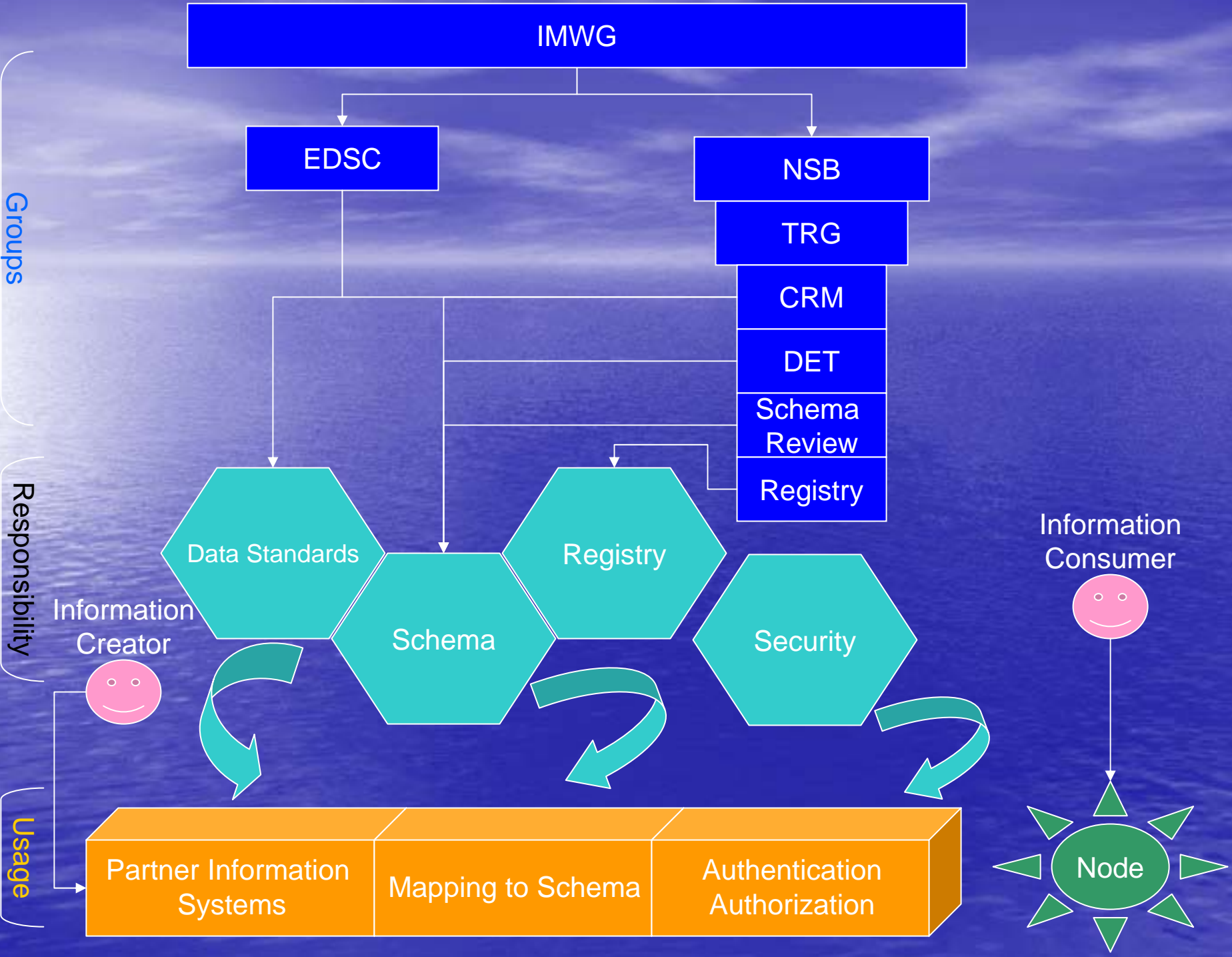


# Exchange Network and Node Overview

Prepared for the Exchange Network Knowledge Transfer Meetings  
Philadelphia, Pennsylvania - April 16, 2003  
Chicago, Illinois – April 22, 2003  
San Francisco, California – May 5, 2003

# What Is a Network Node?

- A Partner's point of entry to the Network.
- The hardware and software Partners use to exchange information on the Network.
  - The operational layer between a Partner's information system and the requesting exchange Partner.
- A Node's operation is guided by the Exchange Protocol, Functional Specification, and other Network Guidance Documents.



