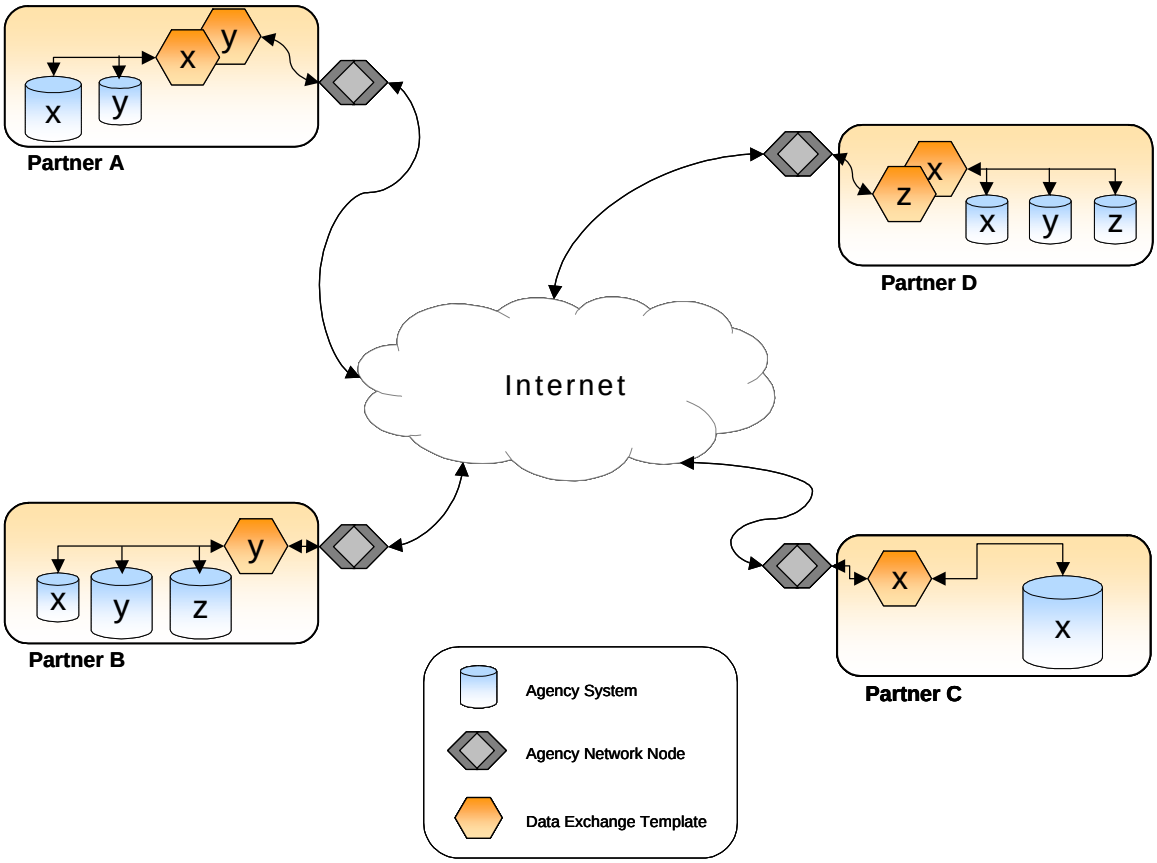
NATIONAL ENVIRONMENTAL INFORMATION EXCHANGE NETWORK -- FROM VISION TO IMPLEMENTATION



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ABSTRACT

The purpose of this paper is to present a brief history and current synopsis of the National Environmental Information Exchange Network (Network), which entered its implementation stage in March 2002. The Network is an innovative approach for the exchange of environmental data among EPA, States, and other Partners that uses the Internet and standardized formats. The Network consists of data exchanges between "Nodes" or portals maintained individually by participating Partners. The Network "vision" is to promote access and exchange quality environmental data while reducing reporting burden and increasing the efficiency of data exchanges between Network Partners. The Network strategy is based upon established best practices and technologies from the private sector in their movement toward e-commerce.

