

SOA Governance and Standards

Andrew Battin, Deputy Director
Office of Information Collection

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EPA IT Contractors Forum

Overview

Share our practical experience gained in the development and implementation of the Exchange Network and the Central Data Exchange



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- Share our practical experience gained in the development and implementation of the Exchange Network and the Central Data Exchange



Topics

- Exchange Network / CDX Background
- Governance
 - Exchange Network
 - Web Services Working Group
- Standards
- Technology

SOA is Changing IT Governance



- **Traditional: command and control of IT resource**
 - Component management (hardware and software) and software reuse
 - Control of production, distribution and consumption
 - Vertically oriented
- **SOA: create opportunities and protect users and providers**
 - Business management: focus on behavior not the tools
 - Service utilization and opportunistic integration
 - Horizontally oriented: intra-enterprise, inter-enterprise, global
- **Changing value proposition for IT governance**
 - Focus is on business operations
 - Must support rapid change
 - Increased use of COTS and outsourcing
 - Standards enabling loose coupling
 - Leveraging open source

SOA Background

**Central Data Exchange
Exchange Network**



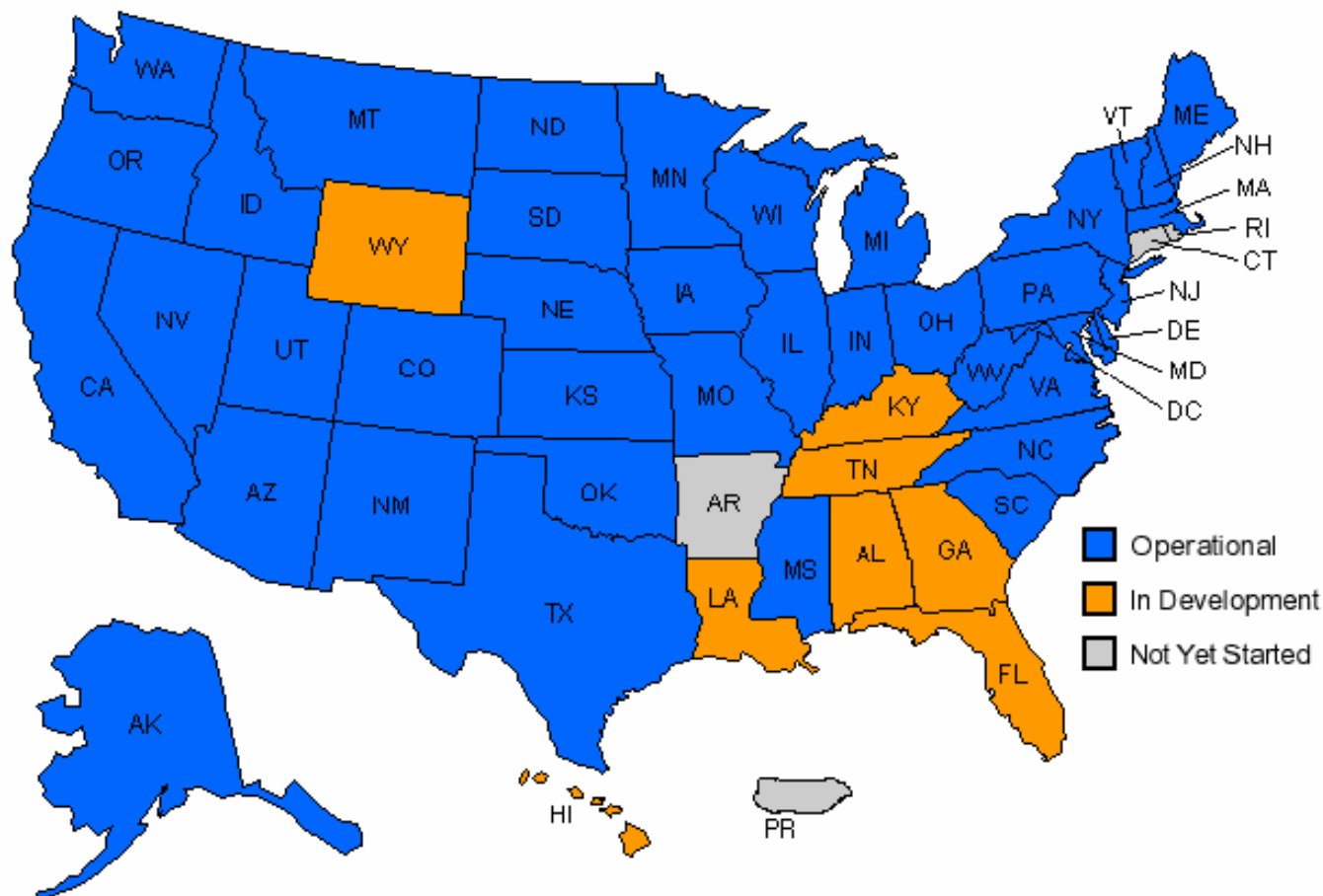
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CDX / Exchange Network



