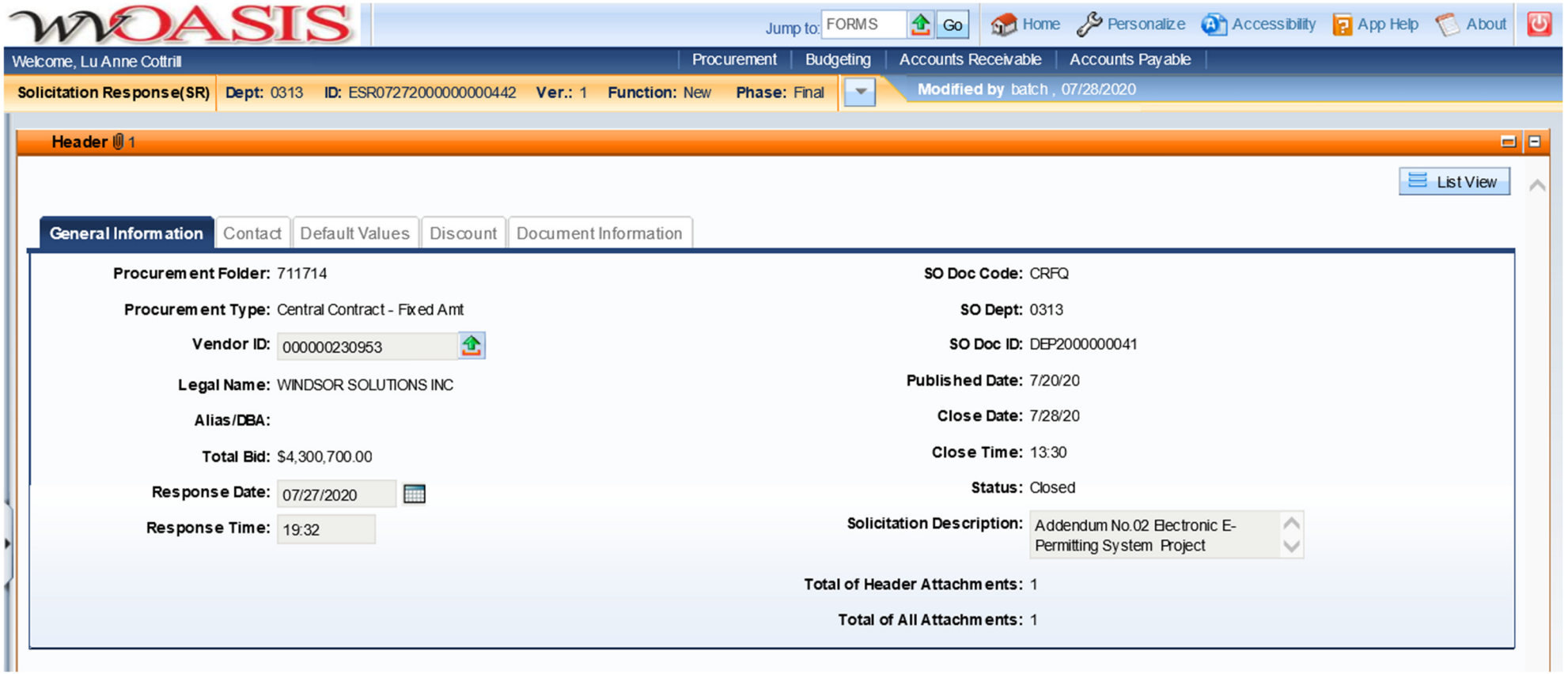
The following documentation is an electronically-submitted vendor response to an advertised solicitation from the *West Virginia Purchasing Bulletin* within the Vendor Self-Service portal at ***wvOASIS.gov***. As part of the State of West Virginia's procurement process, and to maintain the transparency of the bid-opening process, this documentation submitted online is publicly posted by the West Virginia Purchasing Division at ***WVPurchasing.gov*** with any other vendor responses to this solicitation submitted to the Purchasing Division in hard copy format.


