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Implementation Plan for Phase 2 of the Exchange Network

Version: 1.0

June 10, 2013

**Prepared by the
Exchange Network Leadership Council**

Environmental Information



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List of Acronyms

AFS	Air Facility System
API	Application Programming Interface
AQS	Air Quality System
CDC	Centers for Disease Control
CDX	Central Data Exchange
ECOS	Environmental Council of the States
EIS	Emissions Inventory System
ENDS	Exchange Network Discovery Service
ENLC	Exchange Network Leadership Council
EPA	U.S. Environmental Protection Agency
FCD	Flow Configuration Document
GIS	Geographic Information System
ICIS	Integrated Compliance Information System
IPT	Integrated Project Team
IT	Information Technology
NAAS	Network Authentication and Authorization Service
NTB	Network Technology Board
NGO	Non-Governmental Organization
NPDES	National Pollutant Discharge Elimination System
OECA	EPA Office of Enforcement and Compliance Assurance
OEI	EPA Office of Environmental Information
OSW	EPA Office of Solid Waste
OSWER	EPA Office of Solid Waste and Emergency Response
PPA	Performance Partnership Agreement
PPG	Performance Partnership Grant
QA	Quality Assurance
RCRA	Resource Conservation and Recovery Act
REST	Representational State Transfer
SDWIS	Safe Drinking Water Information System
STORET	Storage and Retrieval
TRI	Toxic Release Inventory
TRI-ME	Toxic Release Inventory – Made Easy
WQX	Water Quality Exchange
XML	Extensible Markup Language

Introduction

Overview

The National Environmental Information Exchange Network is a partnership that supports better decision-making through improved access to higher quality environmental information. The U.S. Environmental Protection Agency and agencies from states, tribes, and territories are collaboratively building the Network to improve the nation's ability to understand, protect, and preserve human health and the environment.

The Exchange Network Leadership Council (ENLC) governs and manages the Network on behalf of its partner organizations. The ENLC is implementing the Network in two phases. Phase 1 of the Exchange Network focused on using Network technology to transform regulatory reporting and the sharing of environmental data. Phase 1 concluded in December 2012 with the complete transition of eight national data flows¹ from outmoded reporting methods to flows using Network technology.

The ENLC created this *Implementation Plan for Phase 2 of the Exchange Network* to guide the next phase of the Network's development. The Plan provides a roadmap for Governance² and partners to follow in building an Exchange Network that is easier to use and more responsive to the needs of environmental decision makers, regulatory practitioners such as permitting or enforcement staff, the public, and other consumers of environmental information.

The plan identifies goals, strategies, and actions to enhance the Network, reduce burden, use resources effectively, institutionalize Exchange Network expertise, and secure sustainable funding. The plan will guide the Governance's activities for three years from 2013-2016. The ENLC will work with other Network governance groups and staff to develop detailed annual work plans that will achieve the plan's goals and renew engagement within the Network community.

Connections to the E-Enterprise Initiative

On December 5, 2012 the President of the Environmental Council of the States (ECOS) and the Assistant Administrator of the U.S. Environmental Protection Agency (EPA) issued a joint statement regarding the EPA/ECOS E-Enterprise Initiative. That statement expressed a vision of

¹ Data flow is an Exchange Network term that refers to the exchange of information between two or more partners. The eight national data flows are the Water Quality Exchange (WQX), Underground Injection Controls (UIC), Beach Notification, ICIS-NPDES, Air Quality System (AQS), Emissions Inventory System (EIS), Facility Identification (FacID) and Toxic Release Inventory (TRI). Data flows for the Safe Drinking Water Information System (SDWIS) and RCRAInfo will offer both Network and non-Network data flows in the near term.

² Governance refers to the Exchange Network Leadership Council and other groups established to manage the Exchange Network. For more information visit: <http://www.exchangenetwork.net/about/network-management/>

E-Enterprise as “a transformative concept intended to make the national environmental protection system even more accessible, effective and efficient by enabling both state and federal regulators, regulated entities and the public to take advantage of advances in monitoring, reporting and information technology.” The goals of Phase 2 of the Exchange Network, as set out in this plan, are very much consistent with this vision.

It is opportune that the Exchange Network is reaching technological and operational maturity in time to support E-Enterprise. The Exchange Network’s technological contribution to E-Enterprise will be critical to its success. As importantly, the Network provides a model for productive collaboration among states, tribes, territories and EPA. The ENLC supports a similarly inclusive model for joint governance of the E-Enterprise initiative.

Moving from Phase 1 to Phase 2

The most powerful and far-reaching improvements to the Network will fully automate data submissions and make environmental data easier to access and use. In Phase 1, the Exchange Network focused on implementing data flows to specific U.S. EPA databases. These flows are for routine, batch transactions that enable regulatory reporting or database synchronization. Their primary value is in supporting low-maintenance, routine exchanges in which the recipient needs a copy of the data for aggregation or processing. The Exchange Network most commonly adds value to these types of exchanges by applying mutually agreed upon data standards, enabling greater automation, reducing the cost of data reporting, and increasing the timeliness of the data.

In implementing the Phase 1 data flows, partners adopted and deployed Exchange Network technology including common XML-based data formats, standardized protocols for exchanging data, and Network Nodes or Node Clients. This was an important intermediate step. However, changing technology alone is not enough to exploit the full value of the Exchange Network. Fully embracing the technology and philosophy of data publishing is the key to offering efficient access to more usable information.

Data publishing makes data available to others through technology called web services. Internet-based travel booking websites are common examples of tools that rely on web services and published data. Airlines use web services to publish their fare and schedule information in a format that travel websites recognize and understand. Those websites offer travelers on-demand access to that information in such a way that they can aggregate it, analyze it, and use it to make decisions about when to travel and which airline to use.

The Exchange Network gives partners the ability to offer this same kind of dynamic, on-demand access to their environmental information. Its standardized web services can power tools that enable consumers to find, integrate, and use data to better understand, manage, and protect human health and the environment.