- Based on SOA Framework
- Shared Services Available
- Published in UDDI
- Share a Well-Tested Specification for Interoperability Across Platforms
- Minimize Burden on Consumers
 - Universal Clients
 - Software Developer Kits

Exchange Network Status





Network / CDX Flows

- Air Quality System
- E-Beaches
- E-Discharge Monitoring Report
- E-Grants
- Facility Registry System
- National Emissions Inventory
- Resource Conservation and Recovery Act
- Safe Drinking Water
- Substance Registry System
- Toxic Release Inventory
- Water Quality Monitoring

SOA Example from the Exchange Network and CDX



Substance Registry Lookup Service

Systematic Name	EPA Registry Name	Classification	CAS Number
1,1'-Biphenyl, chloro derivs.	Polychlorinated biphenyls	Chemical	1336-36-3
Polychlorinated biphenyls (containing 60 or more percent chlorine by molecular weight)		Chemical	No CAS Number

1.

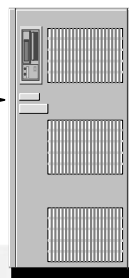
State application looks up detailed chemical information for a permit using an integrated Substance Registry Web Service

2. State Node validates submission using QA service prior to sending

State Permit Application



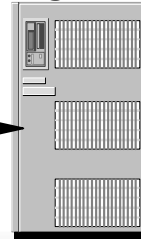
State Node extracts new permits



3.

Node submission to CDX

CDX

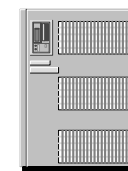


4.

CDX Calls multiple services internally

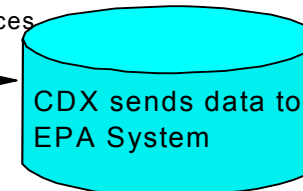
Logging
Archive
Validate

Quality Assurance Service



5.

