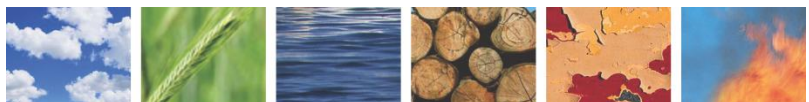

Windsor Solutions, Inc.

Exchange Network Experience

V1.0

June, 2008



Introduction

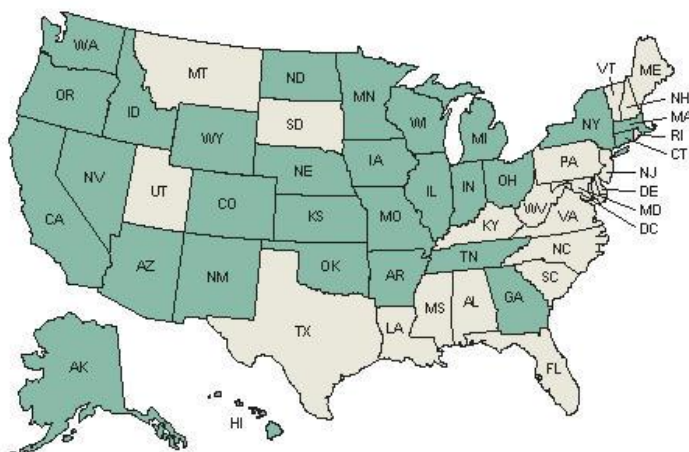
Headquartered in Portland, Oregon, and with an east coast United States office in Northampton Massachusetts, Windsor Solutions, Inc. (Windsor) is an information technology consulting firm that provides industry-specific information systems for environmental, health, and related government agencies. As a systems integrator specializing in environmental information systems, Windsor is unique in its ability to work with and support environmentally focused organizations. Our business knowledge and technical expertise allow us to develop and implement solutions that address an agency's specific needs in regard to critical data collection, appropriate analysis, and timely information sharing.

Founded in Oregon in 1998 Windsor has always strived to be not only a practical implementer of effective environmental information systems but also a thought leader in the innovative use of technology to address environmental challenges. The exchange network represents just one area in which Windsor has demonstrated these qualities. This document shares a selection of the work that Windsor has performed relating to the Exchange Network.

For additional information relating to our experience with the Exchange Network please contact us at www.windsorsolutions.com/ExchangeNetwork/

Qualifications

Windsor has participated in a wide variety of Exchange Network related projects and has a significant track record of deploying robust network nodes and evolving these to take advantage of ever changing technologies. Windsor's latest Node offering (Windsor Node 2008) is the latest in a line of proven solutions for our clients that provides a client with the ability to participate in the exchange with 1.1 specification flows and the newly released 2.0 specifications. The company has been closely involved with the conceptualization, design and implementation of the Exchange Network from the early days.



Some of Windsor's specific achievements have been:

- The first company to successfully implement a fully functional production Node and the company with by far the greatest experience with production Node operation.
- Development and implementation of a Microsoft .Net based Network Node used by around 20 organizations. This Node is interoperable with both SQL Server and Oracle.
- Development and implementation of a Java based Network Node used by 5 organizations.
- Development of multiple regulatory environmental program data flows including FRS, NEI, AQS, SDWIS, RCRAInfo, PCS-IDEF, and TRI.

- Led the development of a number of innovative new data exchanges between partners that have served to dramatically illustrate the potential and power of the Exchange Network, for example the HERE, PNWWQX, and eManifesting exchanges.
- Selected in 2004 and 2006 during open competitive procurement processes as the States' Exchange Network General Support contractor by ECOS. Windsor's responsibilities entail further refinement of the, policies, design and technology of the Exchange Network.
- Leaders in the practical use of web services, XML data exchange, data warehousing, and automated data cleansing.

This section provides brief descriptions of some selected prior project experiences of relevance to the proposed work.

Network Node Implementation

Washington Department of Ecology – Network Node Implementation

Windsor brings practical hands on experience with Node implementations. With the Exchange Network still in the early stages of implementation, the technologies and Node Specification / Protocols employed are leading edge.

