Web Services
The Path to Business Value

E-Gov 2003, Tutorial T-4
Monday, June 9, 2003
9 am – noon
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Environmental Protection Agency
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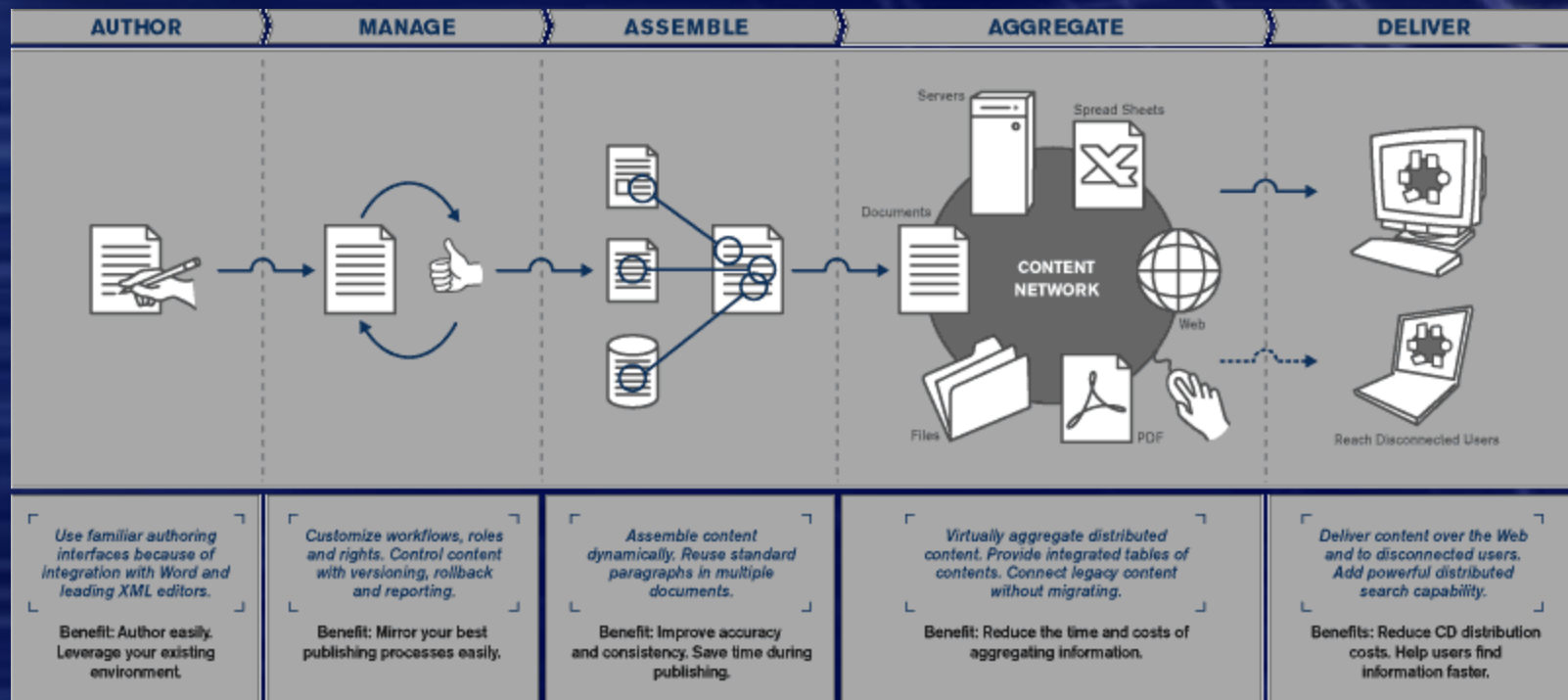
An Amazing Ride with XML Web Services

- **Before - XML Web Services Repository/Distributed Content Network and VoiceXML:**
  - **March 20, 2002, The CIO Council Showcase of Excellence, Special Innovation Award, Presented to the Environmental Protection Agency, Natural Language Interface to Web Content, By the Federal Leadership Council (Mark Forman and the Quad Council), In Association with Post Newsweek Tech Media/FOSE, Washington, DC.**
- **After – CIOC XML Web Services Working Group:**
  - **April 1, 2003, Working Group Chair Recognized with Emerging Technology/Standards Leadership Award at the SecureE-Biz.Net Summit, from Mark Forman, Associate Director, IT and eGovernment, OMB, and David McClure, VP e-Gov, Council for Excellence in Government: "for ushering in new technology to allow us to conduct e-Business securely to further implement the President's Management Agenda."**

Chronology of the Path

- 1. XML Web Services Repository and Distributed Content Network

- 2. EPA VoiceXML Emergency Response Application

- 3. XML Web Services Working Group Pilots

- 4. E-Forms for E-Gov: Early Results and Business Case Outcomes

1. XML Web Services Repository and Distributed Content Network

AUTHOR	MANAGE	ASSEMBLE	AGGREGATE	DELIVER
Use familiar authoring interfaces because of integration with Word and leading XML editors.	Customize workflows, roles and rights. Control content with versioning, rollback and reporting.	Assemble content dynamically. Reuse standard paragraphs in multiple documents.	Virtually aggregate distributed content. Provide integrated tables of contents. Connect legacy content without migrating.	Deliver content over the Web and to disconnected users. Add powerful distributed search capability.
Benefit: Author easily. Leverage your existing environment.	Benefit: Mirror your best publishing processes easily.	Benefit: Improve accuracy and consistency. Save time during publishing.	Benefit: Reduce the time and costs of aggregating information.	Benefits: Reduce CD distribution costs. Help users find information faster.

Corel XMetal   XYEnterprise Contenta   NextPage NXT 3 and Solo

**Multiple vendors providing an end-to-end solution based on XML standards.**

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# 1. XML Web Services Repository and Distributed Content Network

- 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.