CDX sends data to EPA System



Governance



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Exchange Network Governance



Exchange Network Leadership Council (ENLC)
Policy/ Strategic Planning

Coordinator

Network Operations Board (NOB)
Operations Oversight

Network Technology Group (NTG)
Day to Day Operational and
Technical Support

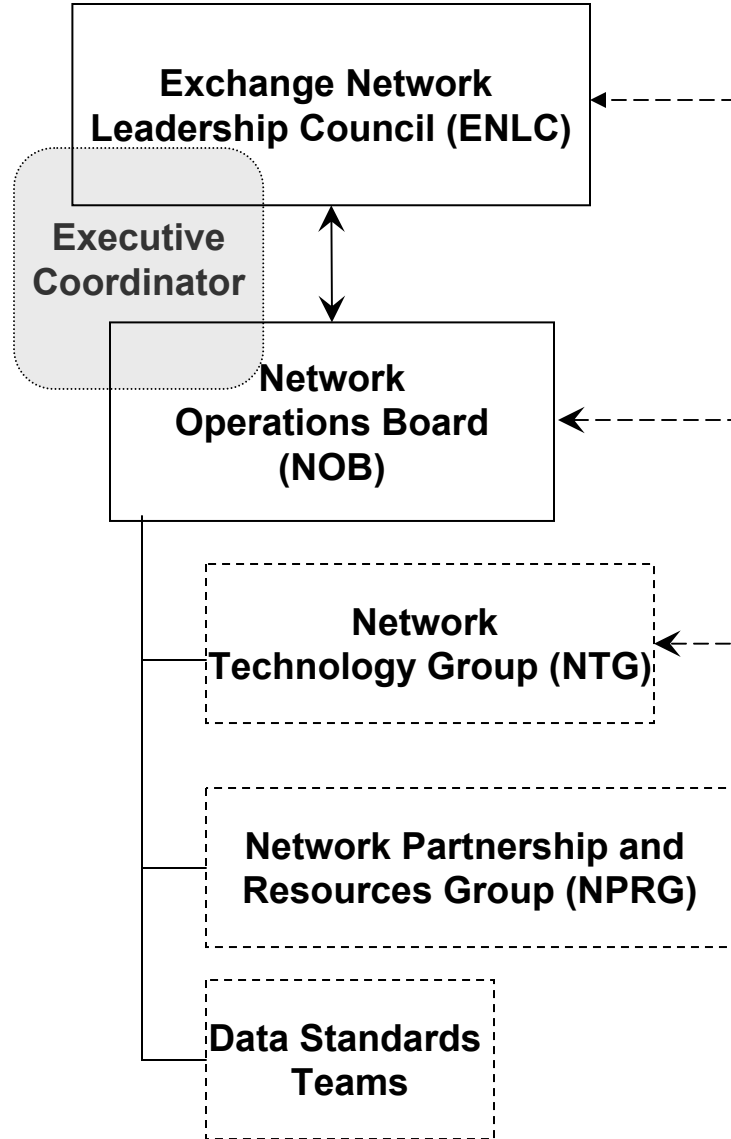
**Network Partnership and
Resources Group (NPRG)**
Day to Day Communications and
Resource Activities