Phase 2 will emphasize opportunities for innovation, collaboration, and exploration that were not possible prior to the existence of the Network. In Phase 2, Network Governance will expand

the availability of published data and make the process of sharing data more efficient. The Network will also forge new partnerships with other communities that have a need to share or access information about the environment.

Phase 2 Implementation Goals

Phase 2 of the Exchange Network will build upon the success of Phase 1 to provide timely, on-demand access to environmental data through innovative technologies, improved support systems, and expanded partnerships.

To accomplish the Phase 2 work, Governance will take steps to support the following four goals:

- *Goal 1: The Exchange Network becomes increasingly usable, efficient, and sustainable.*
- *Goal 2: The Exchange Network becomes increasingly relevant and valuable to a broadening community of partners and consumers.*
- *Goal 3: The Network enables better decisions through timely, accessible, and useful environmental information.*
- *Goal 4: The Exchange Network and its partners have adequate resources for implementation, operations, and maintenance.*

This Plan identifies strategies and actions for achieving each of these four goals. The goals are interdependent and many of the strategies presented support more than one goal.

Audience for this Plan

From its beginning, the Exchange Network has been a partnership. Throughout this plan, we refer to Exchange Network partners as the primary audience. But who is a partner and what does it mean to be a partner? Typical partners through Phase 1 have been EPA, and state, tribal and territorial environmental agencies. These partners built the Network to more effectively share information as part of their core business of regulating pollution and protecting environmental and human health. Often, these exchanges of information satisfy reporting requirements for delegated regulatory programs or interagency grant or funding agreements.

With Phase 2, the Network's increased emphasis on publishing and data access will open up participation opportunities to a broader community. That community could include other governmental, educational, non-profit, and research organizations as well as the public and regulated facilities. This plan seeks to engage those new stakeholders and make the Network relevant for them. As the Network expands, stakeholders will relate to the Network in different ways. Some will use the Network to contribute and provide access to data, others will use the Network to gain access to data, and some will do both. For the sake of clarity, this plan identifies two broad audience segments:

- **EN Partners:** Partners are organizations or individuals that provide data using Exchange Network technology or standards. Partners also include organizations that operate or

maintain shared Exchange Network tools or data flow resources (e.g. schemas, user documentation, etc.).

- **EN Consumers:** Consumers are persons or organizations that access or use data through any type of Network tool or resource. Consumers may include other EN partners, the general public, regulated facilities, or entities that aggregate and republish information.

In some instances, the audience for a specific goal or strategy may be limited to one group or the other. Where this is the case, we attempt to reflect that in the language of the Plan.

Goal 1: The Exchange Network Becomes Increasingly Usable, Efficient, and Sustainable.

During Phase 1 implementation, the Governance and its EPA, state, tribal, and territorial partners standardized the Exchange Network as the means of sharing information among environmental regulators. The scope of Phase 1 was primarily limited to converting 10 national priority data flows (WQX, SDWIS, UIC, Beach Notification, NPDES, AQS, EIS, RCRAInfo, FRS and TRI) from legacy methods such as batch updates or paper reporting to Exchange Network technology. In Phase 2, the Governance and EN partners will enhance, expand, and further solidify the Network's position as the standard for inter-governmental exchanges of environmental information.

Goal 1 strategies will lead to:

- National data flows that are easier to use and business processes that are less burdensome;
- New national data flows that serve the shared needs of Network partners and information consumers;
- A Network that is closely linked to other efforts to improve the electronic collection, management, and exchange of environmental data;
- Shared tools and technologies that improve the Exchange Network's usability and reduce the cost of operating and maintaining Network infrastructure and data flows; and
- A more sustainable Network through expanded training, knowledge sharing, and coordination across partners and business areas.

This goal does not include strategies related to funding or financial sustainability addressed in Goal 4 of this Plan.

Strategy 1.1: Manage the Improvement of Existing Data Flows to Improve Usability, Efficiency, and Consistency with the Network Vision.

While the ten current national system flows use the Network for data exchange, many still rely on manual processes for preparing data, performing quality assurance and error checking, and submitting information to an EPA database. Nearly all flows would benefit from more automation to minimize reporting burdens and increase the timeliness of information exchange.

Partners should design data systems, data flows, and exchange processes that are:

- *Publishing-oriented*: Partners can publish data to make it available through Network Nodes and web services so that partners and consumers can request it on-demand. This

differs from the more traditional approach to national system flow design in which partners submit data to EPA's Central Data Exchange (CDX) Node. EPA national systems should also support outbound web services via the Exchange Network.

- *Standards-based:* Network data flows are based on agreed upon data standards rather than on the design of any one partner's database. Decoupling data exchanges from specific EPA databases can help insulate other partners from potentially costly and disruptive system changes.
- *Stateless:* Stateless data flows do not require partners to track previous interactions with a national system database. Some national system flows require partners to maintain knowledge about the state of the data in the EPA database in order to successfully add, delete, or edit information. Tracking previous transactions with another database adds complexity and burden to a data flow. Partners should incorporate stateless designs in future system and flow enhancements to increase the potential for fully automated data exchange with minimum burden.
- *Fully automatable:* When a data flow requires error checking or data validation, partners should devise automated processes that minimize the need for manual steps in the workflow. Partners should work together to build processes that are appropriate, convenient, and efficient for meeting their collective business needs.
- *Flexible:* Systems should be designed to accommodate a variety of exchange scenarios, including: 1) fully automated Node-to-Node exchanges; 2) manual submissions using a Node or Node Client; and 3) direct use by partners manually updating an EPA database as their primary repository for programmatic data.