1. XML Web Services Repository and Distributed Content Network

2. EPA Emergency Response VoiceXML Application

http://www.epa.gov/ceppo/lepclist.htm
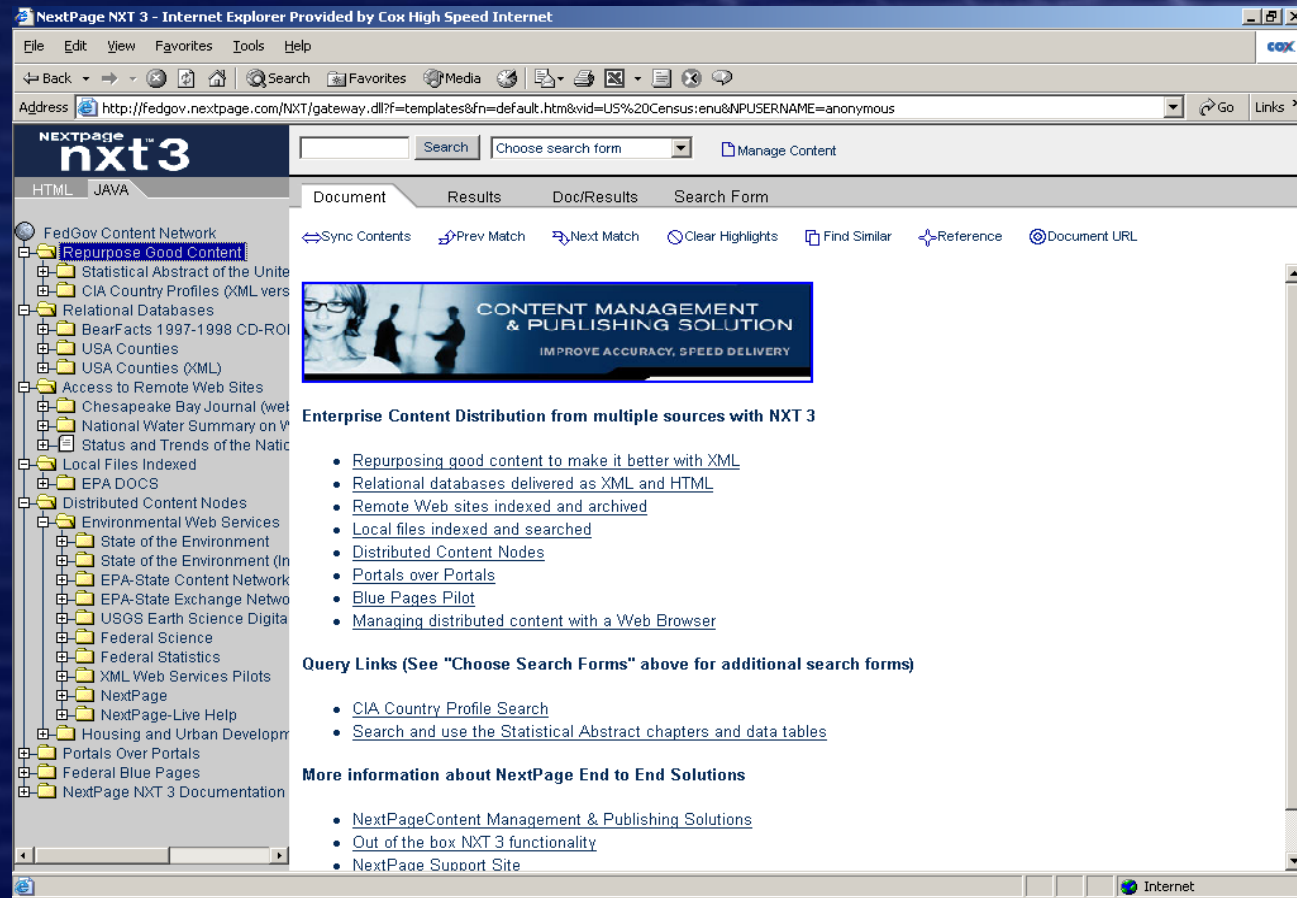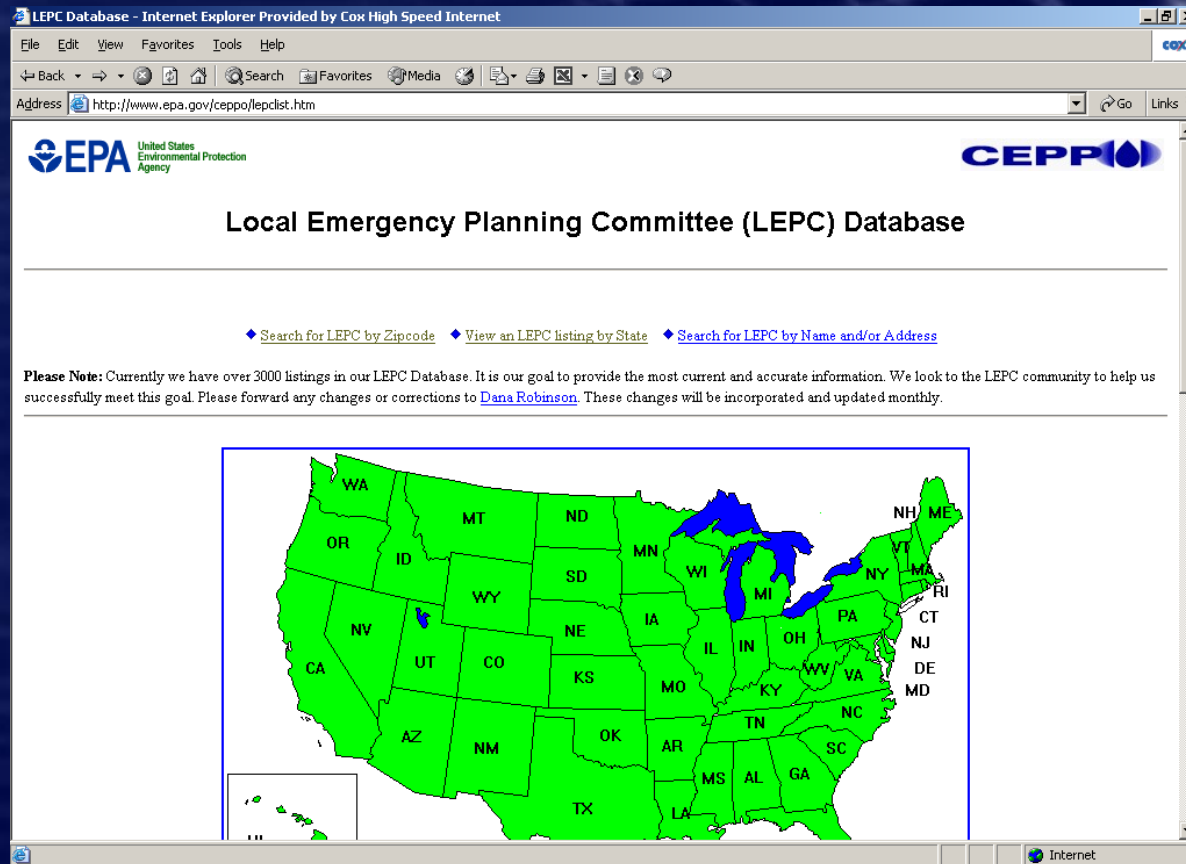
2. EPA Emergency Response VoiceXML Application
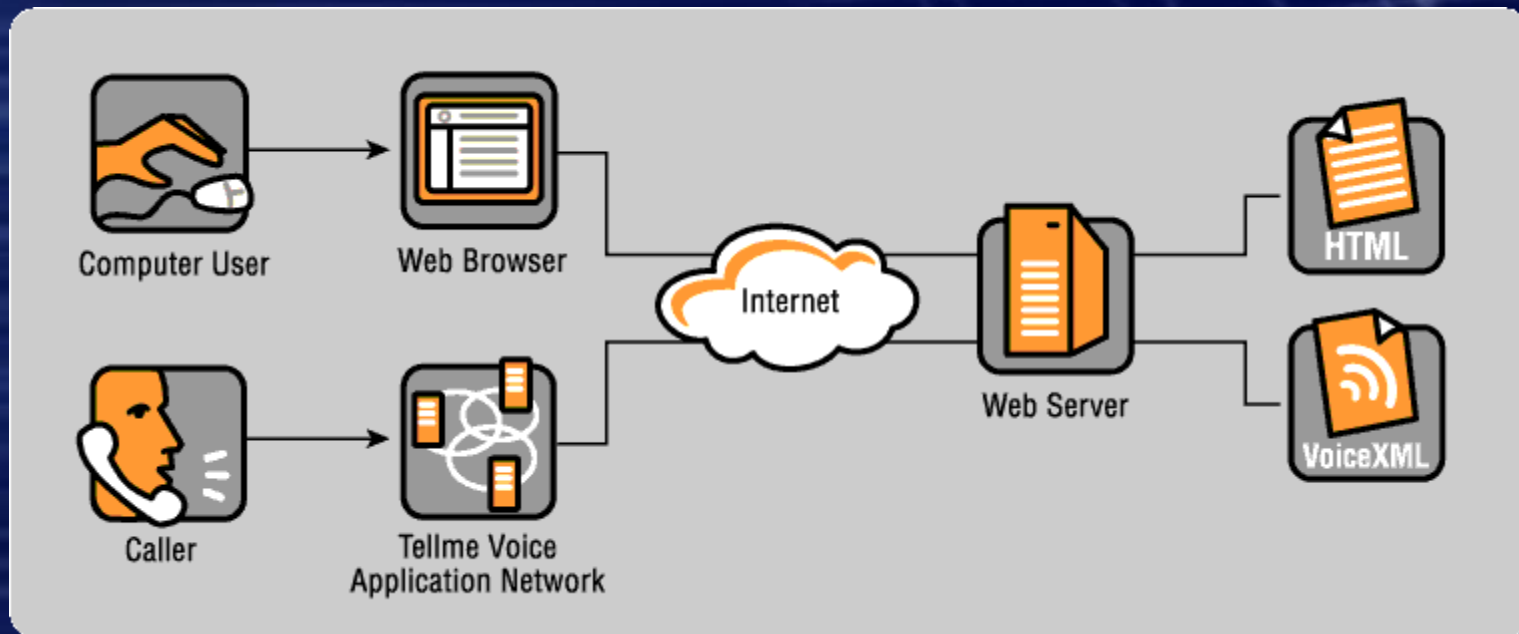
2. EPA Emergency Response VoiceXML Application

- http://130.11.53.73/lepc/FMPro?-db=LEPC.FP5 &-format=-fmp_xml&zip_lepc::zip_code=22181&-find=
- FileMaker Pro 6 XML Query Syntax - Five Parts:
    - The scheme: http
    - The host: IP address
    - The port: 591 (registered with IANA)
    - The file path: /FMPro
    - The query string: name=value pairs (4 in this case) separated by & signs:
        - The database (LEPC.FP5)
        - The format (FileMaker XML grammar - three choices: database dependent, database independent, and grammar) (fmp_xml)
        - The records to retrieve (zip_code=22181)
        - Request for data (yes)

2. EPA Emergency Response VoiceXML Application

- Adam Hocek (Broadstokes, Inc.) created a script (http://www.broadstrokesinc.com/demo/cgi-bin/fmqry.pl) that returns the results from FileMaker as an ECMAScript. This makes it possible to use the same ECMAScript results within a VoiceXML or HTML document:
  - http://www.broadstrokesinc.com/demo/cgi-bin/jsvxml.pl
  - http://www.broadstrokesinc.com/demo/cgi-bin/jshtml.pl.
- The file http://www.broadstrokesinc.com/demo/brand.vxml is used for collecting the callers zip code and then it does a <submit> to jsvxml.pl which will generate a VoiceXML document with the results.
- The VoiceXML application runs on Voxeo's server. Call 1-800-303-9987 and give the application ID as 713589.

3. XML Web Services Working Group Pilots

"Users never know what they want…

… until they see what they get"

3. XML Web Services Working Group Pilots

- **Pilot Titles:**
  - 1. Digital Talking Books on CD-ROM and the Web as VoiceXML.
  - 2. XML Collaborator.
  - 3. VoiceXML for Universal Access and Homeland Security Applications.
  - 4. Geospatial Interoperability.
  - 5. XML Web Services Content Authoring, Management, and Dissemination.
  - 6. Military Systems-Federation of Registries, etc.
  - 7. E-Forms for e-Gov: The Use of XML Standards-based Applications.
  - 8. The MetaMatrix System for Model-driven Integration with Enterprise Metadata.
  - 9. Cognitive Topic Map Web Sites-Aggregating Information Across Individual Agencies and E-Gov Initiatives.
  - 10. Collaboration and CoSourcing: Designing Intergovernmental Services and Sharable Components.
  - 11. The Potential of Semantic Technologies for E-Gov.
  - 12. XML Data Exchange Across Multiple Levels of Government Using Native XML Databases.

3.1 Digital Talking Books on CD-ROM and the Web as VoiceXML

DAISY or NISO Books
(Digital Audio-based Information SYstem) Consortium
and National Information Standards Organization)

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

Federal Architecture and Infrastructure Committee of the CIO Council
GSA Office of Governmentwide Policy

- 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!