# Data or Information Flows over the Network

- Current work is focusing on existing regulatory Flows (e.g. NEI, FRS etc.)
- Partners are already expanding beyond these to different kinds of information, from other sources.

# Network Benefits

- Allows access to more current information
- Sets the stage for the broader exchange of information to include non-regulatory partners
- Provides for more timely, reliable, standardized and consistent data exchanges between Partners
- Provides an opportunity to reduce current reporting burden
- Enhances potential for data integration
- Gives agencies more control over their own data, and ability to tailor other's data to their use.
- Trading Partners select and maintain their own web service infrastructure
- Platform independent

# Looking Under the Hood: Introduction to Network Operation



# The Network Node Supports Four Basic Operations

1. **Administering:** Housekeeping.
2. **Querying:** Querying a partner for some data.
3. **Sending:** Send a set of data to a partner.
4. **Retrieving :** Retrieving from a partner a standard set of data.

# Using the Network

- To be “on” the Network you are either a Service Provider or a Service Consumer
  - Most Nodes will be both
  - Some Service Consumers will only use a client
- Exchanges will be:
  - Node-Node (routine, large, secured communications)
  - Consumer-Node (ad-hoc, smaller communications)



# Broad Range of Service Provider and Consumer Options

- Network Nodes can be used to:
  - Service Other Nodes: support aggregation of data from other Nodes that can then be displayed on a website.
  - Service Clients: submit retrieval data from a Node using a simple client.
  - Integrate Applications: where a local application (webpage, model or report) retrieves information from one or more Nodes as needed.
  - Provide Node Services: use a “hosted” Node, that interacts with other Nodes as a client, but puts data on the Network.
- Two documents describe/define how this works

# Network Exchange Protocol (Protocol)

The *Protocol* is the set of rules that governs the generation and use of valid service requests and responses.

# Network Node Functional Specification (Specification)

The *Specification* is a detailed description of a Node's expected operation that includes:

- A description of the functions the Node will perform
- How those functions are to be invoked
- The output expected from the Node

# The Protocol and Specification

- If you want to build a Node
  - The Protocol and Specification define the expected operation of all Network Nodes.
  - The Network WSDL file exactly defines the Protocol and Specification for Node building.
- If you want to send data to a Node
  - The Protocol defines the expected format of all requests and responses from Nodes.
  - The Network WSDL file could assist you in building a client.

## Protocol and Specification (Cont'd)

- If you want to retrieve data from a Node
  - The Protocol defines the expected format of all requests and responses from Nodes.
  - The Network WSDL file could assist you in building a client.
- *But many users will not need to interact with these directly—they will not care, they just want their data.*