The following actions will support this strategy:

- **Action:** As needed, the ENLC will support EPA Program Offices in convening Integrated Project Teams (IPTs) to engage stakeholders from EPA Headquarters, Regions, states, territories and tribes. Working together as IPTs, partners will improve the usability and efficiency of existing national system data flows. Possible opportunities include using the Exchange Network Administrative Data Flow to standardize error reporting and enable automated recovery from errors or redesigning business processes that include manual steps.
- **Action:** The ENLC will proactively offer Flow Development Assistance to help program offices make improvements to existing data flows so that they operate as efficiently as possible. This may take the form of contracted technical assistance with schema and web service design or designing tools that promote data sharing or data use. The ENLC may also make assistance available to support efforts to model and evaluate business processes to ensure that data flows are designed and constructed to meet business

needs as efficiently as possible. EN staff will make information about this service widely available through the Network website and through OEI data flow liaisons.

- **Action:** EPA's Office of Groundwater and Drinking Water, Office of Environmental Information (OEI), and the ENLC will continue to coordinate on efforts to modernize the Safe Drinking Water Information System (SDWIS NextGen). All parties should work to ensure that the SDWIS NextGen effort fully embraces the Exchange Network and the data flow design principles articulated above. The ENLC will continue supporting the IPT that is developing a publishing-oriented data exchange for drinking water information.
- **Action:** OEI and EPA Program Offices will work with the ENLC to ensure that the Exchange Network tightly integrates with all initiatives to modernize or modify EPA national system databases and associated data flows.
- **Action:** OEI and EPA Program office representatives on the ENLC will analyze new EPA rulemakings for potential relevance to Network data exchanges, and refer them to the ENLC for discussion.
- **Action:** EPA ENLC representatives will ensure that EPA Program Offices publish to the Exchange Network website all plans and schedules to update, modify, or modernize national system data flows. This, augmented by EN Alert messages, will allow Governance and all partners to effectively plan for and participate in the change-management process.
- **Action:** The ENLC will continually evaluate the need to update or develop data standards in support of efforts to enhance national system data flows.

Strategy 1.2: Develop New National Data Flows that Serve the Needs of All Network Users.

Phase 1 data flows include a significant, but by no means complete, set of the core business workflows that governments use to protect human health and the environment. Partners will have reasons to build new national data flows to supplement those included in Phase 1. The work of Exchange Network partners may expand, as may the data associated with that work. The Exchange Network will respond to such changes so that it remains the standard mechanism for data exchange. Governance will support EPA and its partners as they work to modernize existing national data systems not included in Phase 1 such as the Air Facility System. Or, they may create new data flows to support new lines of business such as Greenhouse Gas Emissions or Total Maximum Daily Load data. A key aspect of this support will be to help ensure that system architectures and data sharing business processes are designed in accordance with Strategy 1.1 principles. This will allow partners to take full advantage of the Exchange Network's data publishing capabilities and minimize the effort required to share data.

The following actions will support this strategy:

- **Action:** EPA's Office of Enforcement and Compliance Assurance (OECA), OEI, and the ENLC will coordinate efforts related to the modernization of the Air Facility System (AFS). All parties will ensure that the AFS modernization effort fully embraces the Exchange Network and Strategy 1.1 data flow design principles. EN Governance and staff will support and participate in an IPT to develop a publishing-oriented data exchange for air compliance and enforcement information. EN Governance and staff will provide flow development assistance to the IPT to help ensure that the data flow takes full advantage of the Exchange Network's capabilities.
- **Action:** The ENLC will work with EPA Program Offices, states, tribes, and territories to assess business needs and identify where other development opportunities exist for new national data flows such as ATTAINS. EN Governance and staff will support IPTs and offer flow development assistance to take full advantage of the Exchange Network's capabilities.
- **Action:** The ENLC will continually evaluate the need to update or develop new data standards to support new national system data flows.

Strategy 1.3: Participate in efforts to improve the electronic collection and management of environmental data.

Originally the primary focus of the Exchange Network was efficiently sharing environmental data after partners collected and stored it in a database. However, when partners collect data electronically it is easier to share on the Network than manually collected data. The processes of electronically collecting and sharing data add value to one another.

Common business practices, procedures, and software for electronic reporting and data collection help achieve Network goals by providing better access to primary data sources. As part of the electronic information lifecycle, they support better data access and exchange. Electronic reporting can also help improve the validity of data through automated error checking prior to and after submission. Improved accessibility of electronic data makes human review for data accuracy much easier.

Similarly, the Network helps to support and enhance electronic data collection and supporting technology, such as mobile devices for inspectors and other field personnel. Network web services can supply information to applications and electronic reporting tools on mobile devices that support data collection and inspection workflows.

As this plan is being written, EPA and the Environmental Council of the States (ECOS) are working together to identify ways for environmental regulators to use advanced information and monitoring technologies to electronically conduct business such as reporting and permitting. This project, *e-Enterprise for the Environment*, aims to reduce data reporting and sharing burdens and support better environmental results. The Network will support the e-Enterprise effort by contributing its technology and by its example of effective collaboration among states, tribes, territories, and EPA. This will include promoting other efforts to expand electronic data collection consistent with the Cross-Media Electronic Reporting Rule (CROMERR).

The following actions will support this strategy:

- **Action:** The ENLC will coordinate with the workgroups developing and implementing E-Enterprise. The ENLC will closely track the project's progress and identify logical connection points for the Exchange Network. In particular, the ENLC will watch for opportunities for the Network to: 1) support real-time publishing of electronically collected data; 2) enable data flows for e-reporting, advanced monitoring and mobile inspection applications; 3) contribute to efforts to model, evaluate, and improve information flows; and 4) contribute its experience in governing an effective intergovernmental partnership.
- **Action:** The ENLC will continue its support of an IPT that is exploring the feasibility of creating shared services to support compliance with the Cross Media Electronic Reporting Rule (CROMERR). The IPT is defining the functional requirements for shared CROMERR services and plans to deliver its recommendations to the ENLC. If the approach is viable, EPA and the ENLC will identify methods to move the project forward.
- **Action:** The ENLC will work with EPA program offices to ensure that future electronic reporting initiatives are integrated with the Exchange Network to the greatest extent possible. Examples include electronic hazardous waste manifests (e-Manifest) and electronic reporting of NPDES data.