Windsor was the contractor selected by the State of Washington Department of Ecology to support the implementation of their Node. The Node was developed, implemented and currently performs automated exchange of FRS data to CDX. The Node is fully compliant with the following Exchange Network requirements:

- Network Exchange Protocol Version 1.1
- Network Node Functional Specification Version 1.1
- Network Security Guidelines and Recommendations

Prior to the development of the Node, Windsor assisted the agency in considering a variety of alternative approaches (e.g., vendor's turnkey offerings, other State's demonstrated node configurations, etc.). The maturity of each alternative was considered and their technology contrasted with Ecology's existing technical infrastructure and future data exchange requirements. Based on this research, Ecology decided that Windsor should custom develop a web services Node using the latest Microsoft technologies (i.e., .Net Framework v1.1, and Visual Studio .Net 2003).

The advanced web services and XML capabilities of these Microsoft technologies were employed to provide all of the requirements of the Node Specification and Protocols. Furthermore, a sub-system was developed to provide additional Node administration functionality to expedite the management and deployment of future Exchange Network data flows at Ecology. After two months of development and internal testing, Windsor worked closely with EPA's CDX staff to validate the capabilities of the Washington Node and the CDX Node alike. This joint effort resulted in a working flow of FRS data between the two Partners, and Windsor's input helped CDX identify some necessary changes to be made within the subsequent version 1.1 of the Functional Specification and Protocols.

According to the EPA's Central Data Exchange (CDX) staff, this was the first Node to automatically interchange XML formatted data with EPA based on the Network Exchange specifications.

Since the original Node implementation in 2003, Windsor has assisted Ecology staff at various times with upgrades and enhancements to the original Node to build on the original functionality.

Kansas Department of Health and Environment – Facility Profiler and Exchange Network Project

In October 2003, Windsor began this project to build an integrated Facility Identification system for Kansas Department of Health and Environment (KDHE) and implement a Node including a flow to EPA's FRS system.

The Facility Identification system was based on the system previously developed and implemented by Windsor at the Michigan Department of Environmental Quality. The diagram presents an overall architecture of the system components, demonstrating how the data is replicated from the source systems, transformed (including cleaning of address, geo-coding to fill in missing coordinates, derivation of geopolitical areas such as county and HUC), and then the user applications that allow duplicated data to be reconciled.

The Node used a replica of that implemented at the Washington Department of Ecology, but was modified to work with an Oracle database to support its administrative functions.

The Facility Identification system used Microsoft .Net as the primary development tool, relying on ASP.Net to provide a browser based user interface for the system. The integrated data is managed within an Oracle 9.2i database and uses Oracle Warehouse builder to extract and transform the data from the initial five source program systems. The GIS capabilities are supported by ArcIMS and SDE, and the system uses ESRI's new ArcWeb services for geocoding and address cleansing. The Node Administrative windows client was also developed in .Net.

This system went live, as scheduled, in March 2004, and the first production flow of Facility data to EPA's FRS system will occur in April, once the majority of multi-program duplicate facility data has been reconciled by the system.

Again, since the original Node implementation, Windsor has continued to assist KDHE with regular upgrades and enhancements to the original Node and Facility Profiler systems.

Minnesota Pollution Control Agency – Exchange Network Project

Windsor was engaged by the Minnesota Pollution Control Agency (MPCA) to conduct several Exchange Network related projects.

With the first project, Windsor implemented a Network Node for the agency, with this Node being modeled on the highly successful Node software previously implemented for other States. The Node is developed using the Microsoft .Net framework with a SQL Server database to support its administrative functions.

Development of this Node completed on schedule in March 2006, together with parallel implementation of a data flow to the EPA FRS database. Since this initial implementation, Windsor has developed additional DMR, NEI, and RCRAInfo data flows.

MPCA is authorized by the U.S. Environmental Protection Agency (EPA) to administer the NPDES program for facilities located in the State of Minnesota. The NPDES program issues of wastewater permits to industrial and municipal facilities. Permitted facilities are required to submit monthly reports Discharge Monitoring Reports (DMR) which characterize their wastewater discharges to "waters of the State".