- Medium-independent information access based on open standards (W3C's XML and SMIL):
  - eXtensible Markup Language.
  - Synchronized Multimedia Integration Language

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3.2 XML Collaborator

A component-level collaborative design and registry platform for XML artifacts
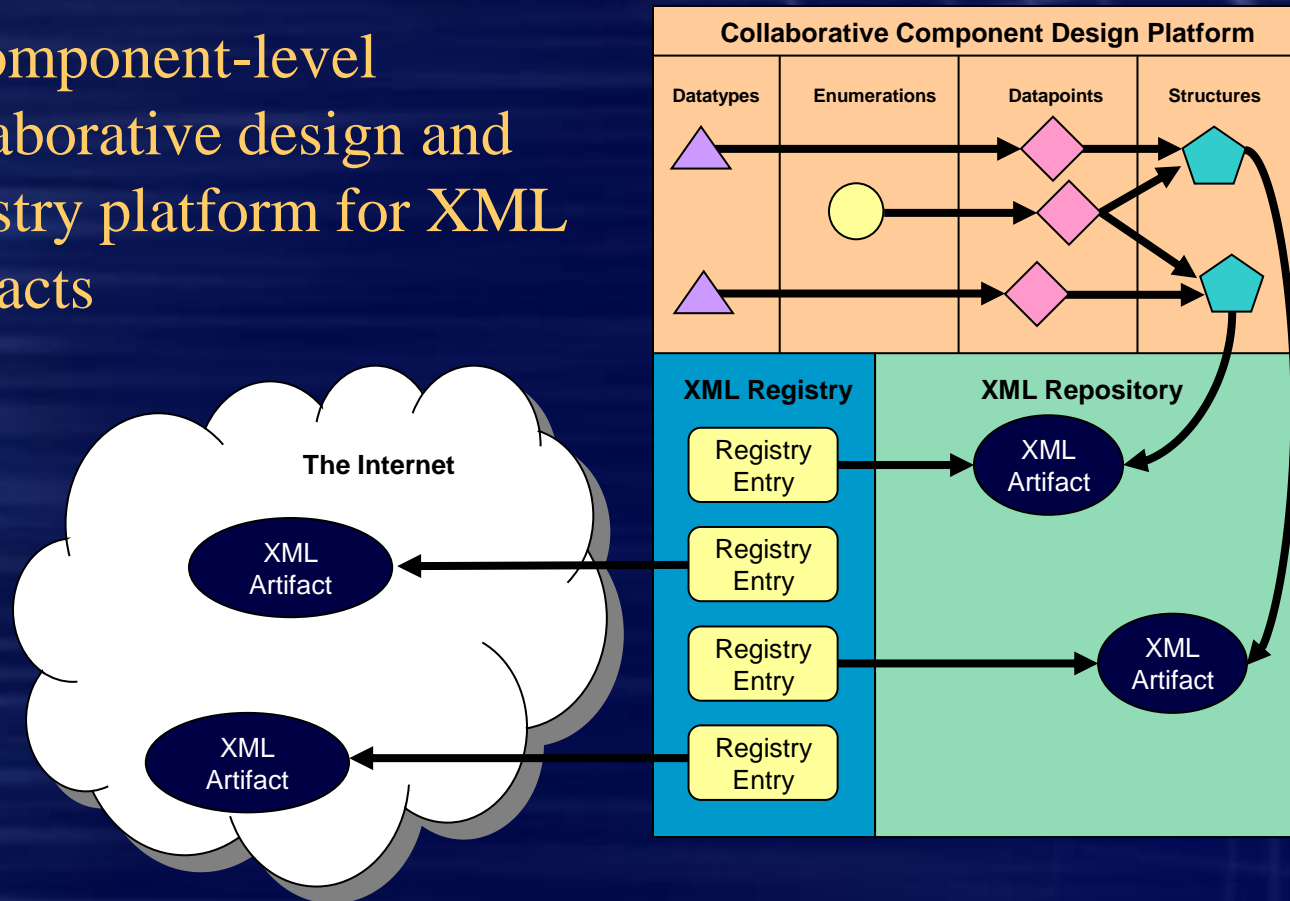
3.2 XML Collaborator

Create the Information Model

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3.2 XML Collaborator

- Example: Show me all the data structures that have been classified as part of the Business Compliance One-Stop Initiative and as a work product of the IRS:
  - Data and Information Reference Model – the data structures themselves (e.g. data dictionary)…
  - Service Components Reference Model – expressed as a reusable component (e.g. XML Schema) …
  - Technical Reference Model – provided in an interoperable way (e.g. an XML Web Service) ….
  - Business Reference Model – classified according to a taxonomy (e.g. Business Reference Model Version 2).
  - Performance Reference Model – Doing all this demonstrates performance!

Source: Kevin Williams, Creating Taxonomies in XML Collaborator, Presentation to the XML Web Services Working Group, April 15, 2003.

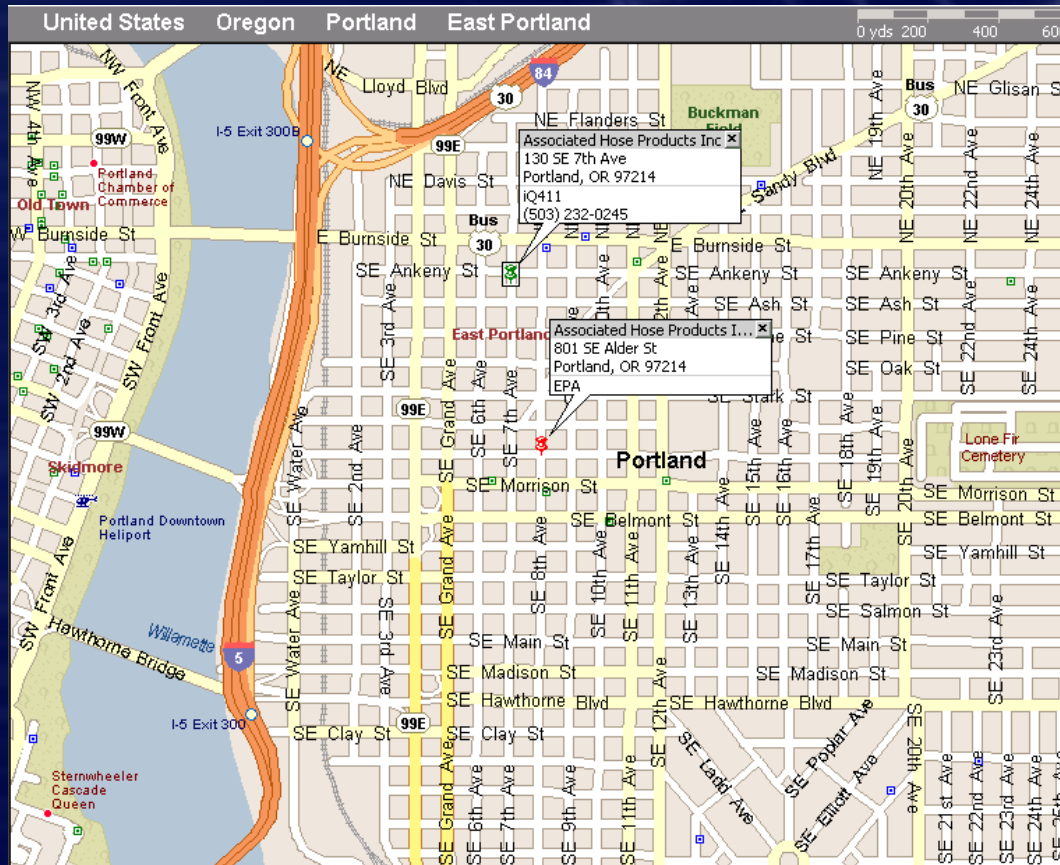# 3.3 VoiceXML for Universal Access and Homeland Security Applications

- Problem:
  - EPA's Facility Registry System (FRS) Database is our unique contribution to Homeland Security, but we need to know how accurate it is before we provide it for that purpose and need it to be delivered as a "Homeland Security" application (XML Web Service).
- Strategy:
  - Provide the FRS as an XML Web Service to Qsent to append its Directory Listing Web Services.
  - Use the FRS-Qsent Web Service to drive a VoiceXML Web Services for Emergency Notification (Reverse 911).
  - Use the FRS-Qsent Web Service to drive Error Correction Web Services (VoiceXML and XForms) to Validate the FRS-Qsent Web Service and FRS itself.

3.3 VoiceXML for Universal Access and Homeland Security Applications

- Qsent Features:
  - Over 145 million residential, business and government listings (99+%). Every record verified through phone installation and account activation with credit history.
    - 250,000 to 500,000 updates daily
    - Four searches methods
    - U.S. Residential – search for an individual
      - U.S. Business and Government – search for business or government agencies
      - Reverse Lookup – search by telephone number
      - U.S. All – search all directories at once
    - Geographic searches
      - City Surround – expand search incrementally from city center (lowest ZIP)
      - Neighborhood Search – search by neighborhoods using ZIP+4

3.3 VoiceXML for Universal Access and Homeland Security Applications

Qsent Verification of EPA Regulated Facilities

Microsoft's MapPoint Web Service!

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3.3 VoiceXML for Universal Access and Homeland Security Applications

Qsent's iQ411 Interactive: Reverse 911 Alert Lookup

3.3 VoiceXML for Universal Access and Homeland Security Applications

Perform Emergency Notification and Data Collection with VoiceXML
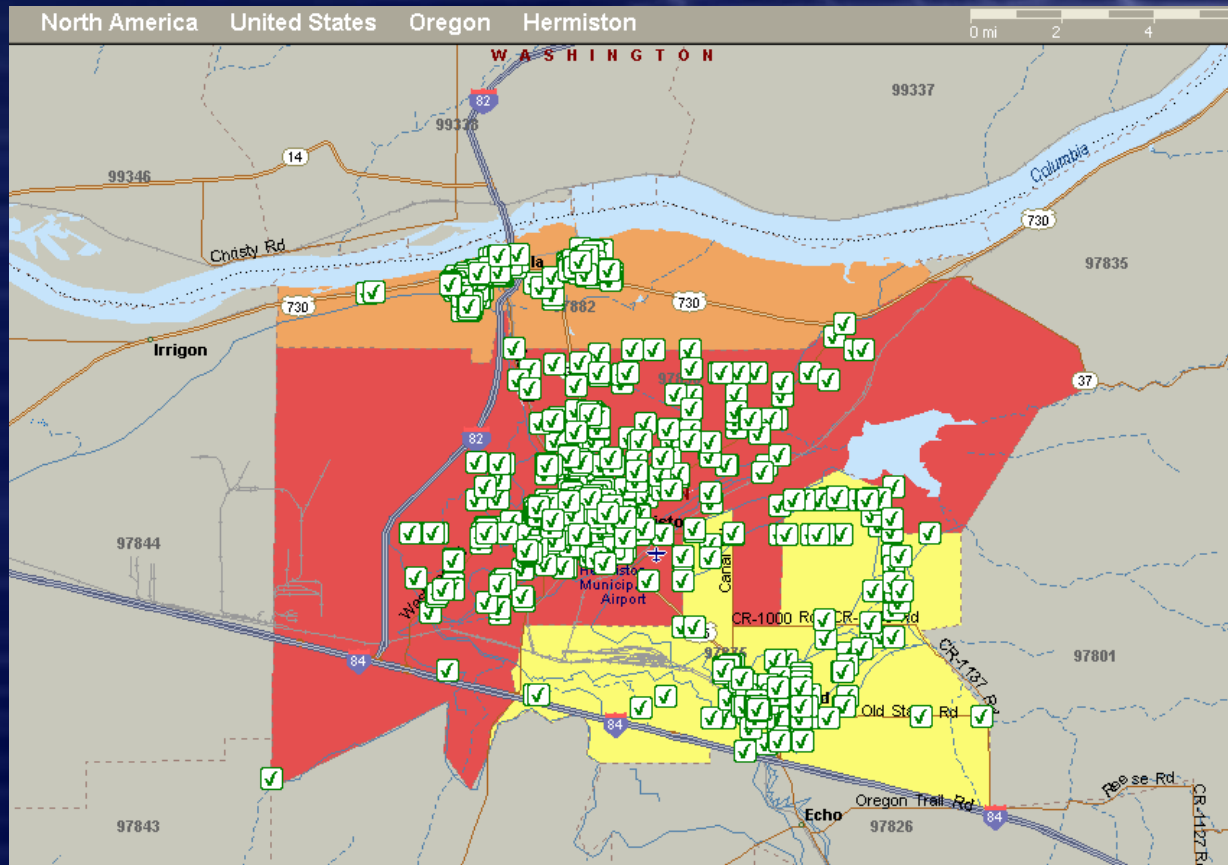
Simulated Contamination From Umatilla Army Depot