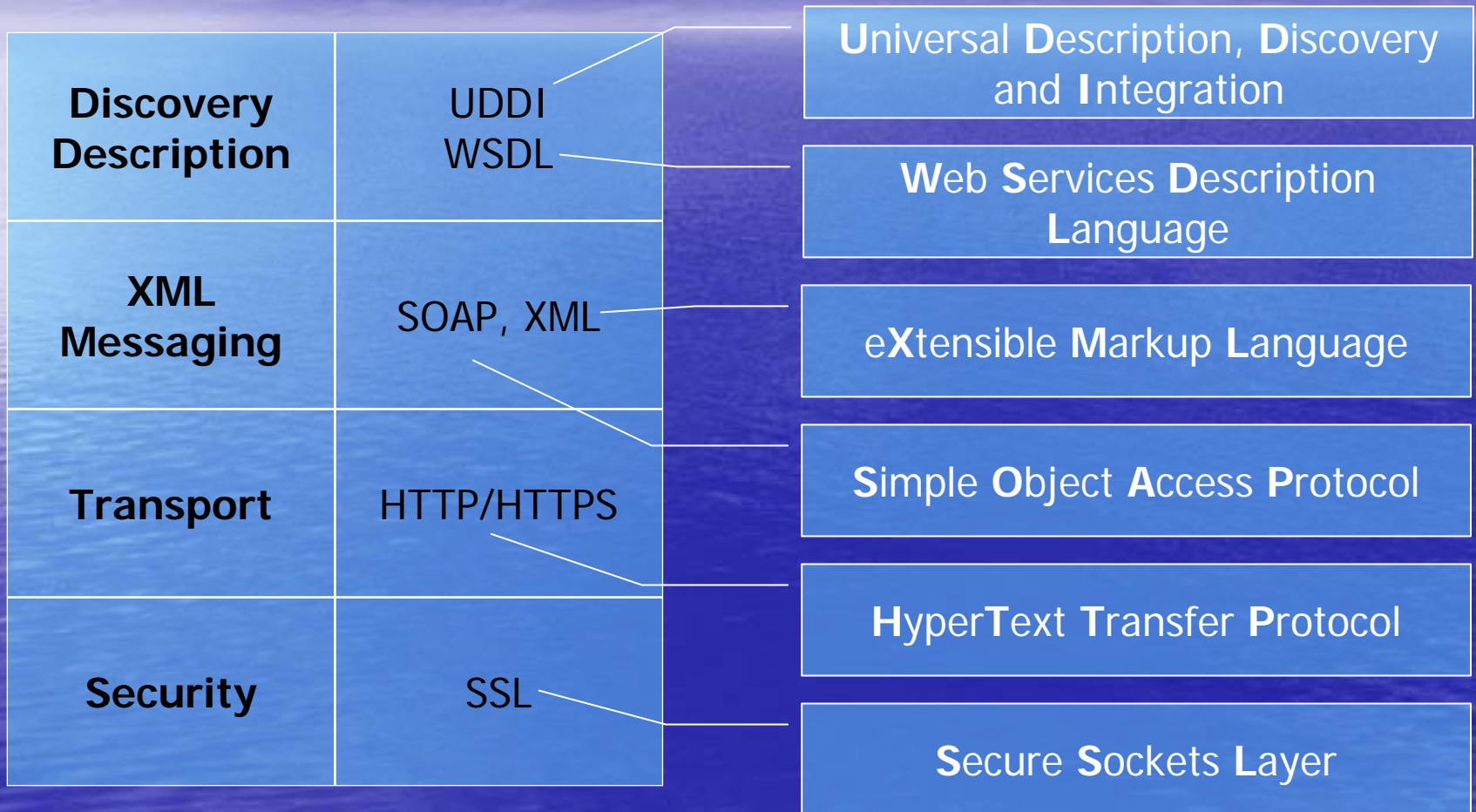
# Expectations for the v1.0 Protocol and Specification

- The Protocol and Specification have an expected shelf life of between 12 and 24 months.
- The documents are forward-looking.
- The Protocol and Specification generically describe Network operations.
- Future work and experience will define very specific flow business processes.

The background of the slide is a photograph of a vast blue ocean meeting a blue sky with wispy white clouds. The horizon line is visible in the upper third of the image. The text is centered in the middle of the frame.

# **Basic Network Technologies and Standards**

# Defining Network Standards and Stack





# Description

## WSDL

- The WSDL file is a machine readable description which provides a central place where the parties to a trading partner agreement can store new service descriptions for subsequent retrieval.
- For a given web service, its WSDL file describes four key pieces of data:
  - Interface – information describing all available functions/methods.
  - Data type – information for all message requests and message responses.
  - Binding – information about the transport protocol to be used.
  - Address – information for locating the specified service.