The mechanism by which DMR data is transmitted to PCS is via the EPA XML Interim Data Exchange Format (IDEF). IDEF provides an alternate format to the legacy 80-column batch card format. IDEF files will be submitted via an automated process managed by the MPCA Network Node.

While the complete IDEF exchange encompasses all PCS modules including facility, permit, limit, measurement and enforcement data, this project focused solely on flowing PCS Measurement Violation (DMR) data for approximately 90 major dischargers.

Washington Department of Ecology – PCS/IDEF Data Exchange Project

Windsor was contracted by the State of Washington Department of Ecology (Ecology) to design, build and implement a PCS/IDEF data exchange through the Ecology Network Node.

Ecology manages the National Pollutant Discharge Elimination System (NPDES) program for regulated wastewater-producing facilities within the State of Washington. As a delegated state for the federal NPDES program, Ecology must issue permits, perform inspections, and enforce regulations relating to the Clean Water Act.

For the purposes of tracking information relating to the NPDES program, Ecology maintains its own internal system, the Water Permitting Life Cycle System (WPLCS). In addition to maintaining WPLCS, Ecology also maintains data in the US Environmental Protection Agency (EPA) Permit Compliance System (PCS) pertaining to the issuance of NPDES permits and data relating thereto. Having built an internal system, Ecology was faced with the challenge of synchronizing data between WPLCS and the federal PCS system.

PCS utilizes antiquated mainframe technology which provides a limited means of uploading data in batch and of retrieving any processing feedback. To simplify and modernize the means of interacting with PCS, EPA has developed a file format which allows states to submit data to the PCS system. This format is known as the Interim Data Exchange Format (IDEF) and utilizes extensible markup language (XML) technology.

Tasked with submitting data to PCS, Ecology set out to build translation routines that compose data files for submission to EPA. Ecology staff was able to make considerable progress in this effort and complete two of the nine modules. Windsor assisted Ecology in completing the development and testing of the data composition modules, implementing the data exchange and achieving synchronization with the federal PCS database.

North Dakota Department of Health – Facility Profiler and Exchange Network Project

In February 2005, Windsor began this project to implement the integrated Facility Identification system developed for the Kansas Department of Health and Environment for the North Dakota Department of Health.

This project utilized the .Net development environment and a SQL Server database. The project included extensive data cleaning activities and was completed in June 2005

In parallel with this project, Windsor also developed and implemented a Node including a data flow from the new facility data warehouse to EPA's FRS system, as well as an additional dataflow to the EPA SDWIS system.

Massachusetts Department of Environmental Protection – Exchange Network Project

In May 2004, Windsor began this project to implement a Network Node and several flows to EPA systems, including RCRAInfo and NEI.

The Node used a replica of that implemented at the Kansas Department of Health and Environment, but was modified to work with a SQL Server database to support its administrative functions. The Node Administrative windows client was developed in .Net and includes a number of enhanced features when compared to the original Washington Node software.

This Node was implemented on schedule at the end of May 2004. Work continued on the development of a production flow of RCRAInfo data to EPA's system. This flow was successfully implemented in October 2004, and represented the first production flow of RCRAInfo data through the Exchange Network. Work on the development of the data flow to EPA's NEI system completed in November, 2004.

Nevada Division of Environmental Protection – Exchange Network Project

In April 2005, Windsor began this project to implement a Network Node and several flows to EPA systems, including NEI and AQS.

The Node is based on the same comprehensive specification implemented at the Kansas Department of Health and Environment, utilizing SQL Server and the Microsoft .Net framework.

Development of this Node completed on schedule in May 2005, together with parallel implementation of a data flow to the EPA NEI database. The NEI flow implementation was unique in that Nevada was the first State to directly incorporate use of the EPA CDX Schematron Web service into the operational Network Node. The Nevada submission was the first to successfully use the Schematron Web service.

The AQS data flow was completed in July 2005 with data being submitted through Web CDX. This data flow is scheduled to be updated to the latest XML schema version during 2008.

Alaska Department of Environmental Conservation – Exchange Network Project

Windsor was engaged by the Alaska DEC to conduct several Exchange Network related projects.