wvOASIS
Jump to: FORMS Go
Home
Personalize
Accessibility
App Help
About
Welcome, Lu Anne Cottrill
Procurement
Budgeting
Accounts Receivable
Accounts Payable
Solicitation Response(SR) Dept: 0313 ID: ESR07272000000000442 Ver.: 1 Function: New Phase: Final
Modified by batch , 07/28/2020
Header 1
List View
General Information
Contact
Default Values
Discount
Document Information
Procurement Folder: 711714
Procurement Type: Central Contract - Fixed Amt
Vendor ID: 000000230953
Legal Name: WINDSOR SOLUTIONS INC
Alias/DBA:
Total Bid: $4,300,700.00
Response Date: 07/27/2020
Response Time: 19:32
SO Doc Code: CRFQ
SO Dept: 0313
SO Doc ID: DEP2000000041
Published Date: 7/20/20
Close Date: 7/28/20
Close Time: 13:30
Status: Closed
Solicitation Description: Addendum No.02 Electronic E-Permitting System Project
Total of Header Attachments: 1
Total of All Attachments: 1

Purchasing Division
2019 Washington Street East
Post Office Box 50130
Charleston, WV 25305-0130

State of West Virginia
Solicitation Response

Proc Folder : 711714

Solicitation Description : Addendum No.02 Electronic E-Permitting System Project

Proc Type : Central Contract - Fixed Amt

Date issued	Solicitation Closes	Solicitation Response	Version
	2020-07-28 13:30:00	SR 0313 ESR07272000000000442	1

VENDOR

000000230953

WINDSOR SOLUTIONS INC

Solicitation Number: CRFQ 0313 DEP2000000041

Total Bid : $4,300,700.00 **Response Date:** 2020-07-27 **Response Time:** 19:32:48

Comments:

FOR INFORMATION CONTACT THE BUYER

Guy Nisbet

(304) 558-2596
guy.l.nisbet@wv.gov

Signature on File **FEIN #** **DATE**

All offers subject to all terms and conditions contained in this solicitation

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
1	Electronic EPermitting System				$2,903,500.00

Comm Code	Manufacturer	Specification	Model #
43232802			

Extended Description : Electronic EPermitting System

Comments: Initial implementation and customization

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
2	Post-Launch Maintenance Period				$114,480.00

Comm Code	Manufacturer	Specification	Model #
81112201			

Extended Description : Post-Launch Maintenance Period - 12 Month Post-Launch Maintenance Period after the last features have been deployed. Hours are estimated at 60 hours per month for 12 months for a total of 720 hours. Vendor will only bill for actual hours used.

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
3	nViro Software Suite Enterprise Licensing or equal	1.00000	EA	$144,000.000000	$144,000.00

Comm Code	Manufacturer	Specification	Model #
43230000			

Extended Description : nViro Software Suite Enterprise Licensing or equal
This includes the license and maintenance & support for the first year.

Comments: Yearly license fee; note year 1 maintenance and support is covered in item 2 above

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
4	Software Support renewal for yr 2				$268,360.00

Comm Code	Manufacturer	Specification	Model #
81112200			

Extended Description : Software Support renewal for yr 2

Comments: Year 2 license $151,000; support up to 720 hours $117,360

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
5	Software Support renewal for yr 3				$279,240.00

Comm Code	Manufacturer	Specification	Model #
81112200			

Extended Description : Software Support renewal for yr 3

Comments: Year 3 license $159,000; support up to 720 hours $120,240

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
6	Software Support renewal for yr 4				$290,120.00

Comm Code	Manufacturer	Specification	Model #
81112200			

Extended Description : Software Support renewal for yr 4

Comments: Year 4 license $167,000; support up to 720 hours $123,120

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
7	Software Support renewal for yr 5				$301,000.00

