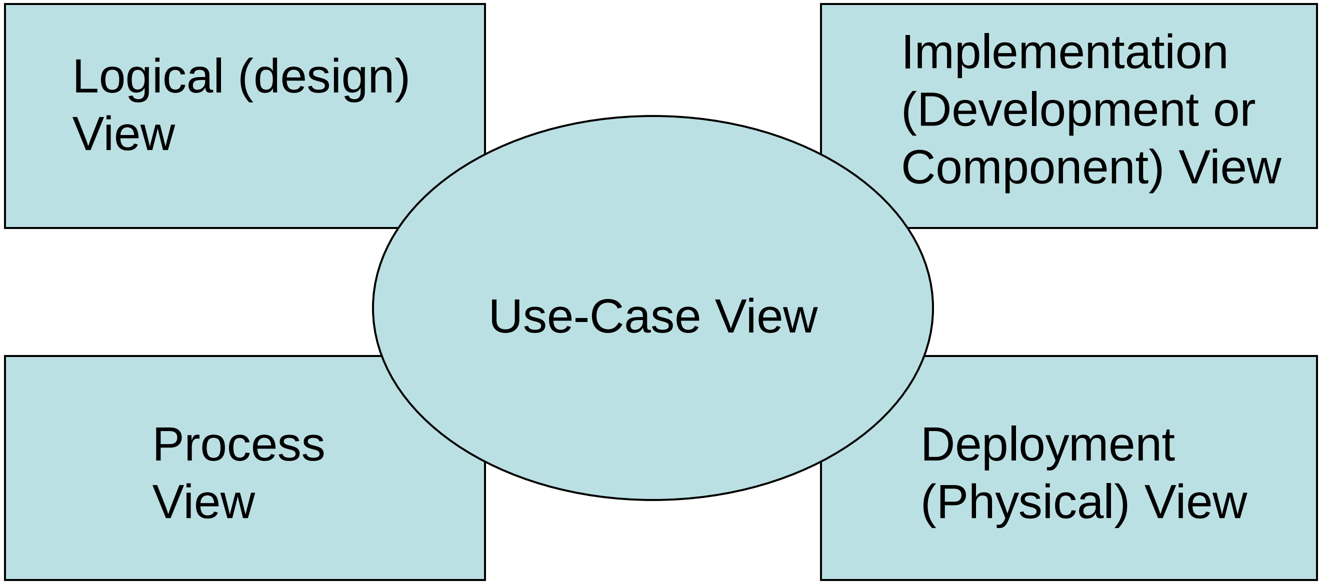
- Textbook Stuff (continued):
  - The 4+1 View Model of Software Architecture:
    - The Implementation Architectural View – The Web Services Technology Stack.
    - The Logical Architectural View – Composition of Web Services.
    - The Deployment Architectural View – From Application Servers to Peer-to-Peer.
    - The Process Architectural View – Life in the Runtime.
    - Use-Case View – Users That Know What They Want a Web Services Architecture to Do (not the case at this time).

Architecting Web Services for Government

The 4+1 View Model of Software Architecture Applied to Web Services

End User
Functional Requirements

Programmers
Software Management



Logical (design) View

Implementation (Development or Component) View

Use-Case View

Process View

Deployment (Physical) View

SOA Architects
JIT Integration of Web Services

System Engineering
Platforms

Architecting Web Services for Government

- Implementing Web Services:
  - Two major categories:
    - Microsoft (single step with .NET)
    - Java (two-step process*)
  - Main categories:
    - Microsoft .NET Framework
    - Application servers (J2EE)
    - Integration brokers (middleware)
    - Database vendors
    - ERP, CRM, and others
    - Web services platform

*Programmers develop classes and bean and then decide which of them are to be created and deployed as Web Services.