With the first project, Windsor is implementing a Network Node for the agency, with this Node being modeled on the highly successful Node software previously implemented for other States. The Node is developed using the Microsoft .Net framework with a SQL Server database to support its administrative functions. This Node was implemented during January 2006.

Windsor also developed an outbound data flow from the State's local STORET database to various partners in the Pacific Northwest Water Quality Data Exchange (PNWWQX) Network. A flow component is being developed that will conform to the XML schema and flow configuration specification defined for the PNWWQX and will provide data from the DEC's local STORET database to the PNWWQX Web application discussed earlier.

Colorado Department of Environmental Quality – Network Node Implementation

Windsor recently completed this project to support the State of Colorado in the implementation of the Washington/Kansas .Net Network Node and the FRS data flow to EPA. The node was implemented in November and development of the FRS flow was completed by December 30, 2004.

This implementation of the node was unique in that Colorado opted to contract with Windsor Solutions to provide support in the node and flow implementation, with the Colorado technical team having primary implementation responsibility. The Colorado team quickly implemented the node in their environment with relatively minor support from the Windsor technical team. Colorado's experience speaks volumes to the robustness and completeness of the Washington/Kansas node as developed by Windsor. This experience demonstrates Windsor's flexibility to meet the individual needs of their clients.

Wyoming Department of Environmental Quality – Exchange Network Project

In May 2006, Windsor began this project to implement a Network Node and initial FRS data flow to the EPA FRS system. Implementation of the Node and FRS data flow was completed on schedule in September 2006.

The Node is based on the same comprehensive specification implemented at the Kansas Department of Health and Environment, utilizing SQL Server and the Microsoft .Net framework.

In parallel with this work, Windsor also conducted a comprehensive assessment of the DEQ's existing NPDES permitting system with a view to understanding compliance with the EPA's ICIS-NPDES database. Based on this assessment, Windsor developed an implementation plan to guide specific activities needed to achieve compliance with the EPA system requirements and to facilitate future Exchange Network based data exchanges from the DEQ WYPDES system to the EPA system.

Windsor is currently engaged with the Wyoming DEQ to perform a ground up redevelopment of the WYPDES system, including the development of the required data flows to ICIS-NPDES.

New York Department of Environmental Conservation – Exchange Network Project

In August 2004, Windsor began this project to implement a Network Node and several flows to EPA systems, including FRS and NEI.

The Node is based on the same comprehensive specification implemented at by Windsor for a number of other States, but the Node was completely redeveloped using the Java programming language and the J2EE development environment. This Node employs the Apache Web services toolkit and works with an Oracle 9i database to support its administrative functions. A Web-based Node Administration utility was developed in JSP and Java to enable the configuration and management of the Node operations, including security management, dynamic data exchange management, transaction and document management and also a sophisticated scheduling tool to allow for data exchanges with partners to be fully automated.

Development of this Node was completed on schedule in mid-November 2004, together with parallel implementation of an initial data exchange between DEC's enterprise Facility Information System (FIS) and EPA's Facility Registry System (FRS). This data exchange enables EPA to automatically retrieve information about regulated facilities in New York State directly from the DEC's central data management system. This exchange now occurs on a biweekly basis with no interaction from DEC staff.

Following the Node implementation, in December 2004, work commenced on a second data exchange between DEC's Air Facility System (AFS) which manages air emission data from regulated point sources in New York State. This exchange was developed to extract data from DEC's central database system and to validate and format this data so that it can be accepted by EPA's National Emission Inventory (NEI) system. This data exchange was implemented in May 2005 and once again, fully automates many tasks previously performed manually by DEC staff.

Also in December 2004, DEC embarked on a collaborative project with New York State Department of Health to establish an automated exchange of ambient air quality data. Data provided by DEC to DOH is used to may air quality to epidemiological data and to better understand the human health effects of environmental conditions. This specific exchange involved the establishment of a means to technically link the Network Node employed by DEC with the Public Health Information Network Messaging System (PHINMS) employed by DOH. This solution breaks new ground in the area of environmental and health information sharing and is being considered as a national model for similar data exchanges. The data exchange was implemented in July 2005.