3.4 Geospatial Interoperability

End Users (B2C or B2B)

OGC Cascading Web Feature Server/Web Mapping Server

Cascading WFS/WMS

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OGC WRS

State and NGO Resources

EPA		
EnviroFacts DB		

EPA		
AirData		

EPA		
STORET		

EPA	USGS	Census	DoT	Other Federal
AirNow	GNIS Gazetteer	TIGER & STF	National Trans. Atlas	GIS or DB
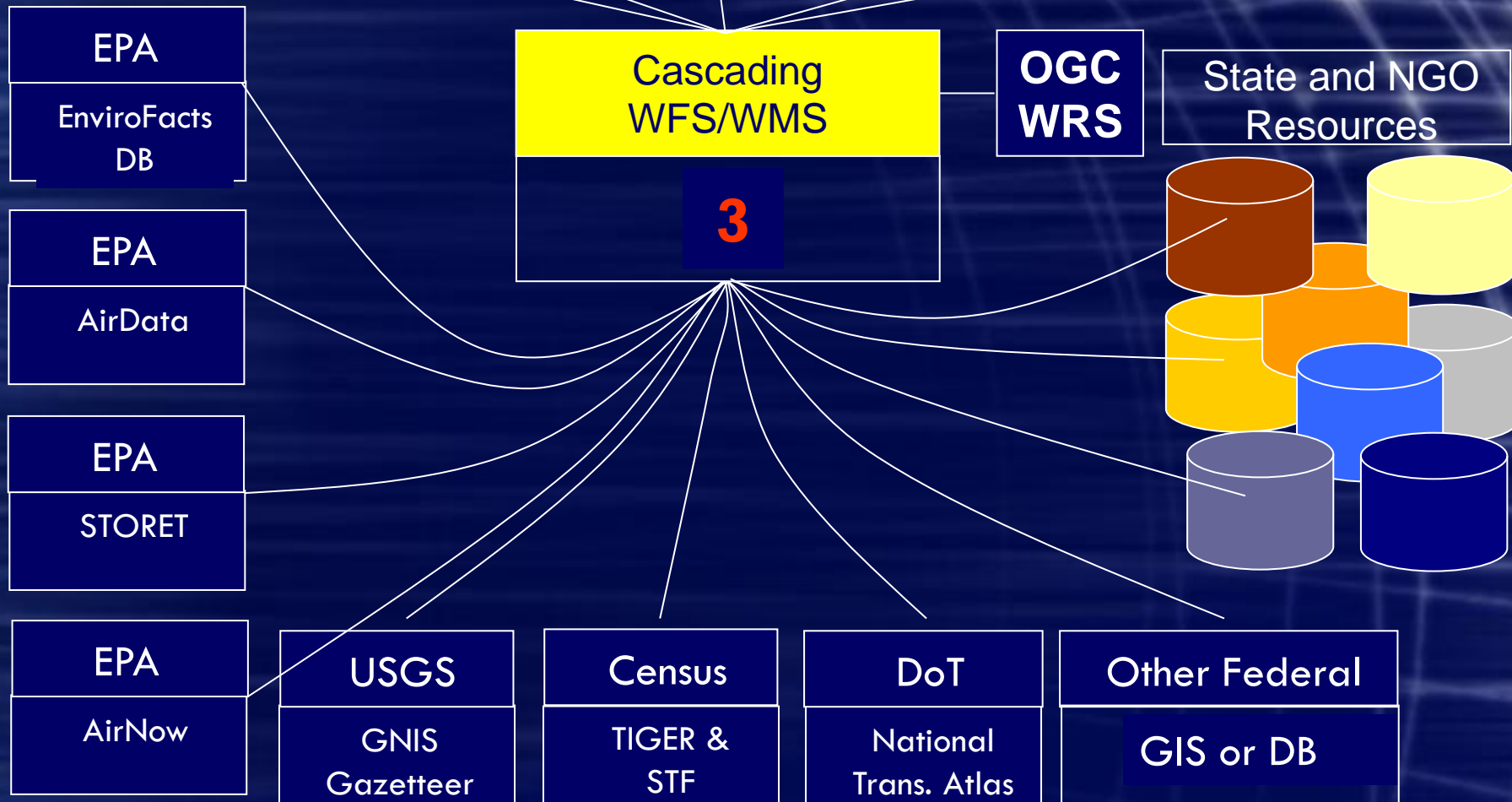
3.5 XML Web Services Content Authoring, Management, and Dissemination

Corel Smart Graphics Studio: Scalable Vector Graphics
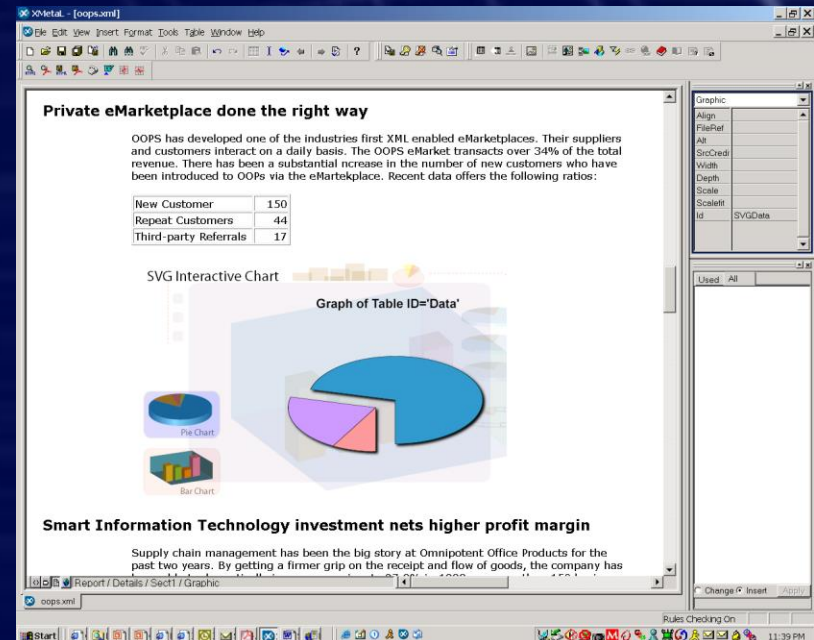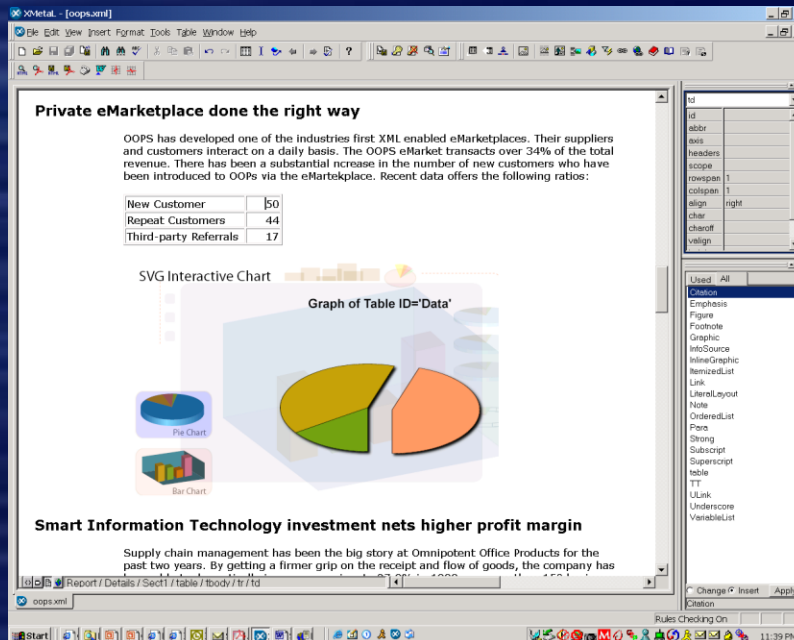
3.6 Military Systems-Federation of Registries, etc.

Common Content Linked by XML Web Services

- **Types of Registries(1):**
  - **ISO 11179 Registries**
  - **OASIS/ebXML Registries**
  - **UDDI Registries**
  - **Ontological Registries**
  - **Database Catalogs**
  - **Software Component Registries**
  - **CASE Tool Repositories**

- **Pilot Projects with Registries:**
  - **XML Design Collaboration and Registry Platform**
  - **XML Design Collaboration and Registry Platform**
  - **XML Design Collaboration and Registry Platform and Tamino**
  - **Open Standard Ontology Tool and Platform (Topic Maps)**
  - **Various (MetaMatrix, etc.)**
  - **Various (CollabNet's SourceCast, etc.)**
  - **Various (GIDS, etc.)**

(1) Source: Eliot Christian, USGS, based on work of ISO/IEC JTC1/SC32 Data Management Subcommittee chair, Bruce Bargmeyer (NIST, EPA, & LBL).