## How the Network Uses WSDL

- WSDL represents the contract between the service requester and the service provider.
- Using WSDL, a consumer can locate a web service and invoke any of its available functions.
- WSDL aware tools enable the consumer to automate this process.

# Discovery

## UDDI\*

- This layer is responsible for centralizing services into a common registry and providing publishing/finding functionality.
- The Exchange Network will create and operate one private UDDI registry shared by all Network Nodes.

\* Currently under development by EPA/CDX

# Questions





**Using the Node:  
The Building Blocks for Information  
Exchange**

# Methods for Network (Hence Node) Operations

Interface	Methods
Administration	NodePing, GetServices
Security	Authenticate, Authorize*
Querying	Query, Execute
Sending	Submit, GetStatus
Retrieving	Notify, Download, Solicit

\* Currently under development by EPA/CDX

# Putting it all Together in a Transaction: Query



# Node Usage/Choices

Business Need	Current Approach	Network Options	Node Operation
Periodic/ Occasional Information sharing with a Peer	E-mail Attachments, FTP, Website posting	NA, unless volume or frequency increases (see below)	NA
Routine Information Sharing with a Peer (especially secured or confirmed)	Batch uploads, email, FTP	Node to Node, or use of a hosted node.	Solicit/Download /Query (Pull) Submit (Push)
Automatic request for ad-hoc information	Custom software	Node to Node, or client to Node	Query (Pull)
Automated collection of data from multiple peers	Multiple Telephone Calls	Node to Node interactions	Solicit/Query (Pull)