Windsor is currently engaged with DEC and the New York DOH to design and develop several new bidirectional data flows over the Exchange Network. Data exchanges from DOH to DEC will include drinking water quality data and spatial public water supply area data, while data exchanges from DEC to DOH will include regulated facility details, remediation sites, and hazardous materials spill information. Each of these new data flows is being designed and built from scratch including the development of new XML schema, flow configuration specifications, and the necessary data service components that will be implemented on the Windsor Network Node deployments at each organization. These new data flows will provide program staff in each agency with greater access to the information they need to link environmental impacts with human health and to take the necessary steps to protect the public.

New Mexico Environment Department – Exchange Network Project

In September 2005, Windsor implemented a Network Node and SDWIS and FRS data flows to EPA systems for the New Mexico Environment Department (NMED).

The Node is based on the same specification implemented at the New York Department of Environmental Conservation and employs the J2EE development environment, together with the Apache Web services toolkit and an Oracle database.

Development of this Node completed on schedule in September 2005, together with parallel implementation of a data flow to the EPA FRS database. An additional data flow to the EPA SDWIS system was developed and this data flow included automated submissions of generated XML files from the State FedRep software to the Windsor Node. This implementation represented the first time that this approach had been attempted among all national users of FedRep.

Windsor is currently engaged with NMED to design and develop the NEI And AQS data flows to EPA, as well as to build an electronic emissions reporting application that will be used by regulated facilities to meet emissions reporting obligations.

Georgia Department of Natural Resources – Exchange Network Project

In February 2006, Windsor implemented a Network Node and SDWIS data flows to EPA systems for the Georgia Department of Natural Resources (DNR). The Node was based on the same specification implemented at the New York Department of Environmental Conservation and employs the J2EE development environment, together with the Apache Web services toolkit and an Oracle database.

In February 2008, Windsor upgraded the Network Node to the latest version and implemented an additional data flow to allow DNR to flow data to the EPA WQX system.

Windsor is currently engaged with DNR to implement the NEI data flow.

Missouri Department of Natural Resources – Exchange Network Project

In January 2007, Windsor implemented a Network Node and initial FRS data flow to the EPA system for the Missouri Department of Natural Resources.

The Node is based on the same specification implemented at the New York Department of Environmental Conservation and employs the J2EE development environment, together with the Apache Web services toolkit and DB2 database.

Windsor subsequently also implemented the RCRAInfo data flow for DNR targeting the submission of the information required to support the Handler module. This data flow is currently being extended to include compliance and enforcement data elements.

Exchange Network Support

Environmental Council of States – General Support Contract

Windsor has been engaged by ECOS to support the Network Steering Board (NSB) with various Exchange Network implementation efforts. As part of this engagement, Windsor has conducted various activities, including:

- Development of guidelines for Trading Partner Agreement development,
- Design of the Flow Configuration for the FRS data flow,
- Design of the Flow Configuration for the RCRAInfo data flow,
- Design of the Flow Configuration for the NEI data flow,
- Design of an XML schema for the Toxics Release Inventory (TRI) data flow,
- Design of an XML schema for the Concentrated Animal Feeding Operations (CAFO) data flow,
- Development of marketing materials,
- Representing ECOS and providing expert technical assistance to the development of the Network Node 2.0 Specifications.
- General support to Network Steering Board institutions such as the Technical Resource Group.

Windsor's contract to provide this support to ECOS was recently extended for an additional two year period.

Pacific Northwest Water Quality Data Exchange

Windsor was engaged with the States of Alaska, Idaho, Oregon and Washington to assist with a number of related information management projects designed to facilitate access to a comprehensive source of data related to water quality in the Pacific Northwest. With this project known as the Pacific Northwest Water Quality Data Exchange (Exchange), the States are using Exchange Network principles to facilitate the exchange of information about water quality between various monitoring groups in the Pacific Northwest.