3.7 E-Forms for e-Gov: The Use of XML Standards-based Applications

- **"Eforms for E-Gov" Pilot Sub-Teams:**
  - **Accessibility**
  - **Business Case**
  - **Client Specifications**
  - **Fixed Content & Behavior**
  - **Form Selection** (six selected)
  - **Presentation**
  - **Records-Keeping**
  - **Schema** (draft paper)
  - **Security** (draft paper)
  - **Services**
- **Team Lead, Rick Rogers (rick@fenestra.com)**
- **Web Site and ListServ:**
  - **http://www.fenestra.com/eforms**
- **Recent news story:**
  - **http://www.gcn.com/vol1_no1/daily-updates/22014-1.html**

3.8 The MetaMatrix System for Model-driven Integration with Enterprise Metadata

MetaBase Modeler

(6) Map virtual XML Document to physical sources using Schema in MOF repository

Design-Time Integration of Data Via Web Services Architecture

(2) Identify and model XML schema types

(3) Import modeled XML elements and types into XML Registry

(4) Define XML Schema using registered elements from MetaBase

MetaBase Repository

XML Collaborator Registry

(5) Import XML Schema info MOF repository

(1) Import Physical Source Metadata

(8) Register WSDL in UDDI Registry

Web Service

Disparate Data Sources

(7) Create and Deploy Web Services for accessing integrated data

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3.9 Cognitive Topic Map Web Sites-Aggregating Information Across Individual Agencies and E-Gov Initiatives

3.10 Collaboration and CoSourcing: Designing Intergovernmental Services and Sharable Components

CollabNet: Effective Collaborative Software Development Environments

project workspace

software development applications

- scm
- issue tracking
- ide integration

knowledge management

- knowledge archive
(lists, forums, code)
- power search
- news
- notification

technical communication

- mailing lists
- discussion forums
- document and file management

project administration

application security, role-based permissions
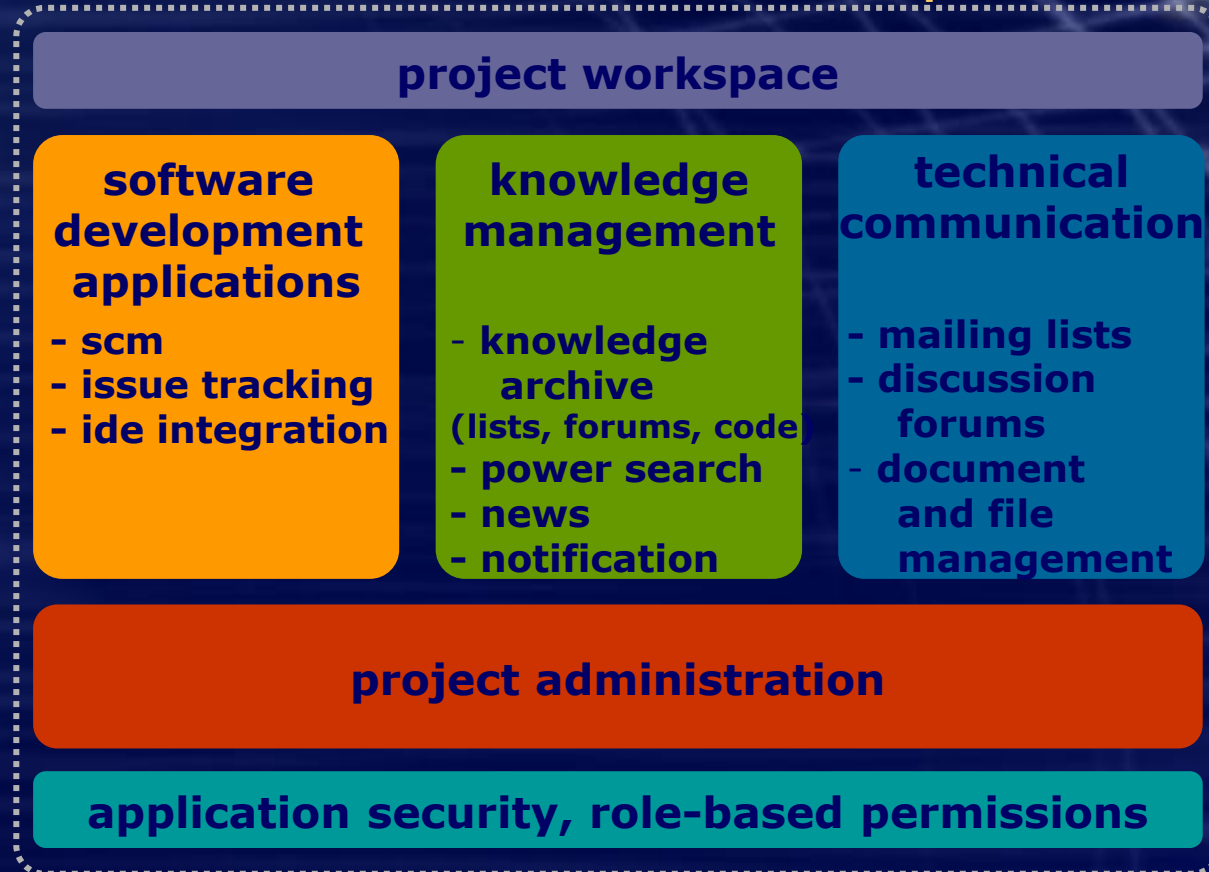
Integrates Structured Exchange (XML), Process Collaboration, and Free-form Interaction.

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3.11 The Potential of Semantic Technologies for E-Gov

The Semantic Web Wave –
Tim Berners-Lee (W3C), January 2003
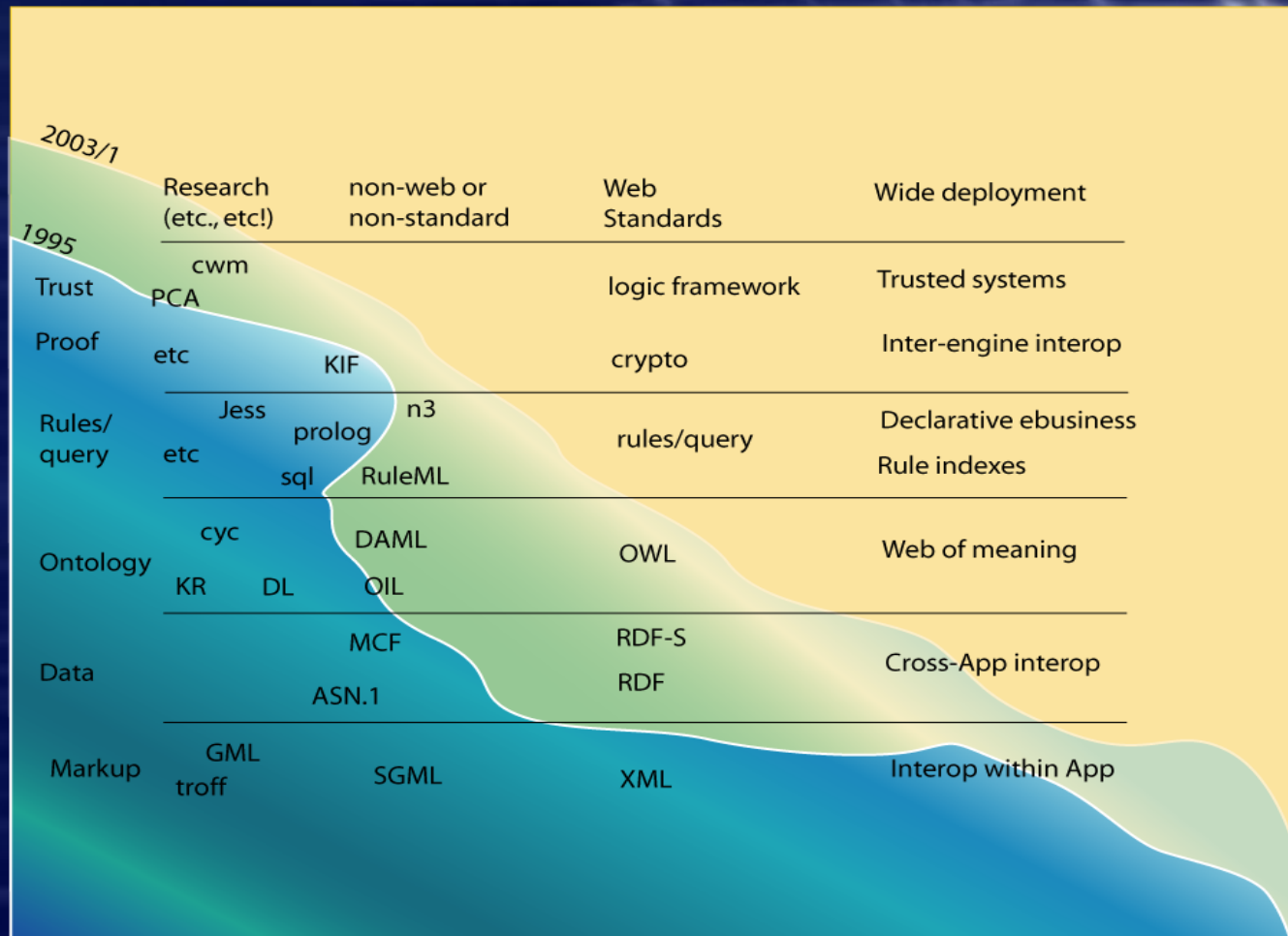
3.11 The Potential of Semantic Technologies for E-Gov