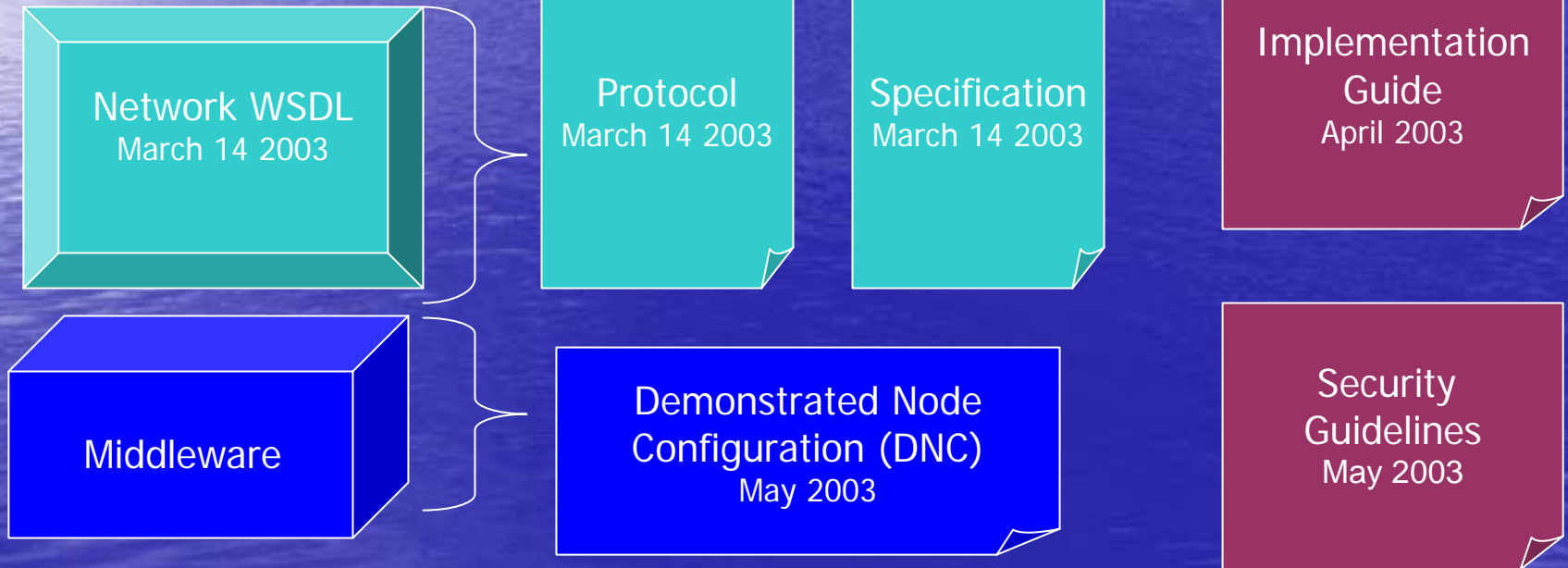




**Building the Vehicle:  
A Partner Node**

# Components of Node Building

## Supporting Documents



# Node 1.0: Diverse Database Environments, Hardware, and Middleware

State	Database Environment	Hardware	Middleware
DE	SQL Server 2000	Dell PowerEdge Dual Pentium	.NET 1.0
ME	Oracle 9.2	Sun E6500	Oracle 9iAS
MS	Oracle 8i	Dell PowerEdge 2650	.NET 1.0
NH	Oracle 8.0	Compaq Proliant ML370	BizTalk Server 2000
NM	TEMPO	Sun SunFire 280R	WebSphere v4.05
NE	DB/2	Gateway 2000 server	XAware XA-Suite
UT	Oracle 9i	Compaq Proliant server	Sybase EASserver
CDX	Oracle 9i	Dell PowerEdge Dual Pentium	BEA WebLogic



# **Network Security**

# Four Basic Network Security Needs

- Authentication
- Authorization
- Confidentiality
- Message Integrity

# Current Network Security

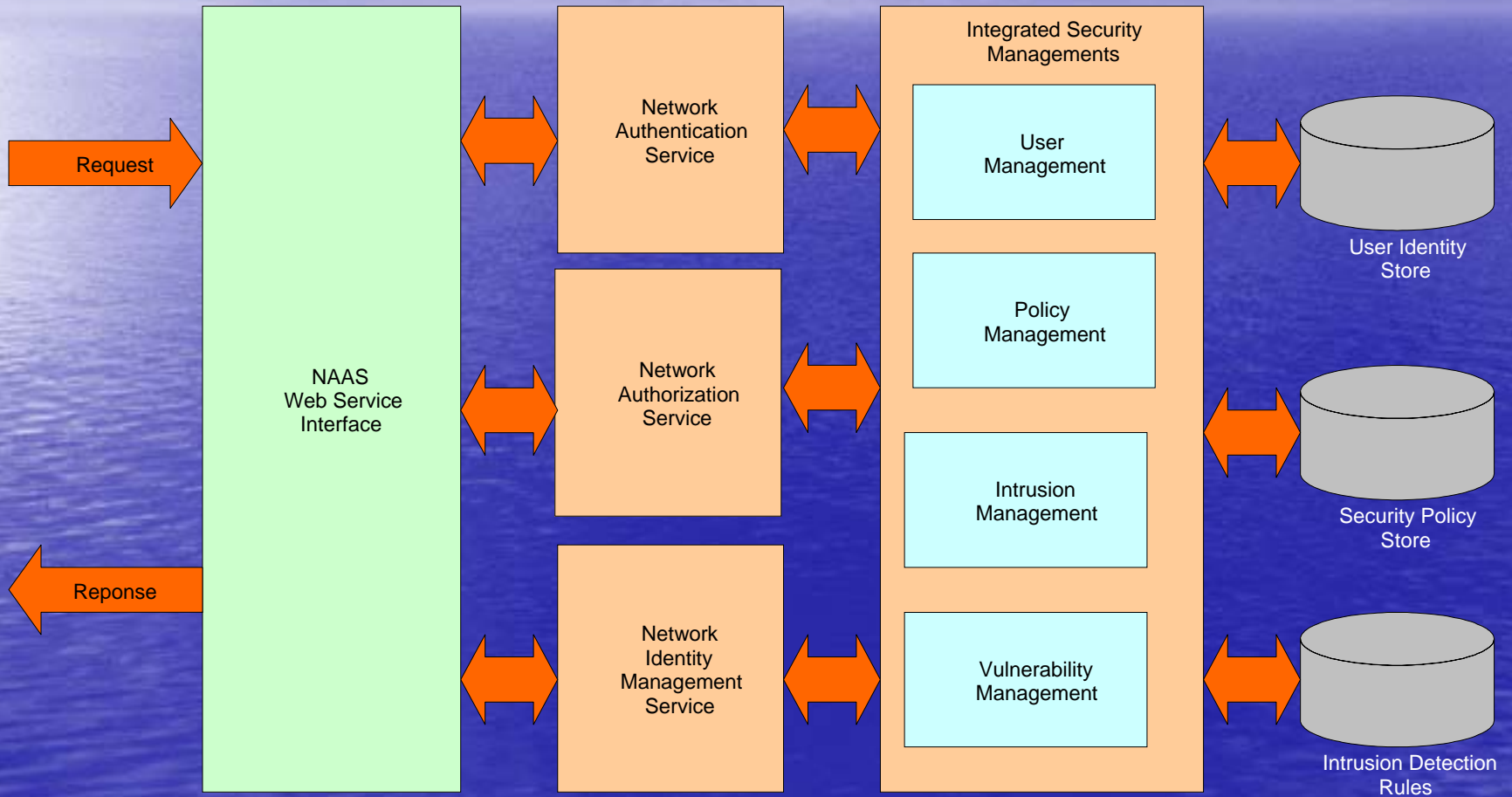
- Protocol and Specification development focused on creating a basic, extensible, and flexible security model.
  - The current protocol and specification places the burden of security on Network Partners.
  - EPA CDX will drive the security in the first generation of the Network.
    - Most initial flows will be Partner to CDX.
    - CDX will provide authentication and authorization for all Network Partners through the Network Authentication and Authorization Services (NAAS).