Strategy 1.4: Track and Adopt New Technologies and Processes that will Benefit and Protect Partners.

The Network will track and take advantage of advances, improvements, and changes in technology. The Network Technology Board (NTB) will be *proactive* in managing the Network's technical portfolio to offer partners tools and processes that are, more efficient, easier to use or less costly to maintain. The NTB will keep pace with changing technology to ensure the Network's continued relevance, sustainability, and security. The NTB will manage changes carefully to allow partners time to integrate them. In a Network with many partners, stability is an important success factor.

The following actions will support this strategy:

- **Action:** The ENLC will continue its support of IPTs such as the one that is currently exploring the feasibility of creating a Virtual Exchange Network Node.
- **Action:** The NTB will routinely research leading information sources to identify opportunities to improve Network technology.
- **Action:** The NTB will provide guidance to help Network partners create standardized, well documented, and discoverable web services that use RESTful design principles. In many cases, REST-based web services may simplify data publishing for EN partners and consumers. The NTB will also offer partners guidance on the use of non-XML data formats such as JavaScript Object Notation (JSON), which may offer advantages in some data exchange scenarios. These actions will support expanding data publishing and access under Goal 3 of this plan.
- **Action:** The NTB will evaluate the capabilities of the Exchange Network's shared infrastructure to ensure that it is robust enough to accommodate the Network's current and future operations.
- **Action:** The NTB will work with EPA to ensure that the Network's shared security infrastructure and policies are consistent with accepted best practices and standards to minimize the likelihood of breaches in security. This includes ensuring that appropriate procedures are in place to respond to and recover from security incidents.
- **Action:** The Exchange Network Coordinator will identify and present to the ENLC opportunities for developing data flow plug-ins and other sharable tools that enable easier data flow implementation.

Strategy 1.5: Increase Partners' Technical Capacity to Implement, Operate, and Maintain Exchange Network Tools and Services.

The Network's sustainability depends on partners' capacity to create and maintain Network data flows. Many partners operate with few, if any staff solely dedicated to the Exchange Network. Often, these people function as Node and data flow administrators and as the lead proponent for the Network within the organization in addition to their other duties. These other responsibilities compete for their time. They often lack complete operational knowledge of the Exchange Network. They may have limited authority over or influence on the organization's information management resources and budgets. For many partners Information Technology resources are centralized in other agencies and not easily accessible. These factors can significantly limit a partner's ability to participate fully in the Exchange Network. They also

often lead to dependence on contractor resources and, combined with centralized IT, leave partners vulnerable to knowledge loss through staffing changes.

Partners will continue to need assistance building internal technical capacity and expertise to maintain and operate Network infrastructure. The NTB will help enhance in-house knowledge and expertise by creating more technical training resources, promoting knowledge transfer among partners, and improving communication among program and information staff.

The following actions will support this strategy:

- **Action:** The NTB will develop a comprehensive library of online training resources including webinars, videos, and written materials. EN staff will identify and prioritize partner training needs and develop targeted curricula for different categories of users such as Node administrators, data flow administrators, Program staff or EN consumers.
- **Action:** EN staff will maintain the Exchange Network website's Knowledge Base as a comprehensive, well-organized user technical support resource for the Network. The Knowledge Base will include links to online training modules, standards and best practices documentation, and answers to frequently asked technical questions. This online resource will supplement Help Desk support. The NTB will evaluate EN guidance and standards to identify missing, obsolete or duplicative information.
- **Action:** The NTB will host quarterly conference calls for users of the two Network-owned Nodes, OpenNode2 and EN-Node. This forum will offer Network partners the opportunity to share knowledge on tools, enhancements, and management approaches for Nodes and data flow components. All conference calls will be recorded and available on the EN website for future reference.
- **Action:** The ENLC will continue to provide partners with access to the CDX Node Help Desk and to technical assistance available through cooperative agreements with state and tribal organizations.
- **Action:** The Exchange Network Tribal Governance Group (TGG) will continue its efforts to enhance tribes' capacity to use the Network. The TGG will facilitate the sharing of best practices in implementation and operations. The TGG will, with EPA, identify opportunities to help build tribal capacity in areas such as communication infrastructure and technical knowledge. They will also identify opportunities to increase tribal awareness, interest, and support of the Exchange Network.
- **Action:** The ENLC will continue to sponsor the Exchange Network National Meeting as a training opportunity and a forum for partners to connect and collaborate. Governance will also encourage separate Exchange Network meetings among tribal and regional partners to promote more training opportunities or targeted discussions. Smaller

regional gatherings may be particularly helpful for encouraging more communication between Program and Information Technology Offices.

- **Action:** The NTB and EN staff will work with EPA program offices and OEI data flow liaisons to identify common implementation issues and develop plans to address them through targeted support, training, or business process improvements. This will work within the support structure EPA programs already use, such as regular user meetings and conference calls to increase the capacity of EN partners. They will also identify and fill any gaps in guidance for implementing, operating, and maintaining EN national system data flows.

- **Action:** The ENLC will help coordinate communication among staff from partner organizations' program offices and information technology offices. One possible approach would be to formalize communication roles, responsibilities, and expectations for the Network Coordinator, EPA Program Office staff, OEI data flow liaisons, and Regional Exchange Network Coordinators. Data-related calls and meetings sponsored by Program Offices may offer an ideal communication venue.

Goal 2: The Exchange Network Becomes Increasingly Relevant and Valuable to a Broadening Community of Partners and Consumers.

The Network's usefulness as a tool for supporting better environmental decisions depends on building a broad-based community of users that understand the value of the Network and its relevance for them. Forging stronger connections with existing and prospective partners and consumers will also help the ENLC chart a course for the Network that is more responsive to their business needs. The EN must develop comprehensive outreach and marketing strategies that promote the value of the Network in ways that engage stakeholders and contribute to a stronger partnership. Much of the Network's long-term success hinges on improving its outreach and marketing.