INTRODUCTION & OVERVIEW

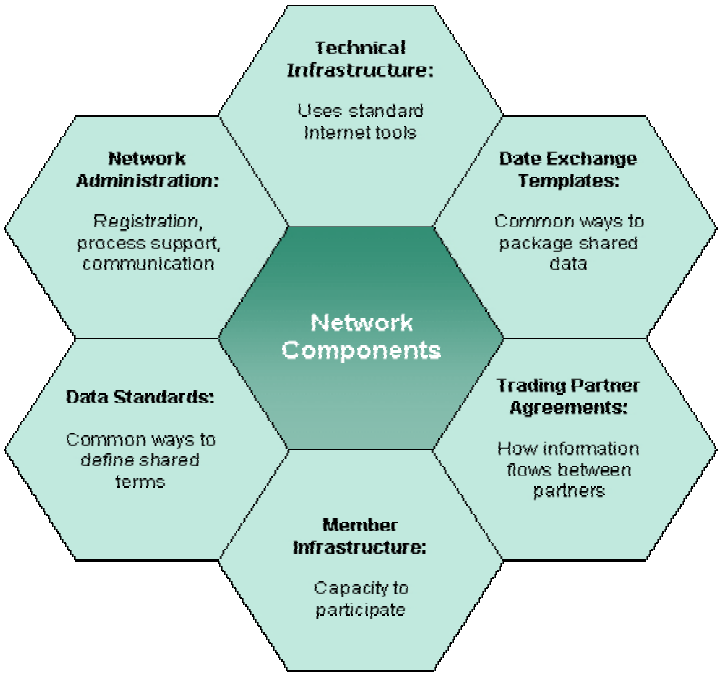
"The future of protecting human health and the environment depends on utilizing powerful information technology tools to inform decision makers." -- Kim Nelson, Chief Information Officer and Assistant Administrator for Environmental Information

Information technology is transforming the way government is doing business. EPA and the States, along with many public and private sector organizations, are using information technology to streamline their business processes and to improve services. In 1998, as part of this e-government transformation, EPA and the States formed a Partnership called the State/EPA Information Management Workgroup (IMWG) to address information management issues of joint concern.[1] The IMWG developed a vision "to build locally and nationally accessible, cohesive and coherent environmental information systems that will ensure that both the public and regulators have access to the information needed to document environmental performance, understand environmental conditions, and make sound decisions that ensure environmental protection."[2] As one way of fulfilling this vision, the IMWG embarked on the development of the

National Environmental Information Exchange Network (Network) to change the way Partner agencies exchange environmental information using the Internet and data standards. The Network concept is outlined in the *Blueprint for a National Environmental Information Exchange Network*[3] *(Blueprint*), and the recently released *Network Implementation Plan*[4]outlines an ambitious schedule of milestones for building a robust Network by 2004.

NETWORK COMPONENTS

The Network is comprised of six major components including Data Exchange Templates (DETs), Trading Partner Agreements (TPAs), Member Infrastructure, Data Standards, Technical Infrastructure and Network Administration.



Each of the Network components plays an important role in the functioning of the Network. The Network facilitates exchanges of information between Nodes (a participant's single, managed point of interaction between Partners on the Network). Nodes use the Internet to exchange data via standardized DETs using common Internet-based protocols. DETs define the format data must take prior to exchange. Established data standards are used to develop DETs. Data standards are documented agreements on formats and definitions of common data. These standards are established to bring better consistency and quality to the data maintained by trading Partners. Data exchanges are governed by TPAs between Partners that document agreed upon data, exchange format, frequency of exchange, and related issues. They explicitly define the quality, timeliness and format of the data. Data flows are supported by technical and member infrastructure. The technical infrastructure is the software, hardware, and protocols used to make flows possible, and the member infrastructure defines the roles and responsibilities of Network participants. Network Administration coordinates all the Network components to ensure the smooth flow of information between participants.

NETWORK FLOWS

The Network is designed to use standard technologies that enable seamless exchanges of nearly any kind of data from one computer to another. Flowing data will test and inform choices about infrastructure as it is built, and building infrastructure will enable more Network Flows to be conducted more quickly.