During this project, Windsor applied an iterative approach to the development of the two critical components of any Network data flow, the XML schema and the flow configuration document. The

initial development of the XML schema for the scope of data was completed following agreement to a matrix of data elements. With the schema complete, Windsor engaged with the partner States to prepare the Flow Configuration Document. This process began with an assessment of the key business questions that will be asked. These key questions were then used to identify the specific Web methods that will be required by analyzing the common outcomes and query criteria. *Data access* flows will support the simple provision of business data, while *data management* flows will support the management of information concurrently by more than one partner. As the required services were better understood, Windsor applied certain changes to the XML schema architecture developed earlier.

The key objective of the flow configuration document was to clearly and comprehensively document the technical aspects of the flow in such a way that new partners will be able to participate effectively in the Exchange.

Following the completion of the XML schema and flow specification, Windsor developed a Web-based application that is able to query various partner Nodes for ambient water quality data meeting a variety of input criteria. The returned XML documents are merged and presented using a Web interface which allows real-time analysis and downloading of desired data sets. The application has been installed on the Oregon Department of Environmental Quality Web site and may be viewed at <http://deq12.deq.state.or.us/pnwwqx/>.

e-Manifest Data Exchange Challenge Grant

Environmental regulatory agencies in the States of Michigan, Massachusetts, Minnesota, and New Jersey have been awarded an EPA Challenge Grant to develop a pilot, multi-state manifest tracking system that utilizes key technologies of the Environmental Information Exchange Network. Windsor has been selected to help these agencies with the development of the pilot system that will demonstrate potential electronic tracking and management capabilities of hazardous waste manifests from the original generation of the identified waste to its ultimate disposal.

The e-Manifest tracking system project mission can be defined in terms of the following goals:

1. Pilot an electronic manifest process using the Exchange Network as the enabler
2. Eliminate current paper and mail based processing burden on industry stakeholders and State regulators
3. Drastically improve intra-state and inter-state cradle to grave tracking of hazardous waste by providing rapid access to data consumers

The project involves the design, development, testing and implementation of a pilot central manifest tracking system and data exchange capabilities between the central repository and existing State data management systems. The e-Manifest tracking system pilot project is scheduled over the next two years. Business process analysis, requirements gathering, and design tasks have been completed and development tasks are now underway. The pilot system is expected to be rolled out to the participating States and representatives from the regulated community during the summer of 2008 for testing.

Components under development include a central manifest data repository, Web-based and mobile manifest submission client applications, and Network Node components to support distribution of the centrally collected manifest data to the respective State Network Nodes.

Homeland Emergency Response Data Exchange Challenge Grant

Windsor worked with the states of Nebraska, Kansas, Iowa and Missouri to design and implement the Homeleand Emergency Response Exchange (HERE).

This project was established to allow participating state environmental agencies to support state and local emergency operations personnel during times of crisis. During emergencies events such as floods, tornados, disease outbreaks and various man-made incidents, emergency responders rely on data that resides with the environmental agencies so that they can assess and respond to both the imminent and secondary threats. The advent of the Exchange Network (EN) has provided the tools needed to support robust and efficient exchange of data between environmental agencies and these partners.

By the end of 2007 the project resulted in a multi-organizational data exchange along with seamless data access ability available to emergency responders. This includes the implementation of select data flows at each state agency along with an intuitive, yet powerful data retrieval application custom-developed to support the needs of the emergency personnel.

The implementation of the HERE data exchange required advanced Network Node capabilities. As part of the project Windsor upgraded the standard Network Node to support these requirements and implemented the new Node in all four States, in both .Net and Java environments. The upgraded Node significantly enhances the previously available functionality.

Network Node Client Development

Independent of data exchange and Node implementation work, Windsor developed several Node Client applications over the last five years. These applications vary in their functionality depending on the target business need but are all freely distributed to Exchange Network Partners. These Windows forms applications are based on the Network Node 1.1 Protocol/Specifications and allow the user to interface with any live Exchange Network node. These powerful tools have assisted many Exchange Network Partners to become engaged with the Exchange Network by:

- Helping Partners to understand the purpose and workings of the Exchange Network via a real-world demonstration ;
- Assisting Partners in testing the workings of their Node while it is being developed and/or deployed; and
- Providing Partners with a temporary, semi-automated alternative to a fully functioning Node that will allow a Partner to submit XML files to another Partner's Node, and/or solicit, query or download XML data (or other such payloads).