Partners need help promoting more awareness of the Network's capabilities, particularly among managers and decision makers in environmental Program Offices. Similarly, the ENLC should better understand the business needs of Network customers, so that they can effectively identify opportunities to use the Network. Greater awareness will help support the Network and expand the types and amount of data that partners share. Tribal governments will benefit from a coordinated effort to identify the most valuable participation opportunities, given their unique regulatory responsibilities and relationships, their data needs, capacity, funding, and comfort with data sharing.

The Network also has enormous potential to be useful to a broader community of organizations that collect or use environmental information, including:

- Other government sectors such as public health, natural resources, and homeland security;
- Research and educational institutions;
- Non-profit environmental or public health organizations; and
- Groups that promote data access and transparency.

The ENLC will broaden the Network's community of partners and consumers by developing plans to strategically engage them and understand how their business needs can help direct the Network's expansion.

Strategy 2.1: Create Relationships with New Partners and Consumers that Will Broaden the Network Community and Expand Information Sharing.

The demand for environmental information across different disciplines is growing as organizations and the public seek more data to support better decisions and solutions to complex environmental problems. The Exchange Network has the potential to support

information sharing among other governmental organizations, non-profits, industry, universities, and the public. The Exchange Network must proactively forge connections and relationships with these new communities to cooperatively improve access to environmental information.

The following actions will support this strategy:

- **Action:** The ENLC will build relationships with organizations that represent potential EN partners and consumers to learn more about their business needs, share information about the Exchange Network, and build relationships with their members. The Network should consider partnering with organizations that represent:
 - State, tribal, and local agencies from the Health, Energy, and Homeland Security communities
 - Federal agencies from the Health, Energy, and Homeland Security communities
 - Public and private universities
 - Research communities (e.g. National Science Foundation)
 - Non-profit environmental and public health organizations
 - Industries subject to environmental regulation
- **Action:** The ENLC will coordinate with the Environmental Public Health Tracking Network's architecture and content teams to identify possible cooperative work.
- **Action:** The ENLC and OEI will engage other data sharing initiatives such as OpenGov, Data.gov, or the Sunlight Foundation to identify opportunities for collaboration or cross-promotion.
- **Action:** The ENLC will more closely engage organizations within EPA that emphasize research and cross-program data analysis. For instance, the EPA Office of the Science Advisor and the EPA Office of Research and Development may know of communities that could benefit from the Network's capabilities to expand data access and integrate data sets.
- **Action:** The ENLC will work with EPA Regional Program Offices to identify and engage regional projects or consortia (such as The Gulf Alliance, Great Lakes Consortium, Puget Sound Partnership) that may have business needs that could be met using the Exchange Network.
- **Action:** The ENLC should consider recognizing new categories of partners and offering them representation on the Governance to establish formal connections and lines of communication.

Strategy 2.2: Create an Outreach and Marketing Strategy to Increase the Network's Relevance, Value, and Support among Partners and Consumers.

The ENLC will develop a comprehensive outreach and marketing strategy to more effectively identify target audiences, understand their business needs, and craft engaging communication tools and content that describe the Network's value. This strategy would broaden support for the Network among existing partners and promote an expansion of the Network into new communities. Furthermore, it will help partners understand that they have a clear stake in the long-term success of the Network, ensuring that it becomes an indispensable tool for supporting better environmental decisions.

The outreach and marketing plan should:

- Build on the efforts in Strategy 2.1 to inventory key audiences of new and existing partners and consumers;
- Identify strategies for forging deeper and lasting connections within and across existing partner organizations, especially among Executives, those in Program Offices and in Information Technology Offices;
- Identify strategies for engaging new partners and consumers;
- Demonstrate the value of the Network, focusing on use cases rather than on explanations of the technology and how it works;
- Devise strategies for expanding awareness of the Network's achievements and successes to date;
- Identify opportunities to increase the visibility of the Network through more effective marketing or branding strategies;
- Identify the Network's available staff, Governance, and contractor resources to support outreach and communication and recommend formal roles and responsibilities for the EN Coordinator, ECOS staff, OEI data flow liaisons, and Regional EN Coordinators;
- Build a marketing campaign that targets a variety of users and includes tools such as online videos, written publications, user testimonials, and demonstrations of tools that use the Network's data services.

The following actions will support this strategy:

- **Action:** The ENLC will charter an Integrated Project Team that will develop a comprehensive outreach and marketing plan that addresses the above needs.
- **Action:** The ENLC will work to oversee and implement the Network's outreach and marketing plan.

Strategy 2.3: Strengthen Partnerships with Tribes and Identify Opportunities for Increased Participation.

The purpose of this strategy is to identify opportunities to promote stronger partnerships with

tribes and expand tribal participation in the Network. There are considerations, unique to tribes, regarding their roles as Network partners. These include their regulatory responsibilities and relationships, their data needs, capacity, resources, and level of comfort sharing data.

Tribal participation in the Network to date has been greatest in the areas of reporting water quality and air quality data using the WQX and AQS data flows. However, many tribes have no, or an incomplete, understanding of its business value. The Network has not made full use of all potential methods for sharing information about the Network with tribes. Some tribes may think that much of the Network has not been highly relevant for tribes because of their often different data needs and capabilities compared to state partners.

Network planning efforts and discussions have often grouped states and tribes together, even though their roles as regulators can be very different. Only a few of the larger tribes have program delegation from EPA. In comparison, all states have at least one, if not several, delegated programs. This means that unlike states, most tribal data needs are not for data flows to EPA national systems. Many tribes also have less information technology capacity than most states. Relatively few have large dedicated IT staff and technological infrastructure.