Comm Code	Manufacturer	Specification	Model #
81112200			

Extended Description : Software Support renewal for yr 5

Comments: Year 5 license $175,000; support up to 720 hours $126,000

West Virginia Department of Environmental Protection
Division of Water and Waste Management

nVIRO Software Implementation

ePermitting System (DWWM20-01)

Response to Request for Quotation CRFQ 0313 DEP2000000041

July 23, 2020

WINDSOR SOLUTIONS | Environmental + Health Information Systems

Contents

Required Forms

Purchasing Divison
2019 Washington Street East
Post Office Box 50130
Charleston, WV 25305-0130

State of West Virginia
Request for Quotation
34 — Service - Prof

Proc Folder: 711714
Doc Description: Electronic EPermitting System Project (DWWM20-01)
Proc Type: Central Contract - Fixed Amt

Date Issued	Solicitation Closes	Solicitation No	Version
2020-06-17	2020-07-14 13:30:00	CRFQ 0313 DEP2000000041	1

BID RECEIVING LOCATION
BID CLERK
DEPARTMENT OF ADMINISTRATION
PURCHASING DIVISION
2019 WASHINGTON ST E
CHARLESTON WV 25305
US

VENDOR
Vendor Name, Address and Telephone Number:
Windsor Solutions, Inc
4386 S Macadam Ave., Suite 101
Portland OR 97239

FOR INFORMATION CONTACT THE BUYER
Guy Nisbet
(304) 558-2596
guy.l.nisbet@wv.gov

Signature X [signature] FEIN # 93-1245518 DATE July 1, 2020
All offers subject to all terms and conditions contained in this solicitation

Page : 1 FORM ID : WV-PRC-CRFQ-001

ADDENDUM ACKNOWLEDGEMENT FORM
SOLICITATION NO.: CRFQ 0313 DEP2000000041

Instructions: Please acknowledge receipt of all addenda issued with this solicitation by completing thi addendum acknowledgment form. Check the box next to each addendum received and sign below. Failure to acknowledge addenda may result in bid disqualification.

Acknowledgment: I hereby acknowledge receipt of the following addenda and have made the necessary revisions to my proposal, plans and/or specification, etc.

Addendum Numbers Received:
(Check the box next to each addendum received)

[X] Addendum No. 1	[ ] Addendum No. 6
[X] Addendum No. 2	[ ] Addendum No. 7
[ ] Addendum No. 3	[ ] Addendum No. 8
[ ] Addendum No. 4	[ ] Addendum No. 9
[ ] Addendum No. 5	[ ] Addendum No. 10

I understand that failure to confirm the receipt of addenda may be cause for rejection of this bid. I further understand that any verbal representation made or assumed to be made during any oral discussion held between Vendor's representatives and any state personnel is not binding. Only the information issued in writing and added to the specifications by an official addendum is binding.

Windsor Solutions, Inc.
Company

Authorized Signature

July 27, 2020
Date

NOTE: This addendum acknowledgement should be submitted with the bid to expedite document processing.
revised 6/8/2012

Purchasing Divison
2019 Washington Street East
Post Office Box 50130
Charleston, WV 25305-0130

State of West Virginia
Request for Quotation
34 — Service - Prof

Proc Folder: 711714
Doc Description: Addendum No.01 Electronic E-Permitting System Project
Proc Type: Central Contract - Fixed Amt

Date Issued	Solicitation Closes	Solicitation No	Version
2020-07-02	2020-07-23 13:30:00	CRFQ 0313 DEP2000000041	2

BID RECEIVING LOCATION

BID CLERK
DEPARTMENT OF ADMINISTRATION
PURCHASING DIVISION
2019 WASHINGTON ST E
CHARLESTON WV 25305
US

VENDOR

Vendor Name, Address and Telephone Number:
Windsor Solutions, Inc.
4386 S Macadam Ave., Suite 101
Portland OR 97239