FEA Capabilities and Partnership Manager – Conceptual Architecture

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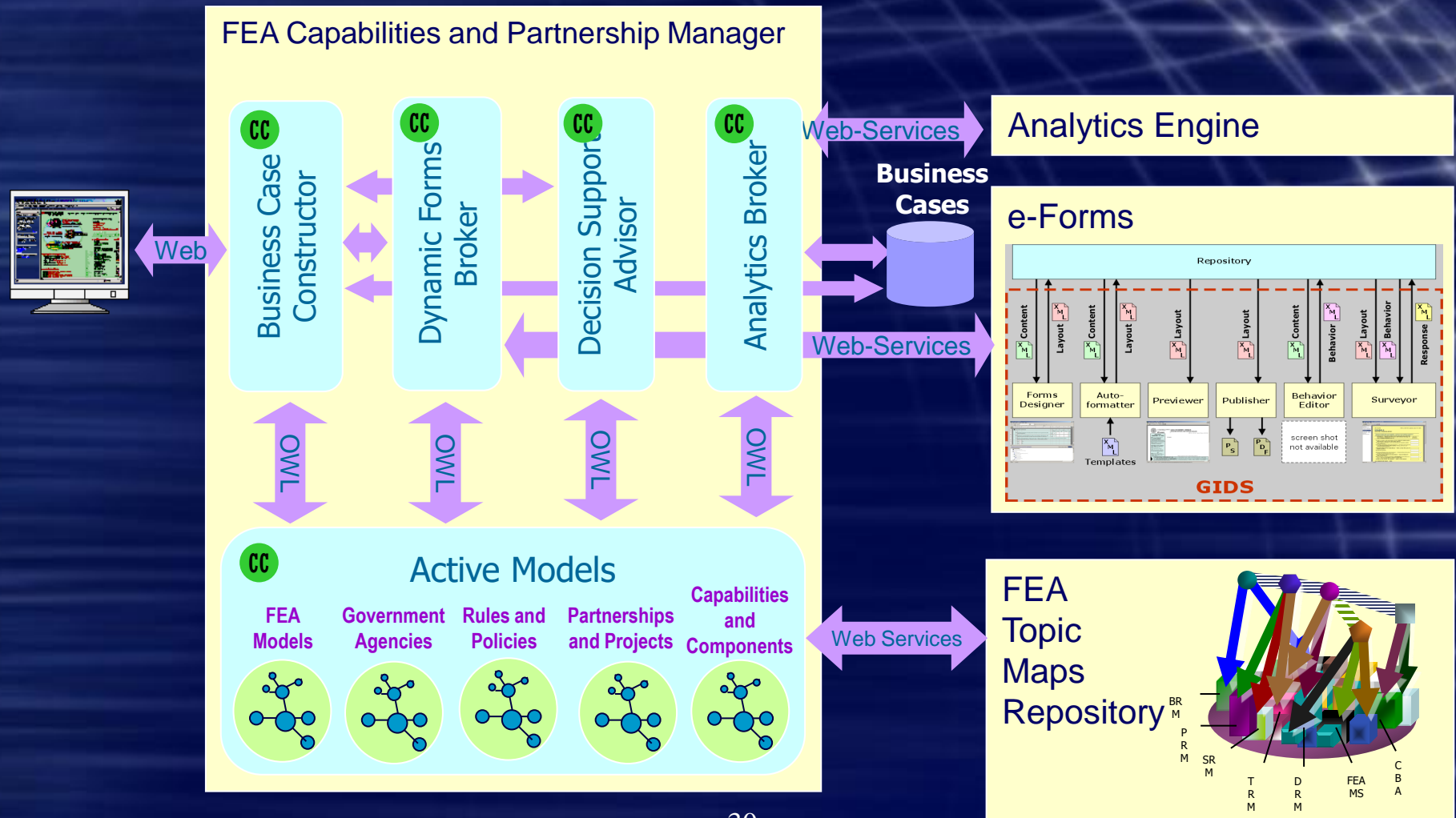
3.11 The Potential of Semantic Technologies for E-Gov

Representing Models with Semantics

- XML solves the problem of separating presentation from structure BUT:
  - No semantics except by explicit agreement BUT
  - Too many dialects AND
  - No interoperability between different dialects
- Semantic technologies are built on XML

DAML-S **(WEB Services)**	DAML-L **(Logic)**

DAML+OIL **(Ontology)** - OWL

RDFS **(RDF Schema)**

RDF **(Resource Description Framework)**

XML **(Extensible Markup Language)**
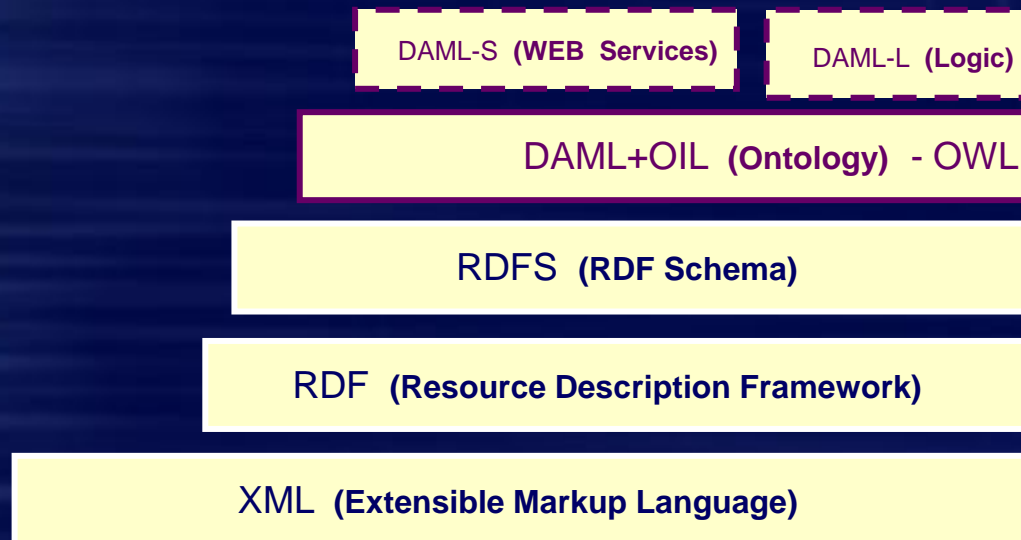
Ontology Engineering

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3.11 The Potential of Semantic Technologies for E-Gov
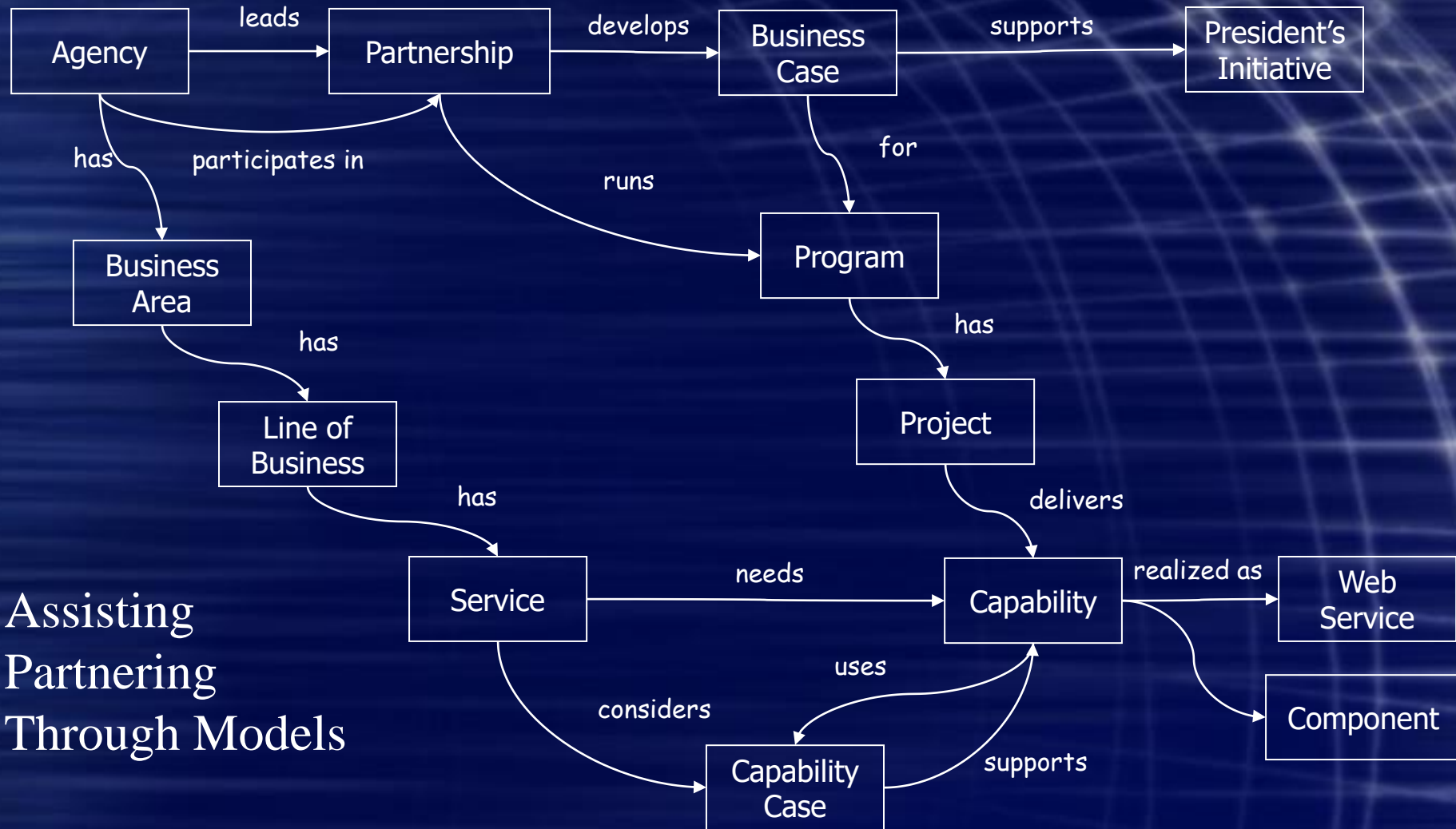
Assisting Partnering Through Models