Data Standards Teams*
Standards Design and
Development

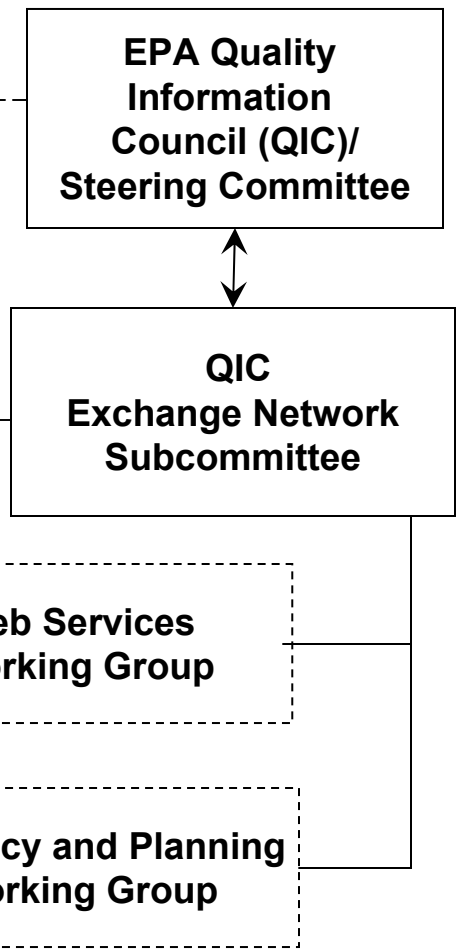
*Example Sub-Groups

Exchange Network Governance Alignment with EPA QIC

Exchange Network Structure



EPA QIC Structure



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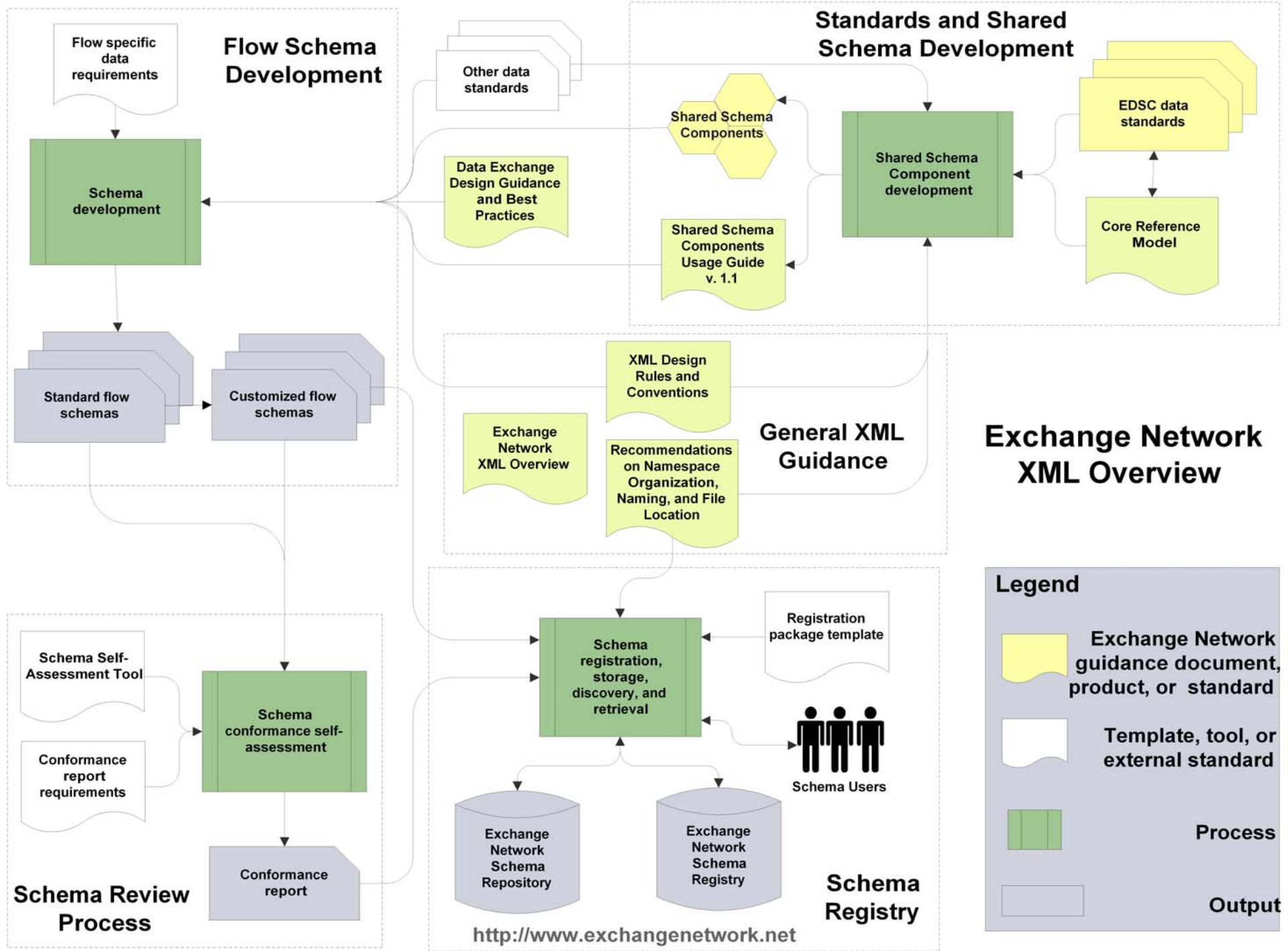
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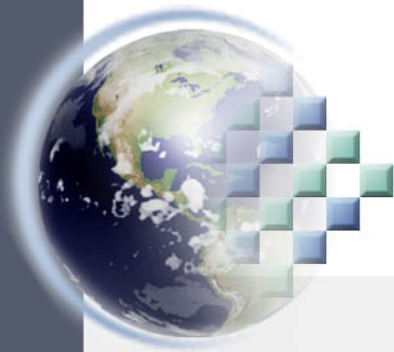
Exchange Network Design Guidance



- DATA EXCHANGE DESIGN BEST PRACTICES
 - Best Practices for Schema Design
 - Best Practices for Handling Large Transactions
 - Best Practices for Data Services
 - Best Practices for Data Validation
- DATA EXCHANGE MODELS
 - The Data Synchronization Model
 - The Data Publishing Model
 - Patterns in Authentication and Authorization
 - Patterns in Requesting Data
 - Patterns in Submitting Data
 - Other Data Exchange Scenarios



Web Service Working Group



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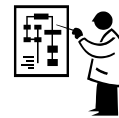
Significance of the WSWG Mission



The deployment of a SOA creates significant technical policy challenges...