FOR INFORMATION CONTACT THE BUYER
Guy Nisbet
(304) 558-2596
guy.l.nisbet@wv.gov

Signature X [signature] FEIN # 93-1245518 DATE July 20, 2020

All offers subject to all terms and conditions contained in this solicitation

Page : 1 FORM ID : WV-PRC-CRFQ-001

Purchasing Divison
2019 Washington Street East
Post Office Box 50130
Charleston, WV 25305-0130

State of West Virginia
Request for Quotation
34 — Service - Prof

Proc Folder: 711714
Doc Description: Addendum No.02 Electronic E-Permitting System Project
Proc Type: Central Contract - Fixed Amt

Date Issued	Solicitation Closes	Solicitation No	Version
2020-07-20	2020-07-28 13:30:00	CRFQ 0313 DEP2000000041	3

BID RECEIVING LOCATION
BID CLERK
DEPARTMENT OF ADMINISTRATION
PURCHASING DIVISION
2019 WASHINGTON ST E
CHARLESTON WV 25305
US

VENDOR
Vendor Name, Address and Telephone Number:
Windsor Solutions, Inc.
4386 S Macadam Ave, Suite 101
Portland OR 97239

FOR INFORMATION CONTACT THE BUYER
Guy Nisbet
(304) 558-2596
guy.l.nisbet@wv.gov

Signature X [signature] FEIN # 93-1245518 DATE July 20, 2020
All offers subject to all terms and conditions contained in this solicitation

Page : 1 FORM ID : WV-PRC-CRFQ-001

DESIGNATED CONTACT: Vendor appoints the individual identified in this Section as the Contract Administrator and the initial point of contact for matters relating to this Contract.

Cy Cho, Communications Mgr
(Name, Title)
Craig Austin, Communications Manager
(Printed Name and Title)
4386 S Macadam Ave., Suite 101, Portland OR 97239
(Address)
503-675-7833 / 503-675-7804
(Phone Number) / (Fax Number)
craig-austin@windsorsolutions.com
(email address)

CERTIFICATION AND SIGNATURE: By signing below, or submitting documentation through wvOASIS, I certify that I have reviewed this Solicitation in its entirety; that I understand the requirements, terms and conditions, and other information contained herein; that this bid, offer or proposal constitutes an offer to the State that cannot be unilaterally withdrawn; that the product or service proposed meets the mandatory requirements contained in the Solicitation for that product or service, unless otherwise stated herein; that the Vendor accepts the terms and conditions contained in the Solicitation, unless otherwise stated herein; that I am submitting this bid, offer or proposal for review and consideration; that I am authorized by the vendor to execute and submit this bid, offer, or proposal, or any documents related thereto on vendor's behalf; that I am authorized to bind the vendor in a contractual relationship; and that to the best of my knowledge, the vendor has properly registered with any State agency that may require registration.

Windsor Solutions, Inc.
(Company)
Kevin Jeffery
(Authorized Signature) (Representative Name, Title)
Kevin Jeffery Vice President
(Printed Name and Title of Authorized Representative)
July 1, 2020
(Date)
503-675-7833 / 503-675-7804
(Phone Number) (Fax Number)

Revised 01/09/2020

10. VENDOR DEFAULT:

10.1. The following shall be considered a vendor default under this Contract.

10.1.1. Failure to perform Contract Services in accordance with the requirements contained herein.

10.1.2. Failure to comply with other specifications and requirements contained herein.

10.1.3. Failure to comply with any laws, rules, and ordinances applicable to the Contract Services provided under this Contract.