3.12 XML Data Exchange Across Multiple Levels of Government Using Native XML Databases

Web Services
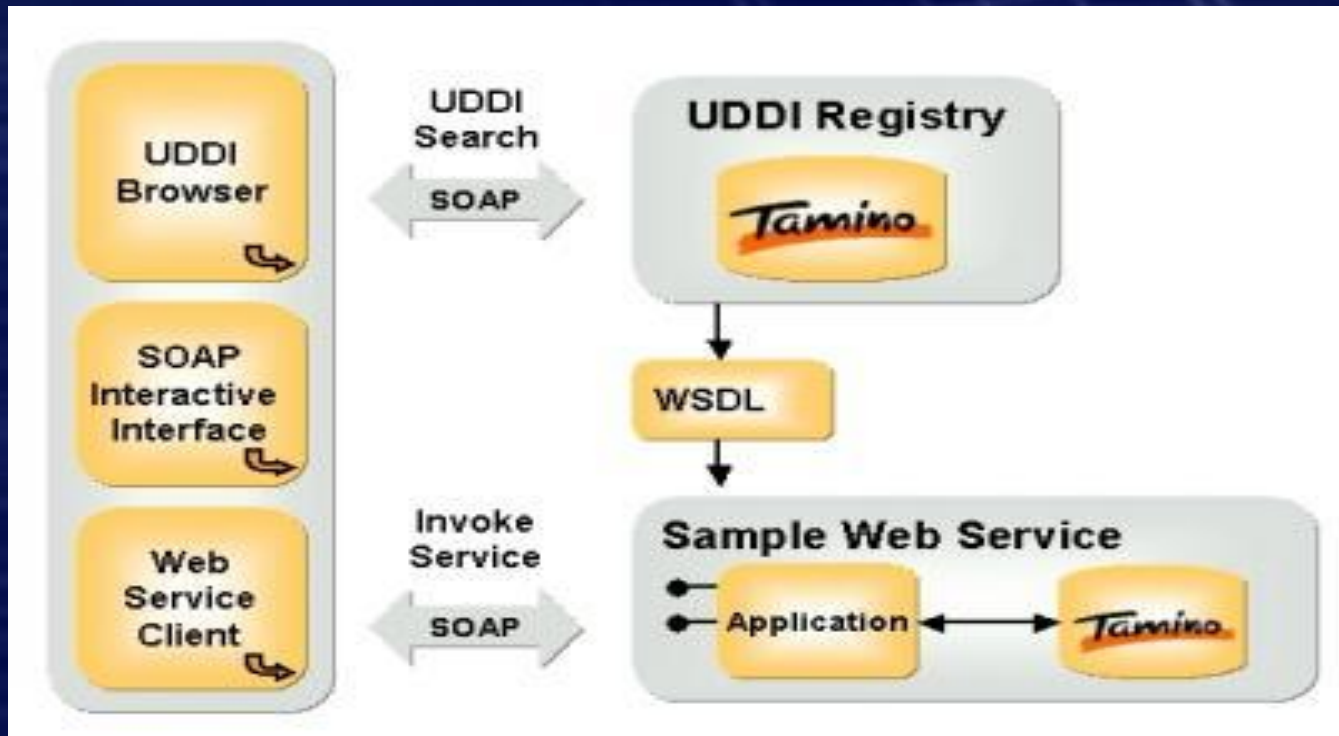
3.12 XML Data Exchange Across Multiple Levels of Government Using Native XML Databases

How UDDI Works

1) Software companies, standards bodies and programmers populate the registry with descriptions of different tModels

4) Marketplaces, search engines, and business apps query the registry to discover services at other companies

UDDI Business Registry

Business Registrations

Services Type Registrations

2) Businesses populate the registry with descriptions of the services they support

3) UDDI assigns a programmatically unique identifier (UUID) to each tModel and business registration and stores them in an Internet registry

5) Businesses use this data to facilitate easier integration with each other over the Web

4. E-Forms for E-Gov Pilot: Early Results and Business Case Outcomes

- 1. The original Pilot was requested by OMB in December 2002:
  - Recommend how to reduce redundancy and increase interoperability across the government in all the E-Forms solutions being used and requested.
- 2. The supplemental Pilot came from E-Gov Initiative Program Mangers in March 2003:
  - Assess the readiness of XML Web Services for a complete E-Gov Initiative like E-Grants, etc.
- 3. The request to operationalize this pilot came from the Business Compliance One-Stop Revised Business Case, April 2003:
  - Take advantage of the pilots to reduce regulatory burden and increase standardization and efficiency in data collection.
- 4. The permission to open source the Census' GIDS Software came from Commerce CIO Tom Pyke in April 2003:
  - This would permit usage by other agencies and governments (e.g. Canada) and distribute costs across more users.

4. E-Forms for E-Gov Pilot: Early Results and Business Case Outcomes

E-Grants Single System Solution (1/29/03)

XForms Web Browser Interface*

| Applicant 1 | Applicant 2 | Applicant 3 | ..... | Applicant N |

Valid XML*

E-Grants

Trusted Broker

XML Collaborator: Design Collaboration And Registration Support*

XML Repository & Web Services*

Valid XML*

| Agency 1 | Agency 2 | Agency 3 | ..... | Agency N |

XML Repository & Web Services*
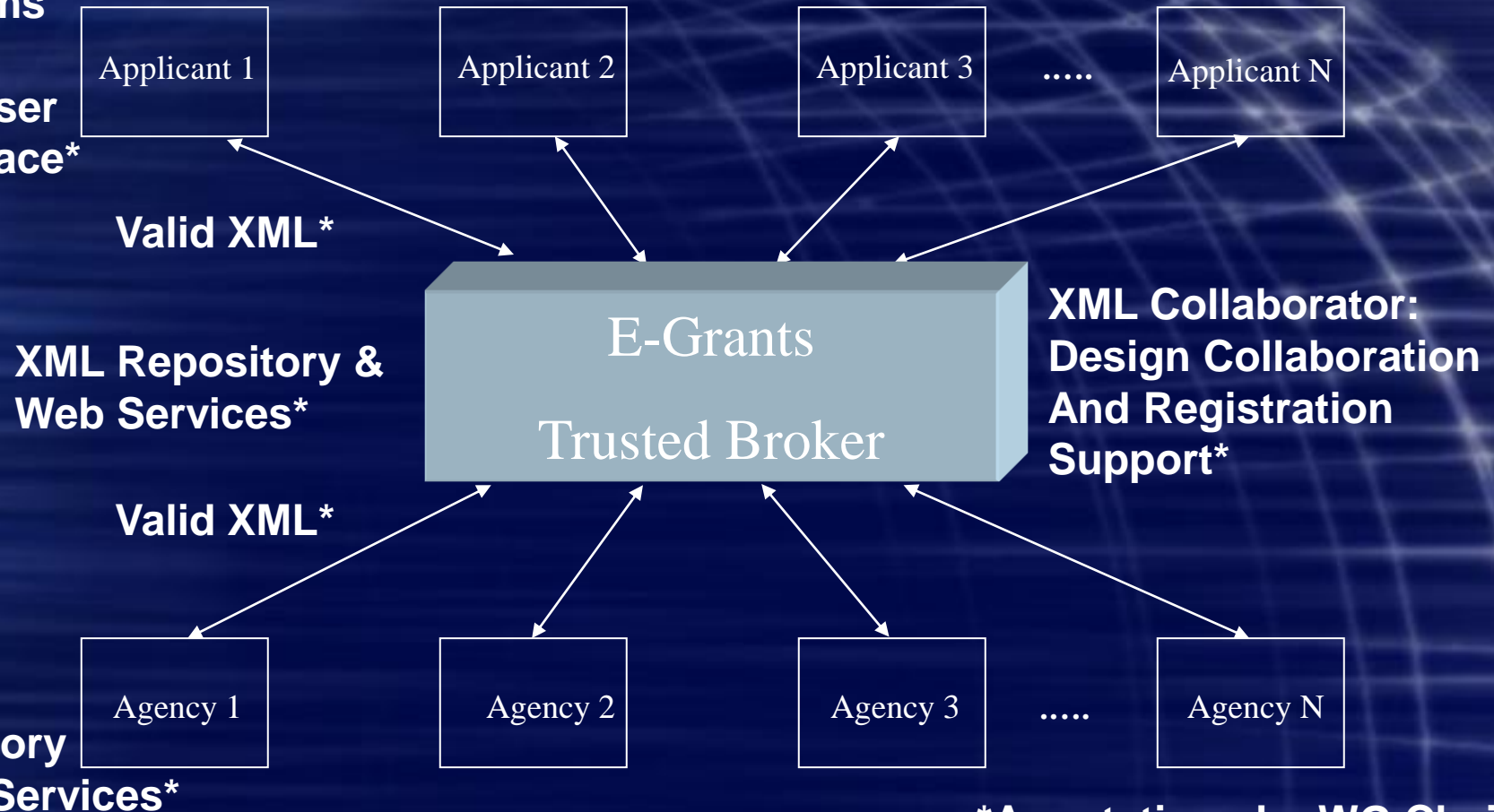
*Annotations by WG Chair

Trusted Broker Embodies Standards, Benefits Applicants and Agencies:
Facilitates System-to-System Interfaces
Builds applicant knowledge of "core" data
Helps identify commonalities among agency-specific data

4. E-Forms for E-Gov Pilot: Early Results and Business Case Outcomes

- Business Compliance One Stop Revised Business Case, April 20, 2003*:
  - "Regulatory Reform is just as important as tax reform for strengthening the economy"
  - Three Proposed Strategies for Reducing Regulatory Burden:
    - Make SBA the Advocate for Regulatory Burden Reduction.
    - Implement E-Forms for Major Industries.
    - Implement Compliance Assistance Tools.
  - Common Elements of Each Alternative:
    - E-Forms (like an Intuit's Turbo Tax).
    - Customer Agent.
    - Partnership.

*Richard J. Varn, President, RJV Consulting, Des Moines, Iowa.

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4. E-Forms for E-Gov Pilot: Early Results and Business Case Outcomes

- Business Compliance One Stop Revised Business Case, April 20, 2003*:
  - Appendix A. Alternatives Analysis - E-Forms:
    - Top Three Vendors:
      - Adobe.
      - Shana (now FileNET).
      - Pure Edge.
  - The principle of enter once; use often must be addressed in a wider context than in the past (Common Reference Model Draft, July 25, 2002).
  - The FEA data architecture and the DRM need to be turned into specific services that each of the E-Gov Initiatives can use to accomplish project and enterprise data management and integration goals (e.g. GSA's First Form, GIDS E-Forms, etc.).
  - There is the need for some shared services to perform the collection, management, integration, and reuse of common data elements (beyond the scope of the BCOS).