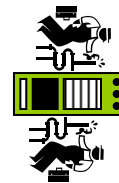
Common Architecture: Without clear guidance & technical direction the development of web services can be costly & pose significant security & interoperability problems



Standardizing Components: Fine grained web-services can be easily accessed and integrated with other application – publish services, not applications



Standardizing Interface: Standard interfaces reduce cost, promote code sharing, and facilitate integration



Making Middleware Interoperable: Interoperability service middle supports successful deployment



Centralizing Security: Centralized security services reduce costs and ensure effective security



Standardizing Tools: Common tools with strong industry support strengthen the system & increase longevity

WSWG Areas of Interest

Quality Assurance Services - Schematron

Network Technology Group - Processes for Schema Development, Review and Approval

Geo-spatial: USGS/ESRI Data Feeds

Business Process Execution Language (BPEL)

Web Services Management

Using the XML Gateway

Commercial Web Services and Interoperability for Oracle, Informatica, Business Objects, Documentum, etc.

Web Services in the Enterprise Architecture

External Web Services

EPA Internal Tool Services

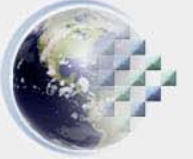
Using UDDI

Interoperability

Payloads, DIME Attachments, Different Formats

Funding Models/WCF

Web Service Standards



WSWG – Examples of XML Schema Guidelines

- **XML Namespace Must Use URL:** Namespace URL can not only ensure uniqueness, but also provide location information.
- **All XML Schema Should Be Registered In the Registry:** Registry is the official place for publishing XML Schemas.
- **A Procedure for Schema Quality Assurance Is Needed:** XML Schemas should be tested before publishing.
- **New Schemas Should Use Common Vocabularies:** Sharing common vocabularies, elements, and schema components can improve interoperability and reduce cost.

WSWG – Examples of Web Service Guidelines



- **WSDL File Is Required For All Web Services** : WSDL is the contract/Agreement between provider and consumers. It facilitate code generation and dynamic binding.
- **Web Service Attachment Should Be Defined Carefully:** DIME has better performance over SwA (SOAP with Attachment). MTOM should be widely adopted.
- **Web Services Should Support Both SOAP 1.1 and SOAP 1.2:** SOAP 1.1 is still the dominant protocol while SOAP 1.2 is gaining momentum.
- **Generic Web Services** promote code sharing, service sharing and interoperability.

WSWG – Examples of UDDI Guidelines



- **UDDI Should Be Used As the Central Web Service Registry :**
It provide standard web service interfaces for discovery and integration. All web services should be published into the registry.
- **Registration of Web Services Should Be Controlled:** A standard process for publishing web services to the UDDI registry is needed. (Validation – Approval – Publish).
- **All Published Web Services Must Have WSDL:** Web service description file is required for binding.
- **Web Services Should Be Categorized in the Model:** A web service must have an association to a Technical Model defined in the UDDI registry.