10.1.4. Failure to remedy deficient performance upon request.

10.2. The following remedies shall be available to Agency upon default.

10.2.1. Immediate cancellation of the Contract.

10.2.2. Immediate cancellation of one or more release orders issued under this Contract.

10.2.3. Any other remedies available in law or equity.

11. MISCELLANEOUS:

11.1. Contract Manager: During its performance of this Contract, Vendor must designate and maintain a primary contract manager responsible for overseeing Vendor's responsibilities under this Contract. The Contract manager must be available during normal business hours to address any customer service or other issues related to this Contract. Vendor should list its Contract manager and his or her contact information below.

Contract Manager: Steve Rosenberger

Telephone Number: 503-675-7833

Fax Number: 503-675-7804

Email Address: steve_rosenberger@windsorsolutions.com

147

West Virginia Ethics Commission

Disclosure of Interested Parties to Contracts

(Required by *W. Va. Code* § 6D-1-2)

Name of Contracting Business Entity: Windsor Solutions, Inc. **Address:** 4386 S Macadam, Suite 101 Portland OR 97239

Name of Authorized Agent: Kevin Jeffery **Address:** same as above

Contract Number: _____ **Contract Description:** Electronic EPermitting System Project

Governmental agency awarding contract: WV DEP

☐ **Check here if this is a Supplemental Disclosure**

List the Names of Interested Parties to the contract which are known or reasonably anticipated by the contracting business entity for each category below *(attach additional pages if necessary)*:

1. **Subcontractors or other entities performing work or service under the Contract**
   ☒ Check here if none, otherwise list entity/individual names below.

2. **Any person or entity who owns 25% or more of contracting entity (not applicable to publicly traded entities)**
   ☐ Check here if none, otherwise list entity/individual names below.
   Kevin Jeffery
   Guy Outred

3. **Any person or entity that facilitated, or negotiated the terms of, the applicable contract (excluding legal services related to the negotiation or drafting of the applicable contract)**
   ☒ Check here if none, otherwise list entity/individual names below.

Signature: Kevin Jeffery Date Signed: July 01, 2020

Notary Verification

State of Oregon, County of Multnomah:

I, Kevin Jeffery, the authorized agent of the contracting business entity listed above, being duly sworn, acknowledge that the Disclosure herein is being made under oath and under the penalty of perjury.

Taken, sworn to and subscribed before me this 01st day of July, 2020

Notary Public's Signature

OFFICIAL STAMP
CATHERINE MARIE BOYKIN-SENA
NOTARY PUBLIC - OREGON
COMMISSION NO. 989084
MY COMMISSION EXPIRES JULY 02, 2023

To be completed by State Agency:
Date Received by State Agency: _____
Date submitted to Ethics Commission: _____
Governmental agency submitting Disclosure: _____

Revised June 8, 2018

STATE OF WEST VIRGINIA
Purchasing Division

PURCHASING AFFIDAVIT

CONSTRUCTION CONTRACTS: Under W. Va. Code § 5-22-1(i), the contracting public entity shall not award a construction contract to any bidder that is known to be in default on any monetary obligation owed to the state or a political subdivision of the state, including, but not limited to, obligations related to payroll taxes, property taxes, sales and use taxes, fire service fees, or other fines or fees.

ALL CONTRACTS: Under W. Va. Code §5A-3-10a, no contract or renewal of any contract may be awarded by the state or any of its political subdivisions to any vendor or prospective vendor when the vendor or prospective vendor or a related party to the vendor or prospective vendor is a debtor and: (1) the debt owed is an amount greater than one thousand dollars in the aggregate; or (2) the debtor is in employer default.

EXCEPTION: The prohibition listed above does not apply where a vendor has contested any tax administered pursuant to chapter eleven of the W. Va. Code, workers' compensation premium, permit fee or environmental fee or assessment and the matter has not become final or where the vendor has entered into a payment plan or agreement and the vendor is not in default of any of the provisions of such plan or agreement.

DEFINITIONS:

"Debt" means any assessment, premium, penalty, fine, tax or other amount of money owed to the state or any of its political subdivisions because of a judgment, fine, permit violation, license assessment, defaulted workers' compensation premium, penalty or other assessment presently delinquent or due and required to be paid to the state or any of its political subdivisions, including any interest or additional penalties accrued thereon.