*Richard J. Varn, President, RJV Consulting, Des Moines, Iowa.

4. E-Forms for E-Gov Pilot: Early Results and Business Case Outcomes

Simplified Use Case: E-Forms

Design-time:

- Identify the data elements in the form(s), harmonize the elements (promoting reuse wherever possible) and create an XML Schema for each form (XML Collaborator).
- Store the XML Schema in an XML registry (XML Collaborator), so that others can access the information necessary to:
  - Create e-forms and paper forms (GIDS).
  - Create mapping(s) to information systems, such as relational databases, object-oriented databases, and flat files (MetaBase Modeler).
  - Store in native (Tamino Server) and/or relational databases.

Runtime:

- Present user with a form to be filled out. User populates the form and submits it (GIDS).
- Create XML from the submitted data (GIDS) that complies with the schema registered in the XML registry (XML Collaborator) and populate information systems with the data gathered from the user (MetaMatrix Server and/or Tamino Server).

4. E-Forms for E-Gov Pilot: Early Results and Business Case Outcomes

4. E-Forms for E-Gov Pilot: Early Results and Business Case Outcomes

UDDI Registry

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WSDL Document

3

1

4

Client

5

6
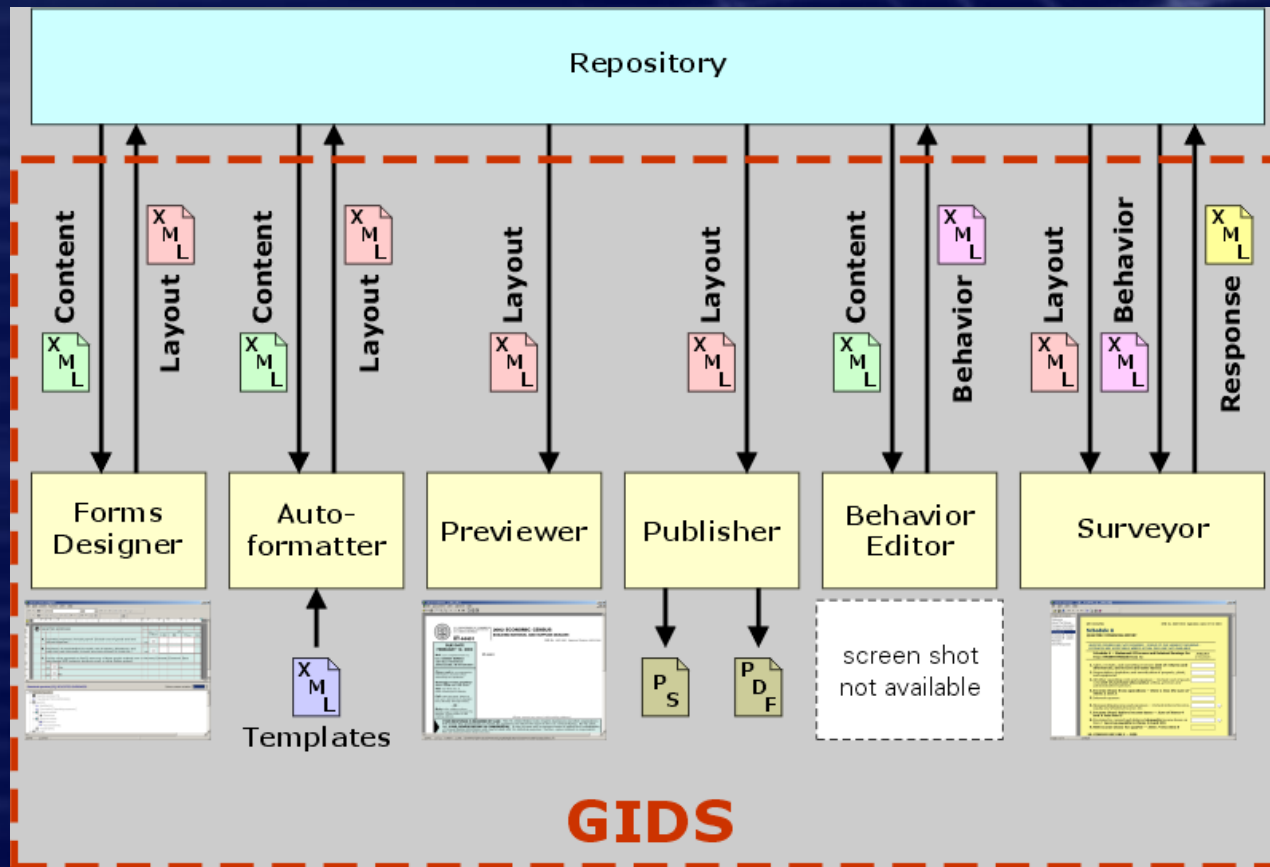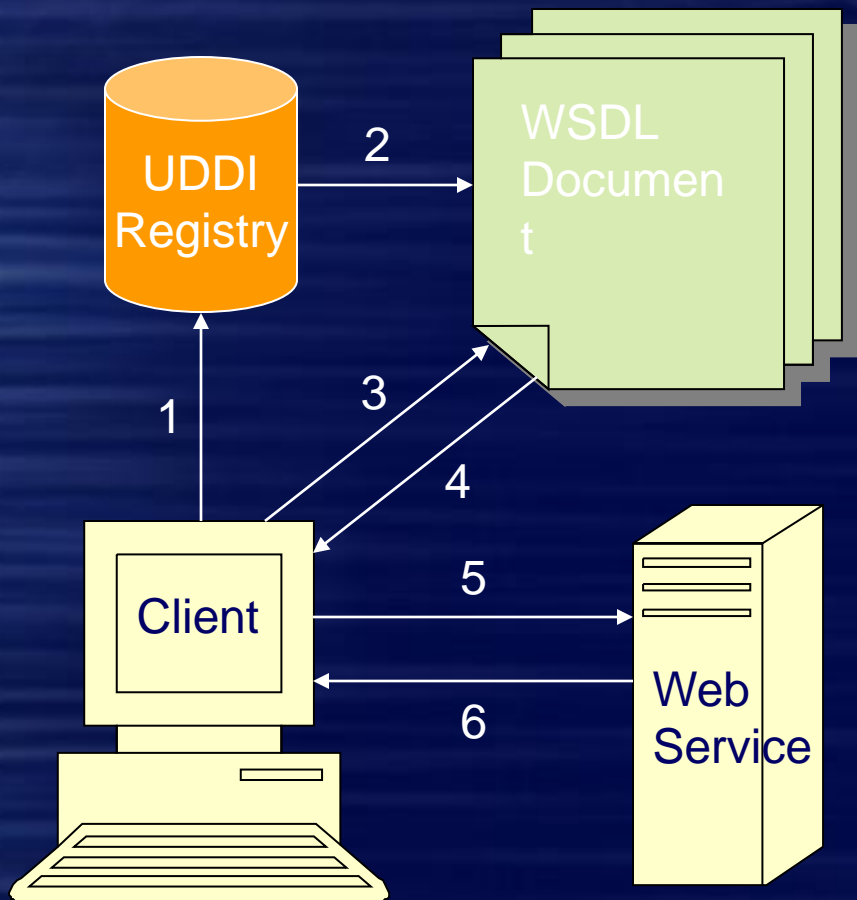
Web Service

- 1. Client queries registry to locate service.
- 2. Registry refers client to WSDL document.
- 3. Client accesses WSDL document.
- 4. WSDL provides data to interact with Web service.
- 5. Client sends SOAP-message request.
- 6. Web service returns SOAP-message response.

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4. E-Forms for E-Gov Pilot: Early Results and Business Case Outcomes

- June 2nd Workshop at the White House Conference Center:
  - 1. Open GIS Consortium
  - 2. Adobe
  - 3. Conclusive Technology
  - 4. Digital Evolution
  - 5. MetaMatrix
  - 6. Microsoft
  - 7. Object Builders
  - 8. Sand Hill Systems
    - Note: These vendors did not respond by the May 26th template deadline:
      - Soltex (Not heard from)
      - SeeBeyond (May submit for June 26th)
      - ITM Associates (May submit for June 26th)
      - Pure Edge (May submit for June 26th)
      - AmberPoint (May submit for June 26th)

4. E-Forms for E-Gov Pilot: Early Results and Business Case Outcomes

- **Component Registry and Repository Template for XML Web Services Pilot Projects:**
  - **(1) Company background and capabilities including participation in standards organizations. Include URL(s) to Web site (s). This could be in the format of the UDDI Business Registry (UBR) "White Pages" (general information about a company's name, address, contact information and identifiers), "Yellow Pages" (divides the company into various categories based on the products or services the company offers), and "Green Pages" (technical information about a company's products, services and Web services).**
  - **(2) E-Gov pilot architecture (where are the re-usable components?, where are the XML Web Services?, where are the possibilities for interoperability with other vendors in Phase 2?, etc.). Include URL(s) to diagrams.**
  - **(3) Demonstration of the pilot. Narrative of what the pilot shows. Include URL(s) to instructions and functioning Web services.**
  - **(4) Supporting documentation. Include URLs to XML artifacts (forms, XML Schema, WSDL, etc.) and other information to explain them.**
  - **(5) Lessons learned and suggestions (optional).**
- **Note: This template will have an XML Schema soon based on an extension of the UDDI XML Schema.**
  - **http://www.uddi.org/schema/uddi_v2.xsd**

4. E-Forms for E-Gov Pilot: Early Results and Business Case Outcomes

- **Note: Several of the vendor templates will be presented and demonstrated as time permits.**
  - **See http://web-services.gov**
- **Some Upcoming Events:**
  - **June 17th, Collaboration Workshop and XML Web Services Working Group Meeting.**
  - **June 18th, E-Forms for E-Gov Pilot Team Meeting.**
  - **June 26th, Emerging Components Conference Series.**
  - **July 15th, Solution Envisioning for Semantic Applications Workshop and XML Web Services Working Group Meeting.**
  - **July 17-18th, MITRE XML SIG Meeting.**
- **Questions and Answers.**