Standards



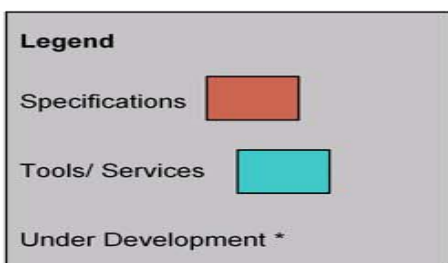
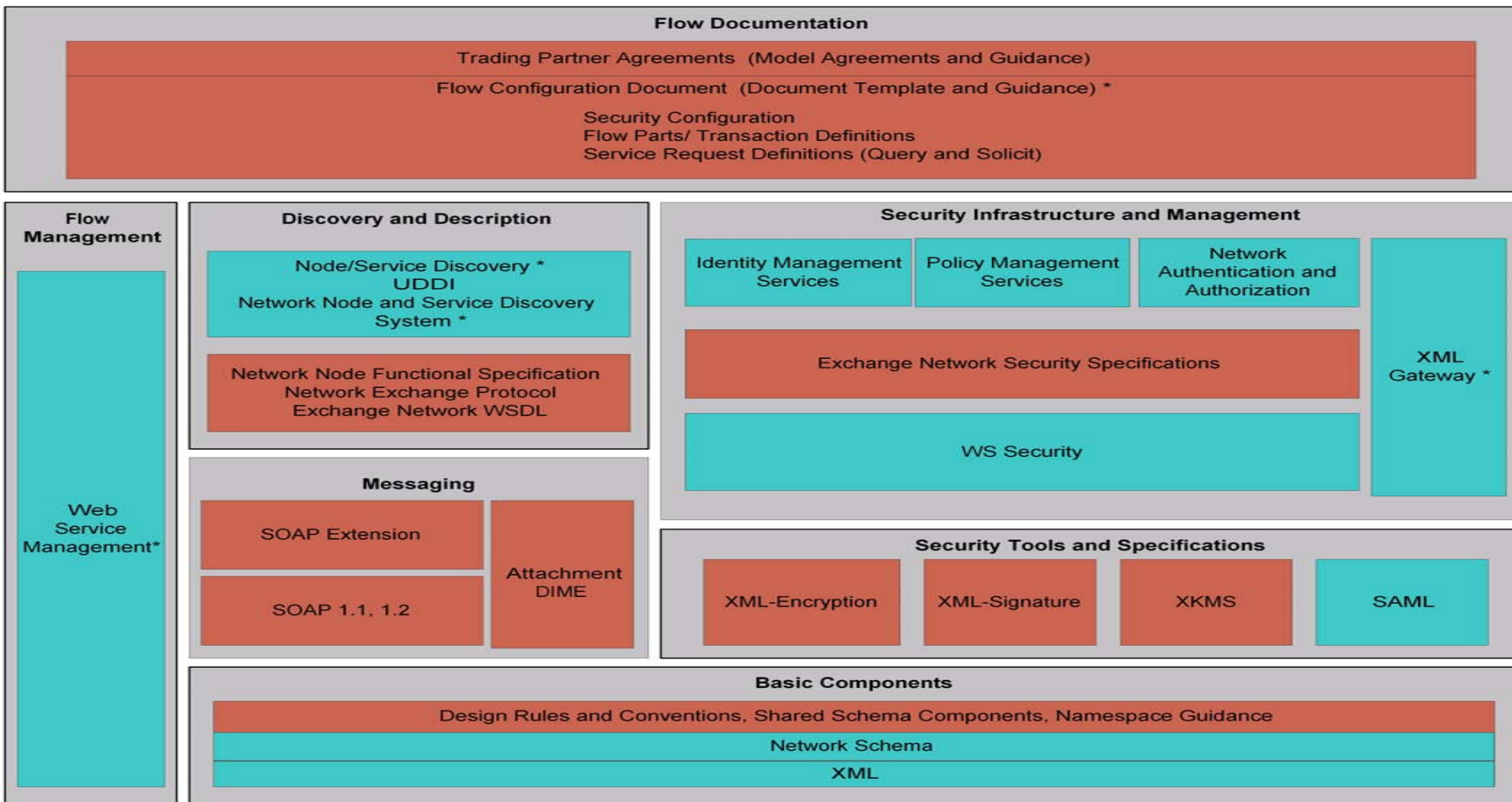
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Standards in Place for the Exchange Network /CDX



- SOAP v1.1: Simple Object Access Protocol
- WSDL v1.1: Web Services Description Language
- UDDI v3: Universal Description, Discovery and Integration
- W3C XML-Encryption
- W3C XML-Signature
- SAML v1.1: Security Assertion Markup Language
- WS-Security v1.0
- XKMS v2.0: XML Key Management Specification
- DIME – Direct Internet Message Encapsulation
- Exchange Network Protocol and Specification

Current and Anticipated Exchange Network Technology and Specifications Stack



Exchange Network Technology Standards and Specifications

Technology



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SOA Infrastructure and Shared Services



- **Universal Description, Discovery, and Integration (UDDI)**
 - A catalog of services and service definitions that enables organizations and applications to quickly, easily, and flexibly find and use Web services over the Internet.
 - Deployed UDDI V3 (Systinet) and Drafted UDDI Guidelines
 - *Status: In Production*
- **XML Gateway (DataPower)**
 - Web service message filtering and XML acceleration services.
 - e-Authentication/SAML Pilot Complete
 - *Status: In Test*
- **Network Authentication and Authorization Services (NAAS)**
 - Security services for authentication and authorization of web services.
 - *Status: In Production*