Many tribes receive grants to conduct air and water monitoring activities, but they do not all have associated reporting requirements. Those that do often submit data to EPA regional offices, but the data do not necessarily go into an EPA national system. The relatively small number of tribes that have delegated programs have data collection and submission requirements similar to states.

Many tribes are interested in accessing geographically-relevant data about natural resource attributes, such as the quality of the air, water, and fish on or near tribal lands. Often, tribes are interested in extracting such geographically based data from several sources such as EPA, states, USGS, or the Bureau of Land Management. These sources can give tribes a more complete picture of the natural resource attributes in their local area. Tribes often use this data for different purposes than state and federal environmental agencies. For example, many tribes examine toxics in fish tissue to develop strategies for improving water quality and related programs. Knowing the levels of toxics in fish tissue is of great importance for tribes that engage in subsistence fishing.

Some tribes approach data sharing cautiously, often because of issues related to sovereignty. Data can sometimes be part of a lawsuit or intergovernmental dispute. Historical trust issues also exist among tribes, states, and the Federal government, and also between tribes. These can be significant barriers to Network participation.

Tribes can have vastly differing levels of technical and organizational capacities. Those with more limited capacities can face significant barriers to Network participation. Some tribes have found value in collaborating with other tribes through tribal associations and intertribal councils such as the Northwest Indian Fisheries Commission and the United South and Eastern Tribes. In several instances, these intertribal groups have helped more tribes participate in the Exchange

Network.

The ENLC will work with tribal partners to further understand and surmount barriers to tribal participation. The following actions will support this strategy:

- **Action:** The ENLC and EN Staff will describe and demonstrate the Network's value to tribes at tribal meetings such as national tribal conferences, National and Regional Tribal Operations Committees. The ENLC will also support the Federal funding of tribal programs to participate in data sharing efforts.
- **Action:** OEI will conduct a pilot tribal readiness assessment to further clarify barriers to participation and identify potential solutions. The assessment will consider:
 - Barriers to data collection and data access, technical and resource capacity limitations, and data sharing concerns;
 - The types of data assets that tribes need to access;
 - Options for providing funding to support the development of tribal infrastructure
 - The provision of regional-based technical support;
 - Options for expanding Network participation through partnerships with tribal associations and intertribal councils; and
 - The development of more shared tools to overcome challenges associated with the operation and maintenance of technical infrastructure.

OEI will encourage other tribes to do self-assessments using tools and experiences derived from the pilot with mentoring from tribes participating in the pilot.

- **Action:** Through the Tribal Governance Group or an IPT, tribes should identify actions that would advance tribal participation in the Network and report them to the ENLC. This group should also identify and actively promote tribal innovations that would be of significant benefit to other tribal partners.

Goal 3: The Network Enables Better Decisions Through Timely, Accessible, and Useful Environmental Information.

The Phase 2 vision for the Exchange Network extends well beyond building more efficient data flows for sharing regulatory information. The Network will improve transparency and expand access to information so that organizations and individuals can make more informed decisions about managing or advocating for the environment. EN partners can use the partnership, tools, and technology of the Exchange Network to publish environmental information that is timely, discoverable, and useful for consumers.

A partner publishes data on the Exchange Network by making information available through a web service. That allows EN consumers to make targeted, on-demand requests for information. Publishing also enables developers to build desktop, web-based, and mobile applications that can dynamically access, integrate, and display information in ways that are optimized for the needs of EN consumers. Consumer-driven data access is what differentiates data publishing from the more traditional reporting data flows. Expanding data publishing is a key strategy that will most directly increase the value of the Exchange Network by making information more transparent, timely, and usable.

Several EN partners have already built successful projects that demonstrate the power of data publishing. One example is the Homeland Emergency Response Exchange (HERE), which allows emergency responders to reach across jurisdictional boundaries and retrieve integrated environmental information from EN partners on regulated facilities, hazardous waste, drinking water infrastructure, and air and water quality monitoring. HERE uses data published through the Network to securely integrate and display data for emergency planners and responders so that they can better protect human health, the environment, and sensitive infrastructure. Other efforts such as the Air Quality Data Exchange and the Pacific Northwest Water Quality Exchange have helped partners share real-time air quality and water quality monitoring information with EN consumers in their region.

Building on these early successes, the ENLC will launch a significant effort to help EN partners and consumers increase their capacity to publish and use environmental information. The ENLC will engage EN partners and consumers through a comprehensive set of strategies for designing, building, and implementing publishing services and data access applications that meet their business needs.

Strategy 3.1: Convene Teams to Develop Data Sharing Solutions That Serve the Needs of EN Partners and Consumers

The most useful publishing services and applications will be collaboratively planned, built, and implemented by communities of EN partners and consumers that are united by challenges around access to environmental information. The ENLC will seek out motivated members of

these communities and support their efforts to discuss ways to use the Network to solve their business problems and support better environmental decisions.

The ENLC can use several approaches to identify and reach communities of interest. First, it will target communities and organizations that have already expressed an interest in using the Network. Candidates include communities that manage and use the following types of data:

- Air radiation monitoring
- Institutional controls
- Drinking water compliance and monitoring
- Underground injection controls
- Non-point source pollution
- Beach closure notifications
- Cross-media data integration

Second, the ENLC will draw from the results of Goal 2's effort to reach out and find communities that might benefit from Network technology. EPA Regional Offices are likely to be particularly helpful in identifying opportunities given their working relationships with a wide variety of different types of partners.

Third, the ENLC will work with OEI to identify and target projects that have received funding from EPA's Exchange Network Grant Program. The ENLC may be able to help those projects' participants find other collaboration opportunities, provide them with organizational support, or supplement their technical expertise.