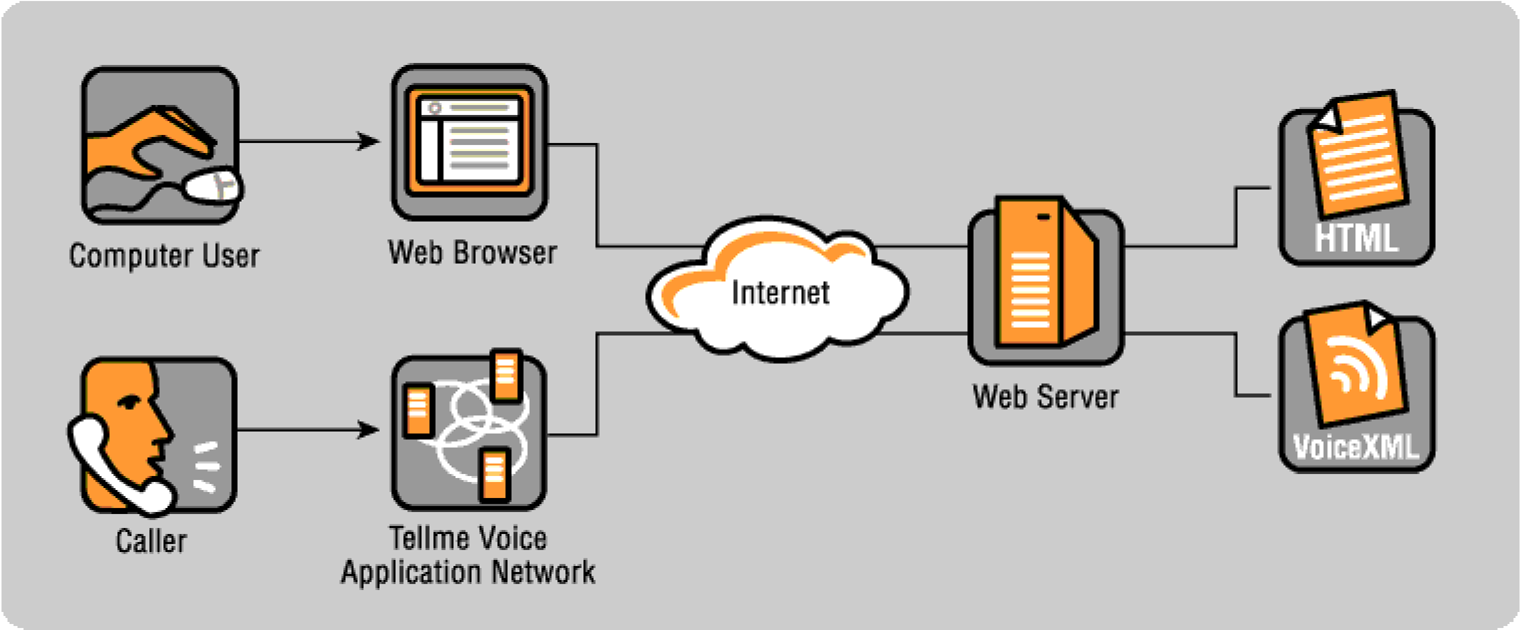
Architecting Web Services for Government

- Implementing Web Services:
  - Vendor Views on Adoption of Web Services Technologies:
    - BEA Systems, Cape Clear, HP, IBM, IONA, Microsoft, Oracle, Sun Microsystems, and Systinet.
    - Vendors were nearly unanimous in their support for the core standards – SOAP, WSDL, and UDDI – but vary in their support for additional technologies. It is agreed that security is an essential next step, but opinions vary regarding the relative priority of transactions, process flow, and reliable messaging proposals.

Architecting Web Services for Government

- First Incubator Pilots:
  - XML Collaborator (recall first section).
  - VoiceXML (see next slides).
  - XML Standards for Geospatial Data (not covered here).
  - Distributed Content Networking (next section).

Architecting Web Services for Government



http://www.voicexml.org/, http://www.w3.org/Voice/

Architecting Web Services for Government

Pilot No.	Purpose	Database	VoiceXML	Query
1 (Fall 2001)	EPA Emergency Response	FileMaker 5.5 (Apple Computer)	Tellme, Inc.	ZIP Code (Area Code-to-ZIP Code Default)
2 (Spring 2002)	Federal "Blue Pages" Directory	MS Access-NextPage NXT 3	Tellme, Inc.	Government Function
3 (Fall 2002)	Public Directory Listings	Qsent	Real Soft, Inc.	Name, Address, Phone Number, Geography, etc.
4 (in process)	Public & Government Directory Listings	Qsent & Agency XML Web Services	Real Soft, Inc.	Name, Address, Phone Number, Geography, etc.