SOA Infrastructure and Shared Services



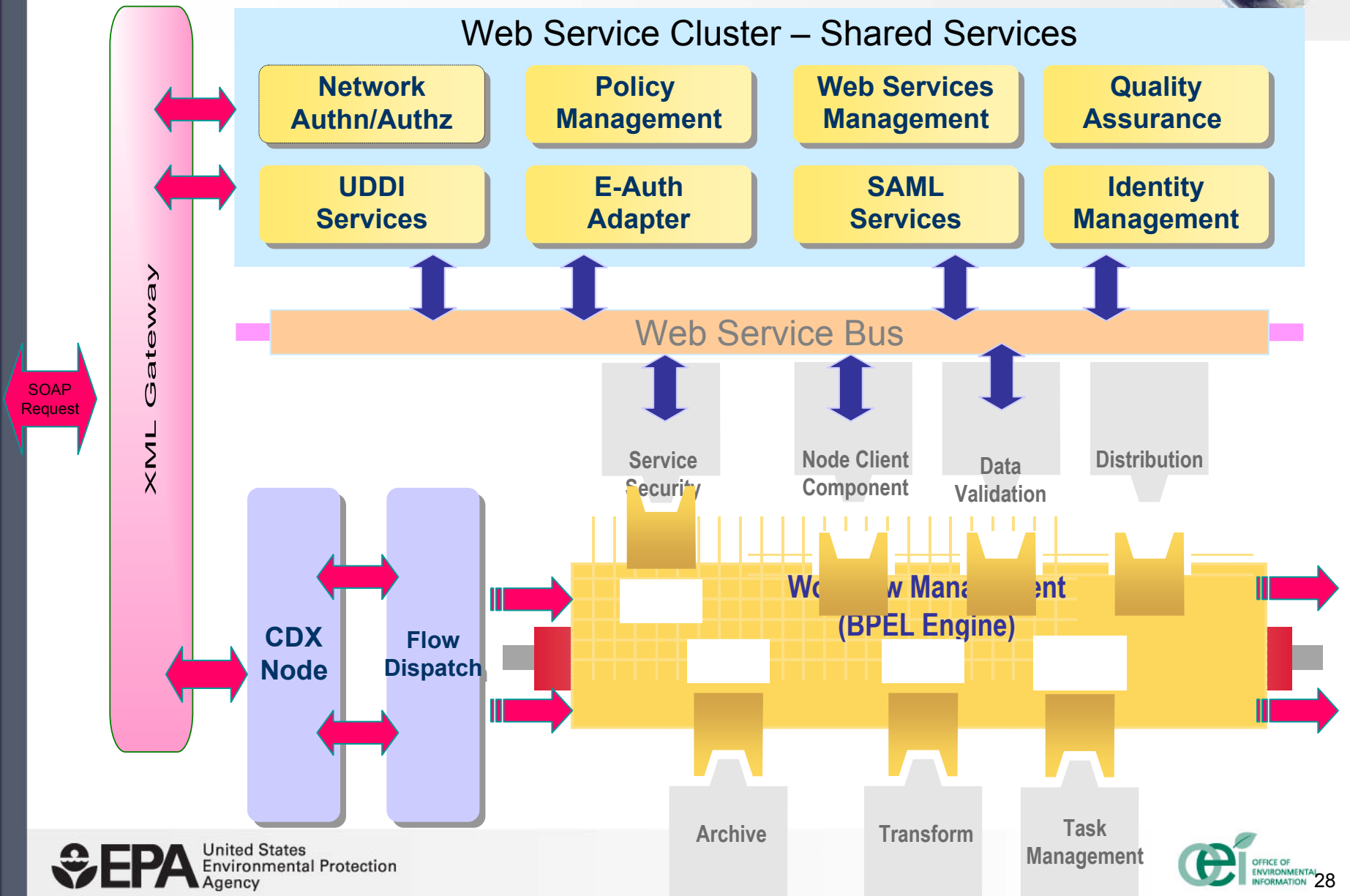
- **Quality Assurance**

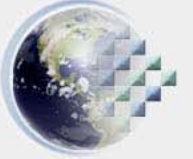
- Services for validating XML documents against schemas and extended business rules.
- *Status: In Production*

- **Business Process Execution Language (BPEL) - Orchestration**

- *Status: Under Evaluation*

CDX SOA Model





Questions?

- References:
 - www.epa.gov/webservices
 - www.epa.gov/cdx
 - www.exchangenetwork.net
 - Web Services Working Group
 - Contact Connie Dwyer, dwyer.connie@epa.gov