Finally, EPA Program Offices should work closely with OEI, the ENLC, and EN partners to develop services for publishing data from EPA National Databases. Several EPA Program Offices have already begun publishing data from their systems, such as RCRAInfo and the Facility Registry System. This effort should be expanded to all major EPA databases. Data published from EPA national databases can support:

- Direct users that need bulk access to data to manage their programs;
- Ad hoc, secure data access for EN partners;
- Access for the public; and
- Expanded electronic reporting under the state/EPA e-Enterprise effort

The Exchange Network has shown that Integrated Project Teams (IPTs) are an effective way of organizing groups of stakeholders to achieve successful data sharing solutions. IPTs are multi-disciplinary in order to bring together all the business and technology skills required to build a successful product. IPTs are cross-functional in the sense that they include people who have different roles with respect to using or supporting the product or service.

The ENLC will help communities of interest to establish, organize, and facilitate IPTs that will design and build solutions to meet their data sharing needs.

The following actions will support this strategy:

- **Action:** The ENLC will identify communities of interest that will benefit from the Network's ability to facilitate data discovery, access, and use. Candidates should be drawn from:
 - The Network's outreach efforts under Goal 2;
 - Organizations and communities known to have expressed interest in using the Network;
 - Awardee lists from EPA's EN Grant Program; and
 - Users of EPA National Databases that require data access through publishing services

- **Action:** The ENLC will help recruit, convene, and support IPTs that will allow communities of interest to develop Network data sharing solutions. The number of IPTs will be based on interest, available resources, and scope. The ENLC will formalize its support of IPTs by creating Charters that define their purpose, roles, and responsibilities. The ENLC will also identify resources to facilitate IPT calls and provide technical support.

- **Action:** With the encouragement and support of the ENLC, EPA Program Offices and OEI will organize IPTs to collaboratively develop publishing services for EPA databases.

Strategy 3.2: Document Business Requirements and Build Publishing Services.

IPTs will fully consider and document the business needs of the community they represent and prepare use cases for Network publishing services. IPTs should consider such questions as:

- What data should be shared?
- What are the data's purposes?
- How will users access the data (Node-to-Node exchange, web application, client application, mobile device, other)? In what format?
- Where are the data housed (centralized in an EPA national database or in EN partner databases)? Where timely and accurate data are available in EPA databases, it may be most efficient to use those databases as the primary source of published information rather than relying on individual partners to publish their data. Business and data requirements should determine the approach.
- What types of questions will consumers ask of the data?
- Are partners interested in using data to develop environmental indicators? If so, what data will they require?
- What services could enable multi-media and place-based data integration for cross organizational and jurisdictional analysis?

Upon completing a comprehensive requirements analysis, IPTs will design and build data publishing services that meet those needs and enable new collaboration opportunities. The

ENLC and NTB will help to ensure that services adhere to Network standards. They will also recommend best practices to maximize automation, standardization, and opportunities for reuse.

The following actions will support this strategy:

- **Action:** IPTs will document business requirements and design and build data publishing services that meet the community of interest's needs.
- **Action:** The ENLC and NTB will provide flow development assistance and technical expertise to help the IPT select appropriate architectures and service designs so that the group builds data flows that:
 - Are consistent with Network standards and best practices;
 - Take full advantage of Network shared services and tools;
 - Function as efficiently as possible while meeting the business requirements of EN consumers; and
 - Are well documented so that EN consumers can easily use the services to access data.
- **Action:** The NTB will ensure IPTs are aware of the Network's standards, guidance, and best practices for data flow development. For example, the Network's guidance on building RESTful web services may help partners and consumers develop simpler approaches to designing, implementing, maintaining, and using services that publish environmental data.

Strategy 3.3: Assist Partners in Implementing and Maintaining Publishing Services.

The ENLC will work through IPTs to help Network partners more easily implement and maintain data publishing services. This will help promote more rapid growth in the amount and types of data being published on the Network. The support will include training materials to help more EN partners understand how to publish their data.

The NTB and EN staff will also ensure partners who wish to publish data are fully aware of the Network's highly extensible and reusable technology. Network tools and services may help partners to minimize their implementation and maintenance costs. Partners can use the shared infrastructure of freely available Node software and data flow plug-ins. Partners can also take advantage of shared centrally managed infrastructure such as the Network Authentication and Authorization Service and the Exchange Network Discovery Service. These tools and services offer a "build once-use many times" approach that will reduce the incremental costs to implement and support publishing web services. Other shared tools, such as the Exchange Network Browser and the Exchange Network Services Center, are important foundations on which to expand the Network's capability to support better data discovery and use.

The following actions will support this strategy:

- **Action:** The ENLC and NTB will work with IPTs to create sharable implementation tools such as data flow plug-ins that will enable partners to publish data with less effort and at a lower cost.
- **Action:** The NTB will promote the Virtual Node, which may help implementers deploy and maintain publishing services at a reduced cost.
- **Action:** As part of Strategy 1.5, the NTB will develop training to provide partners with the knowledge to implement and maintain data publishing services. The ENLC may explore the feasibility of using resources to provide targeted assistance from Exchange Network flow developers when needed. The ENLC, NTB, and EN staff will stay engaged in IPTs to identify when partner needs and Network priorities may call for this type of direct assistance.
- **Action:** As part of the Marketing and Communications Plan identified in Goal 2, the ENLC will market data publishing flows to others in the Network community to encourage greater awareness, reuse, and more widespread data publishing.

Strategy 3.4: Support the Development of Tools that Promote Easier Discovery, Integration, and Use of Environmental Data.

Effective data access tools will use Network services and technology, focusing on making data easier to discover, integrate, and use. EN consumers will not need to have a working knowledge of the Network to take advantage of its capabilities. Rather, Network technology will serve as a behind-the-scenes service provider.

In addition to meeting the data access needs of EN partners and consumers, effective data access tools demonstrate the Network's value and help to make it more tangible. Partners need incentives to get involved in the Exchange Network and invest in its future. Information tools that support greater operational efficiency can encourage more widespread interest and participation.

The ENLC and NTB will support the efforts of IPTs and partners working in EN grant-supported projects to build Network applications. These will help EN consumers discover, access, and use data to make better decisions. They will also work with publishing IPTs to use existing tools like the Exchange Network Discovery Service (ENDS), the Exchange Network Browser, and the Exchange Network Services Center.