Architecting Web Services for Government

- Questions and Answers.
- 5 Minute Stretch Break.

Experience with Distributed Content Networking in Government

- Brief History:
  - Proposed to FedStats.Gov in 1998 – organization and technology not ready.
  - Proposed to FedStats.Gov in 2000 – do it ASAP (started October 1st and presented FedStats.Net in early November!).
  - Lots of favorable publicity, but caused FedStats.Gov political problems – discontinued in the Spring 2001.
  - EPA and other agencies still interested – FedGov Content Network.
  - Special Award for Innovation from Mark Forman and the Quad Council at the CIO Showcase of Excellence – encouraged to promote to the other e-Gov initiatives in Spring 2002.
  - One of the proposed four incubator pilot projects in the new CIO Council’s XML Web Services Initiative.

Experience with Distributed Content Networking in Government

- NextPage NXT 3 P2P* Platform:
  - Esther Dyson’s Release 1.0, 1/22/2002:
    - “NextPage is unique in the content-management market in its distributed approach”:
      - “NextPage’s platform, NXT 3, virtually connects the distributed information sources and makes them appear integrated to the user. Unlike syndication, in which content is copied and integrated with other content locally, NextPage keeps objects where they are.”
      - “NextPage uses the standard simple object access protocol (SOAP) to exchange and normalize information between local content directories, assembling meta-indexes so that users can search or manipulate content transparently, regardless of physical location.”

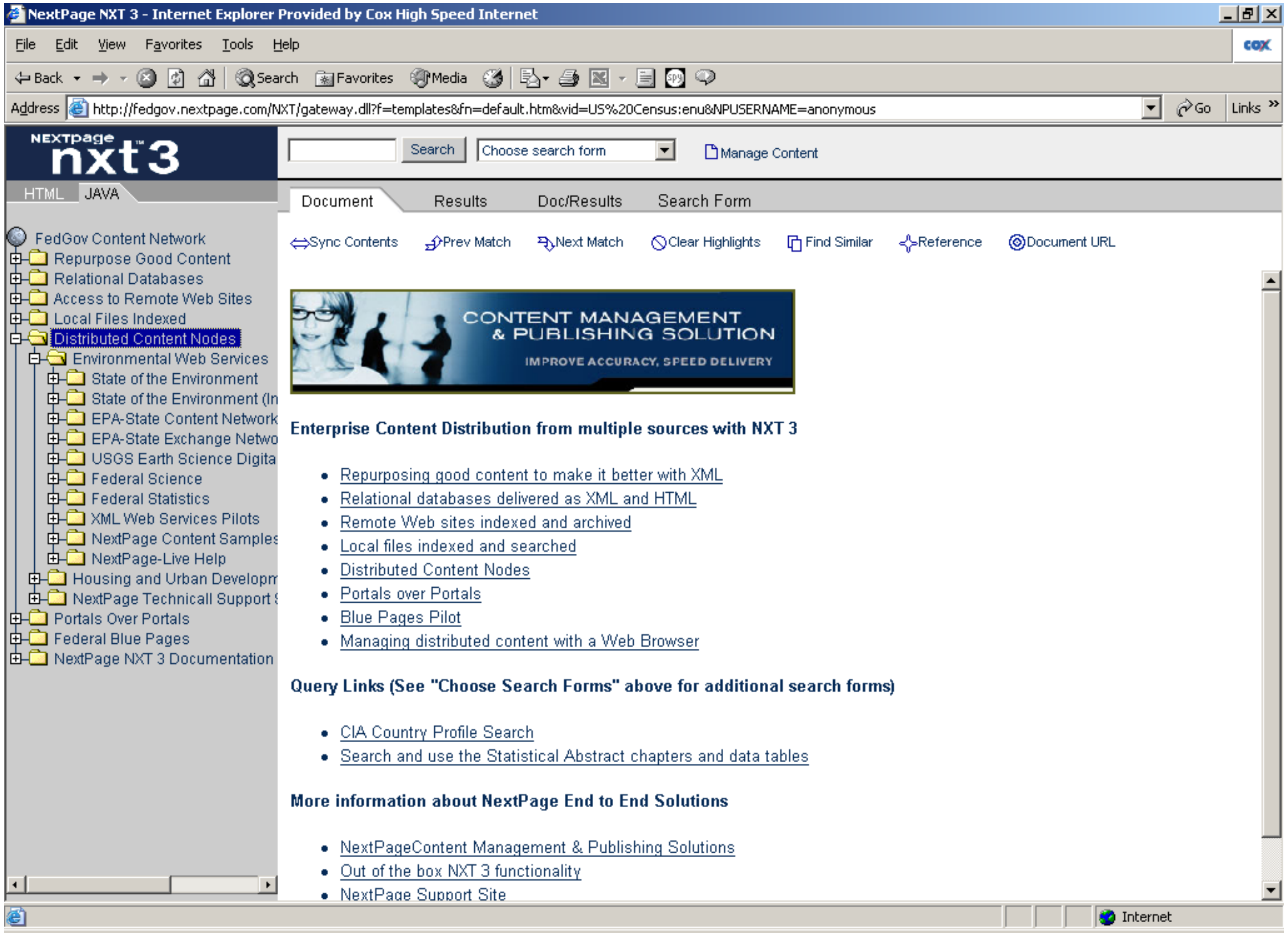
* Peer-to-peer: Every device connected to the network is both a server and consumer of content.