A Network Flow is defined as a routine use of the Network to satisfy a business need for exchanging specific information (and replace a legacy flow if one existed) between two or more Network Partners. Network Flows are defined by the exact data that will be exchanged in particular transactions rather than by the technical details of the exchange process.

Flows have been tested by States and EPA through the Network Node Pilot Program for the following data:

- National Emissions Inventory (Office of Air and Radiation)
- Permit Compliance System/Interim Data Exchange Format (IDEF) (also known as CDX/IDEF)
- Federal Registry System

EPA has also worked with the private sector to receive Toxics Release Inventory data through EPA's Node called the Central Data Exchange (CDX). A draft schedule of priority flows for National Systems has been developed by EPA and is available on its website.

DEVELOPING THE NETWORK

The Network will be developed from the conceptual work of the IMWG Action Teams, under the stewardship of the Network Steering Board, and through the experiences of Network participants. The Network will continue to be supported through staff contributions, contractors, direct funding of individual projects, and through grant programs. The Exchange Network Grant Program will help accelerate Network participation.

Action Teams & Pilot Projects

Numerous State and EPA participants have worked on Network development. State/EPA Action Teams were organized and pilot projects were formed to help advance various components of the Network. Network implementation will not be linear; instead, Network Partners must carefully coordinate and learn from several simultaneously occurring efforts.

The Network Node Pilot Project (Alpha and Beta Phases) demonstrated the productivity of hands-on collaboration between States and EPA in developing Network flows.
During the Alpha Phase (Spring - Summer 2001) of the pilot, representatives from Nebraska, New Hampshire, Delaware, and Utah participated in the development of "proof of concept" Nodes that quickly demonstrated that XML could be used to build Nodes as described in the *Blueprint*. Using a common piece of "middleware" to link their information systems, prototype Nodes could answer queries for their facility data with standardized XML responses. During the Beta Phase (Fall 2001 - Winter 2001) of the pilot, the primary goal was to learn about Node development and functionality. The pilot has been very successful in proving the concept of Network Nodes and a Beta Phase Results Report (Pre-final version) [5] is now available on the ECOS and EPA websites.

Various Action Teams have created the foundation for developing the Network components.

- ***Data Exchange Templates*** describe and enforce the format and specific restrictions of Network Flows. IMWG Action Teams have established draft Templates for PCS/IDEF, AIR Emissions, facility identification information and STORET (ambient water quality monitoring). These early experiences have already identified many of the challenges, issues, and opportunities that Network Partners will need to address.
- ***Trading Partner Agreements*** define the Network Partners, information, stewardship, security, and other relevant technical and organizational details essential for mutually-agreed upon exchange of information between two or more Network Partners. The States of Nebraska and Mississippi have used their Trading Partner Agreements with EPA for exchanging facility data as models for other Network Partners. The Network Steering Board will also create guidelines for writing Trading Partner Agreements.
- ***Data Standards*** allow the data from and between many Network Partners to be integrated efficiently and effortlessly. The IMWG's Environmental Data Standards Council (EDSC) has finalized Data Standards for industry classification, chemical, biological taxonomy, calendar date, facility identification and latitude/longitude. Standards for enforcement/compliance, Tribal identifiers, water quality monitoring and permitting data are close to completion. The EDSC is continuing to develop Data Standards for use in the Network.
- ***Technical and Member Infrastructure*** are the mainstays of the Network. Each participant must invest in both the technology and the organizational aspects of participating in the Network. Future Network Partners benefited from participating in the Network Node Pilot Program, and will impart their "lessons learned" through documenting their experience. The Network Steering Board will sponsor a "follow-on" project, and will also provide some technical assistance and organizational advice to Network Partners.
- ***Network Administration*** will ensure that Network Partners are able to share Data Exchange Templates, obtain technical guidelines, and view TPA Templates through a Network Registry. The test Network Registry is operational and is temporarily being operated by the National Institute of Standards and Technology. The Registry will be operated and maintained by the Network Steering Board.