The NTB and EN staff will also promote Network web services so that application developers in EN partners, EN consumers, private industry, and the general public can consider using them to

build tools for data access and analysis. The Network can expand awareness of its services and tools by partnering with other data access initiatives such as OpenGov, Data.gov, and EPA's Apps for the Environment Challenge. Efforts to promote Network services and data access tools will be incorporated into the Outreach and Marketing Strategy identified in Goal 2.

The following actions will support this strategy:

- **Action:** The ENLC, NTB, and EN staff will participate in data publishing IPTs and identify opportunities to reuse or create data access applications. The ENLC may explore the feasibility of using resources to assist IPTs with the development of tools and applications that support the discovery, integration, or use of environmental information. Investments in tool development should also consider options for meeting long-term hosting and maintenance needs. EN staff will stay engaged in IPTs to identify when partner needs and Network priorities may call for this type of investment.
- **Action:** Under the EN Grant Program, EPA will prioritize proposals that emphasize the development of tools that use Network publishing services to promote better data access and analysis.
- **Action:** The NTB will support continued operations and refinement of the Exchange Network Discovery Service (ENDS), Exchange Network Browser, and the Exchange Network Services Center so that they are responsive to the needs of EN partners and consumers. EN staff will oversee the development of training resources for partners and consumers on these tools under Strategy 1.5.
- **Action:** The NTB will support development of a data service application programming interface (API) library to assist application developers in creating tools that are powered by Network web services.
- **Action:** The NTB and EN staff will work with IPTs and other application developers to register sharable data access tools in EPA's Reusable Components Service. EN staff will promote these tools so that other EN partners and consumers can find and use them.
- **Action:** The ENLC will seek out opportunities to collaborate with other data access initiatives such as OpenGov or Data.gov.
- **Action:** The ENLC will promote data access tools to highlight the business value of the Network as part of the Outreach and Marketing Strategy in Goal 2.

Goal 4: The Exchange Network and its Partners Have Adequate Resources for Implementation, Operations, and Maintenance

The ENLC will secure resources at a level sufficient to sustain partner participation and effectively implement the activities contained in this Phase 2 Implementation Plan.

The primary sources of funding for Exchange Network partners are EPA Exchange Network Grants and EPA National Program Grants. The Exchange Network Grant Program provides competitive funding to eligible partners for EN projects. EPA National Program Management grants are an important source of funding for the operation and maintenance of Exchange Network infrastructure and data flows that support regulatory reporting.

Along with other funds from the EPA Office of Environmental Information, the Exchange Network Grant Program has also supported cooperative agreements with state and tribal partner organizations. These cooperative agreements fund staff and contractors that support the Governance. They also support the participation of state and tribal partners in the Governance. Furthermore, the cooperative agreements have helped to fund the development of shared tools, services, training, and guidance for partners. EPA, states, and tribes also contribute significant staff time and contractor support to the Exchange Network Governance from their own budgets.

All of the actions described in this Plan assume, at a minimum, continued funding from these sources to support Phase 2 activities. The annual EPA budget will limit the scope and extent of the planned activities. In times of tightening budgets at the state, tribal, and Federal level, the ENLC will consider all possible options for obtaining resources to accomplish the goals and actions in this plan efficiently and effectively.

Strategy 4.1: Secure Resources for Near-term Investment in Phase 2 Priorities.

The following actions will support this strategy:

- **Action:** The ENLC will regularly review OEI and cooperative agreement budgets and spending plans to ensure that they are aligned with the goals and strategies of the Phase 2 Implementation Plan. The ENLC will identify and carry out operational efficiencies to maximize the funding available for the most critical core Network functions.
- **Action:** The EPA will advocate for state and tribal cooperative agreement budgets funded at a level adequate to support the activities in the Phase 2 Plan.

Strategy 4.2: Develop a Comprehensive Grants Strategy Aimed at Effectively Targeting Available Funding.

EPA will develop a strategy to support operations and maintenance of the Exchange Network while encouraging partners to develop innovative projects and activities that reflect the priorities of Governance.

The following actions will support this strategy:

- **Action:** OEI will ensure that the Exchange Network Grant Solicitation Notice will encourage project proposals that support the initiatives of the Phase 2 Implementation Plan including:
 - Development of publishing-oriented data flows and services
 - Implementation of data publishing web services
 - Development of tools that support data discovery and use

- **Action:** The ENLC will continue to work with environmental Program Offices in EPA Headquarters and Regions, states, tribes, and territories to reaffirm that program office formula grants can specifically identify and support operations and maintenance of Exchange Network National System data flows.

Strategy 4.3: Cultivate Long-term Sources of Funding to Assure the Sustainability of the Network.

Over the long-term, the Exchange Network will require resources to support continued investment in shared infrastructure, central services, Governance, staff, and technical innovation.

The following actions will support this strategy:

- **Action:** Annually, the ENLC will ensure that the Exchange Network has strong linkages to EPA's strategic plan.

- **Action:** As the ENLC pursues partnerships with new communities and stakeholders under Goal 2, it will pay particular attention to opportunities that may offer access to new resources that can supplement traditional funding sources.

- **Action:** The ENLC will work with EPA and other partners to identify shared tools and services that have the potential to reduce operating costs. EPA will not charge partners for the use of tools and services it builds. This does not preclude state and tribal

partners from using those tools or services to support processes that collect fees from regulated communities.

- **Action:** EPA will advocate for resources to support central shared services and Exchange Network Governance operations and innovations. This includes funding to support cooperative agreements with state and tribal organizations.
- **Action:** The ENLC will work with state and tribal organizations to ensure that Network funding is included in recommendations on Federal budgets.
- **Action:** The ENLC will develop an updated return on investment analysis that demonstrates the value of EN grant-funded projects and the cost effectiveness of continued investment in Network technologies.