# Security

## Network Authentication and Authorization Services (NAAS)

- Network Authentication and Authorization Services (NAAS) are centralized security services.
- Security tokens and assertions issued by NAAS are trusted and accepted by all Network Nodes.
- NAAS provides a set of standard web services across the network, accessed by network users and services providers.
- Operations defined in NAAS must be conducted over a secure SSL channel using 128 bit encryption.
- CROMERR Security

# Proposed NAAS Structure





# NAAS: Advantages and Disadvantages

Advantages	Disadvantages
Simplified Implementation	Increased Overhead
Enhanced Security	NAAS Dependency
Cost Effective	
Highly Extensible	
Supports Single Sign-On (SSO)	
Security Monitoring	



# Next Steps

# Node 1.0 Products

Product	Status	Date of Completion
Exchange Protocol	✓	March 14, 2003
Functional Specification	✓	March 14, 2003
Network WSDL	✓	March 14, 2003
Implementation guide	⌚	April 2003
Demonstrated Node Configurations	⌚	May 2003
Security Guidelines	⌚	May 2003

# Lessons Learned

- Immaturity in Web Services Standards and Network Tools:
  - UDDI defined in Protocol and Specification but no Network UDDI infrastructure exists
  - Limitations in message encoding
  - DIME implementations differ by platform
  - Limited functionality of WSDL Tools
- Mapping the 'back-end' systems to the Schema is one of the most challenging and time intensive tasks.
- Difficult to provide accurate cost estimates – too many variables.
- Node builders should be able to use Node code from similar Nodes. The Node 1.0 team is creating Demonstrated Node Configurations.

# Recommendations to the NSB

## The Node1.0 Group Recommends Support for the Following Activities:

Flow Management  
Guidance

Protocol and Specification  
Support and Guidance

Assist and Support a  
Network Help Desk

The Node 1.0 Group has proposed the creation of a Network Operations Group (NOG) that will oversee the staffing and organization of these activities.

# Node Building Resources

## The Network Exchange Website

<http://www.exchangenetwork.net>

- Supporting Documents
- Node Updates
- Frequently Asked Questions\*
- Discussions Groups\*
- Implementer Tool Box\*

\* Currently under development

# Questions/Discussion