"Employer default" means having an outstanding balance or liability to the old fund or to the uninsured employers' fund or being in policy default, as defined in W. Va. Code § 23-2c-2, failure to maintain mandatory workers' compensation coverage, or failure to fully meet its obligations as a workers' compensation self-insured employer. An employer is not in employer default if it has entered into a repayment agreement with the Insurance Commissioner and remains in compliance with the obligations under the repayment agreement.

"Related party" means a party, whether an individual, corporation, partnership, association, limited liability company or any other form or business association or other entity whatsoever, related to any vendor by blood, marriage, ownership or contract through which the party has a relationship of ownership or other interest with the vendor so that the party will actually or by effect receive or control a portion of the benefit, profit or other consideration from performance of a vendor contract with the party receiving an amount that meets or exceed five percent of the total contract amount.

AFFIRMATION: By signing this form, the vendor's authorized signer affirms and acknowledges under penalty of law for false swearing (*W. Va. Code* §61-5-3) that: (1) for construction contracts, the vendor is not in default on any monetary obligation owed to the state or a political subdivision of the state, and (2) for all other contracts, that neither vendor nor any related party owe a debt as defined above and that neither vendor nor any related party are in employer default as defined above, unless the debt or employer default is permitted under the exception above.

WITNESS THE FOLLOWING SIGNATURE:

Vendor's Name: Windsor Solutions, Inc.

Authorized Signature: [signature] Date: July 01, 2020

State of Oregon

County of Multnomah, to-wit:

Taken, subscribed, and sworn to before me this 01st day of July, 2020.

My Commission expires July 02, 2023

AFFIX SEAL HERE

OFFICIAL STAMP
CATHERINE MARIE BOYKIN-SENA
NOTARY PUBLIC - OREGON
COMMISSION NO. 989084
MY COMMISSION EXPIRES JULY 02, 2023

NOTARY PUBLIC [signature]

Purchasing Affidavit (Revised 01/19/2018)

Introduction

Windsor Solutions, Inc. (Windsor) is pleased to submit this response to *the Request for Quotation, Electronic EPermitting System Project* to the West Virginia Department of Environmental Protection, Division of Water and Waste Management (referred to in this document as DEP or DWWM) for implementation of an Online Environmental Regulatory Permitting System (ePermitting). In preparing this document, Windsor has reviewed the CRFQ provided by DWWM and we are confident that our software solution and approach to implementation will meet the Division's functional and technical requirements in the requested timeframe.

Windsor acknowledges that all requirements in the Specifications presented by the CRFQ will be met by the nVIRO software and will be implemented within the agency's requested timeframe, within the framework of the agile development process prescribed by the RFQ.

This document presents an overview of the software solution, which is built around nVIRO, Windsor's commercial off-the-shelf (COTS) offering. nVIRO is a proven, effective solution for ePermitting and regulatory compliance that is in production and being utilized by state environmental agencies around the US in single-division applications and ranging to entire agency wide implementations. By selecting nVIRO for its Online Environmental Regulatory Permitting System, DWWM will be joining a growing family of cutting-edge agencies modernizing their regulatory and data management processes and tools, resulting in greater efficiency and transparency.