Experience with Distributed Content Networking in Government

- NextPage NXT 3 P2P* Platform:
  - Andy Warzecha, The META Group, 3/12/2002:
    - “If companies want to do cross-enterprise content management, NextPage has the solution”:
      - "Content networks provide a way for users to simultaneously access Internet sites, databases, intranets and other formal or informal content resources as if the content existed in a single location."
      - "The advantage of this approach is that new content sources can be added quickly ... This puts power in the hands of business users to quickly tie in or disconnect the various content sources they require access to." (see next slide)

* Peer-to-peer: Every device connected to the network is both a server and consumer of content.

Experience with Distributed Content Networking in Government


NextPage NXT 3 - Internet Explorer Provided by Cox High Speed Internet
File Edit View Favorites Tools Help
Back Search Favorites Media
Address
Go Links
NEXTpage nxt3
Search
Choose search form
Manage Content
HTML JAVA
Document Results Doc/Results Search Form
Sync Contents Prev Match Next Match Clear Highlights Find Similar Reference Document URL
FedGov Content Network
Repurpose Good Content
Relational Databases
Access to Remote Web Sites
Local Files Indexed
Distributed Content Nodes
Environmental Web Services
State of the Environment
State of the Environment (In
EPA-State Content Network
EPA-State Exchange Netwo
USGS Earth Science Digita
Federal Science
Federal Statistics
XML Web Services Pilots
NextPage Content Samples
NextPage-Live Help
Housing and Urban Developm
NextPage Technicall Support
Portals Over Portals
Federal Blue Pages
NextPage NXT 3 Documentation
CONTENT MANAGEMENT & PUBLISHING SOLUTION
IMPROVE ACCURACY, SPEED DELIVERY
Internet

http://fedgov.nextpage.com/NXT/gateway.dll?f=templates&fn=default.htm&vid=US%20Census:enu&NPUSERNAME=anonymous

Enterprise Content Distribution from multiple sources with NXT 3

- Repurposing good content to make it better with XML
- Relational databases delivered as XML and HTML
- Remote Web sites indexed and archived
- Local files indexed and searched
- Distributed Content Nodes
- Portals over Portals
- Blue Pages Pilot
- Managing distributed content with a Web Browser

Query Links (See "Choose Search Forms" above for additional search forms)