Overview of the Network Implementation Plan

In February 2002, the IMWG approved the *Network Implementation Plan*, which represents the accumulated knowledge and recommendations for developing the Network. The *Network Implementation Plan* contains quarterly milestones until 2004 to advance the quality of the Network components. However, due to the innovative nature of the Network, the Network will not be implemented in a linear fashion. Network Partners are expected to work together, "learn by doing," and to be flexible as the Network progresses. Flowing data will test and inform framework parameters, and development of the frameworks will enable more Network Flows to be conducted quickly.

High-Level Goals for Measuring Network Progress (by 2004)

35 Trading Partners with active Network Nodes

Network Flows and Trading Partner Agreements for all EPA National Systems

Guidelines written on: TPAs, Node specifications, Network exchange protocols, Data Exchange Templates and Security

To support the administration of the Network, the IMWG chartered and approved a preliminary budget for the State/EPA Network Steering Board (Board), which has begun to take on its Network implementation, administration and steering roles. The Board, comprised of senior managers from the States and EPA, will oversee the technical aspects of the Network and guide its implementation. The Board's main tool for tracking progress on the Network will be to administer the *Network Implementation Plan*. As implementation begins, the Board's support and advice regarding best practices and available technical resources will be crucial to Network Partners' success. States and EPA look forward to planning exchanges of information with other Partners as the Network evolves.

Exchange Network Grant Program

In Fiscal Year 2002, the U.S. Congress provided $25 million in grant funds for a National Environmental Information Exchange Network Grant Program (Network Grant Program) that will provide resources to States, Territories, and Tribes for Network implementation. EPA has designated $1.5 million of these funds to support Network Administration services for Network participants. Additionally, working groups staffed by EPA, States, and Territories will conduct a significant portion of the Network administration. EPA is reserving $2.5 million of these funds to support Tribes' Network participation.

According to the *Notice of National Environmental Information Exchange Network Grant Guidelines*,[6] the Exchange Network Grant Program will award monies under four categories:

1. **Network One Stop** - supports the broader goals of the One Stop program to 1) reduce reporting burden on industry, States, and local governments; 2) foster multimedia (air, water, waste) and geographic approaches to problem solving; and 3) provide the public with meaningful, real-time access to environmental data. Maximum grant award is $500K per state, and $100K per tribe from tribal set-aside funds.
2. **Network Readiness** - assists States and Tribes in developing their environmental data, participation in the Exchange Network, and development of a Node to support the Exchange Network. Maximum rant award: $400K per state, $100K per tribe from tribal set-aside funds.
3. **Network Challenge** - supports States or Tribes in collaborative efforts that will create benefits for others. Examples include multiple States conducting the Exchange Network

Node pilots or development of the Facility standard by multiple States. Maximum grant award: $1M per state, $300K per tribe from tribal set-aside funds.

4. **Network Administration** - designed to support the administration of the Network. (Note: this grant will support the Network Steering Board.)

In addition to this grant program, EPA and States plan to continue investing in the Network through internal EPA investments in Network development (including the support of EPA contractors), EPA support to other Network Partners (States, Territories, and Tribes) for joint Network development and Network participation (including existing information management grants), and independent State investments. In the future, other government agencies or outside parties may also directly or indirectly support Network development. As appropriate, the Board will evaluate and pursue these sources where they might support joint infrastructure. Network Partners will also continue to pursue these and other sources to support Network efforts.

CONCLUSIONS

Information is fundamental to the work of environmental protection. Environmental decision makers at all levels need timely and high quality environmental information to make informed decisions. Yet, many of the current systems and approaches to information exchange are not designed to meet those needs. The Network is a major component of the solution. The Network utilizes technologies and approaches that help create e-commerce and will provide an alternative to the current approach of exchanging data.

Ultimately, the Network will improve the practice of environmental management by improving the flows of environmental data. Once fully operational, the Network will provide Network participants will be a powerful, reliable, and secure tool for exchanging environmental data. This new approach for exchanging environmental information is based on agreements, open standards, and common tools. The Network will enhance access to quality environmental data, reduce reporting burden, and make information exchanges between EPA, States, and other Network Partners efficient and timely. Finally and most importantly, the Network will enable Partners to harness the power of the information revolution to address future environmental challenges.

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