- CIA Country Profile Search
- Search and use the Statistical Abstract chapters and data tables

More information about NextPage End to End Solutions

- NextPageContent Management & Publishing Solutions
- Out of the box NXT 3 functionality
- NextPage Support Site

http://www.sdi.gov http://fedgov.nextpage.com/default.htm

Experience with Distributed Content Networking in Government

- Tour of a distributed content network:
  - Please select the Java Tab for easier navigation.
  - We have the NXT 3 software platform installed on several Web servers where the content originates and is maintained so that it can be made to look and function as though it is only on one server by XML Web Services.
  - We have to tell you which content is on different servers because there is no way telling by just looking at the interface.

Experience with Distributed Content Networking in Government

- Tour of a distributed content network (continued):
  - It is generally said that content is 90% unstructured and 10% structured (databases) and that XML (eXtensible Markup Language) is the solution to bringing structure to unstructured content to produce a number of significant benefits.
  - Those benefits can be demonstrated when good content is repurposed to make it more structured and functional with XML.

Experience with Distributed Content Networking in Government

- Tour of a distributed content network (continued):
  - The first example is the Statistical Abstract of the US where 40 Acrobat and 1500 Excel files have been converted to an XML content collection that is highly structured, accessible, and searchable.
  - The second example is the CIA Country Profiles that have been extensively markup with XML so that custom search queries can produce sortable data tables even when no data tables exist in the original document.

Experience with Distributed Content Networking in Government

- Tour of a distributed content network (continued):
  - Structured content (relational databases) can be readily converted to XML in real-time using the NXT 3 database adapters and presented as both “raw” or “styled” XML as shown in the examples on the site. Links between databases can be made as is demonstrated in the USA Counties databases linking to the same county in the Bear Facts database.

Experience with Distributed Content Networking in Government

- Tour of a distributed content network (continued):
  - Recall that digital libraries need to provide content persistently available in digital form on the Internet. NXT 3 does this by an intelligent Web Services agent that will crawl, index in XML, and archive the contents on entire Web sites.
  - 8.5 years of the Chesapeake Journal Newspaper online has been preserved by NXT 3 so it can be searched separately or jointly along with any or all other content nodes, including other remote Web sites!

Experience with Distributed Content Networking in Government

- Tour of a distributed content network (continued):
  - Local files on the Web server in their native (proprietary formats) can be indexed in XML and searched separately or jointly along with any or all other content nodes.
  - Major collections of content on other servers can be made to look as though they are centralized on one server as is the case with Environmental Web Services (see the Digital Library of the State of the Environment).
  - Major collections of content can be built/hosted on one server and then moved to another server as in the case with Housing and Urban Development (HUD) Node.

Experience with Distributed Content Networking in Government

- Tour of a distributed content network (continued):
  - The NXT 3 is being evaluated for its ability to create an “uber portal” or portal over portals by using it to index on a regular schedule several on the major portals in the Federal government.
  - The Federal Blue Pages Pilot is an examples of how NXT 3 could be used to deliver and update distributed content that changes frequently (phone numbers across government agencies) and that needs to be disseminated on the telephone using VoiceXML as well as the Web.

Experience with Distributed Content Networking in Government

- Tour of a distributed content network (continued):
  - – Finally, the NextPage NXT 3 Documentation is maintained by NextPage on their own server, but looks as though is an integral part of this portal server.
  - – Distributed content networks can also be feed and maintained by content providers just uploading their content through a Web browser without their needing to have a full-fledged Web server themselves. This NXT 3 feature is called “Managed Content” (with a Web browser).

Experience with Distributed Content Networking in Government

- Tour of a distributed content network (continued):
  - Custom query forms using XML have also been developed to provide more customize or personalized access to the individual content nodes for both databases and structured documents.
  - Finally links to more information about NextPage End-to-End Solutions have been provided (see next slide).

Agenda

- 12:00 - 1:00: Lunch
- 1:00 - 1:30: NextPage Overview - Ed Scrivani
- 1:30 - 2:30: NextPage Triad Products Demo - Chris LeBaron
- 2:30 - 3:00: Discussions - All