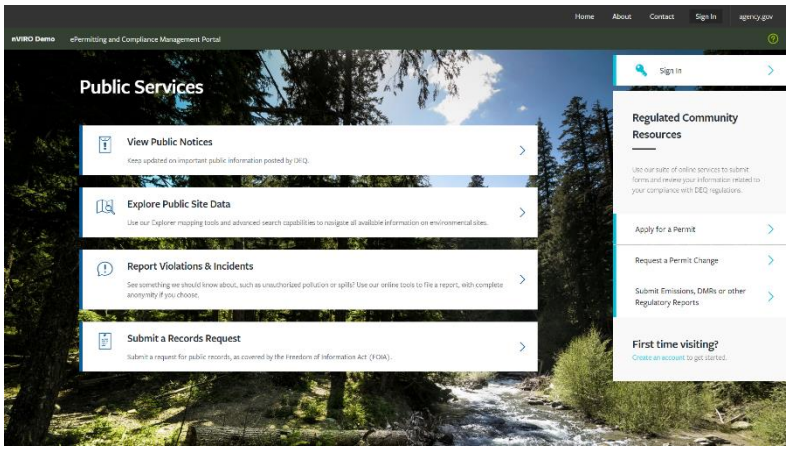
Proposal Organization

This document is organized as follows:

- Overview of the Solution
- Proposed Project Approach
- Unique Position of the Product
- Vendor and Team Qualifications
- References
- System Development Life Cycle Requirements
- Project Documentation
- System Documentation
- End-User Security Documentation
- Security and Engineering Practices
- Developer Security Testing
- Pricing
- Product Licensing
- Staff Resumes

Windsor has reviewed in detail the Specifications and Requirements, as well as Attachment A, Current Process & Systems; Attachment B, Online Forms & Templates; and Exhibit C: NIST Data & System Security.

Our Solution



nVIRO is a highly flexible and configurable solution specifically built for environmental regulatory agencies based on many decades of experience, in contrast to generic one-size-fits-all CRM solutions.

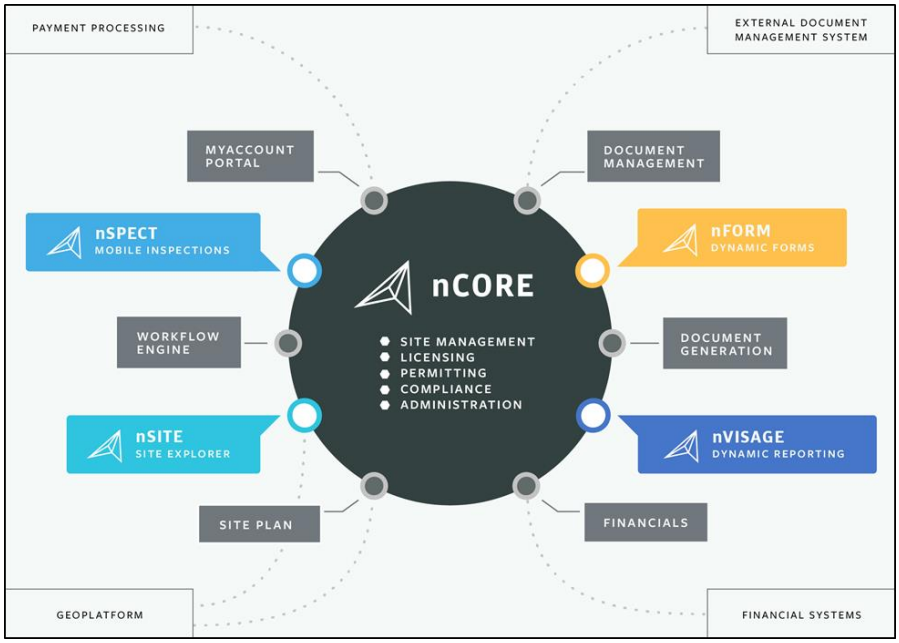
Unlike many large-scale workflow management solutions, which are highly generic by nature, nVIRO was designed and engineered specifically to support environmental and public health regulatory program management and business processes. This specific regulatory focus in nVIRO has provided significant benefits to a number of regulatory agencies in the States of South Carolina, Kansas, Wyoming, Indiana, Alabama, and Michigan. This same environmental and public health focus provides for a significant overlap in the "out of the box" functionality provided within nVIRO.

We believe that nVIRO is the best solution for DWWM for many reasons, including:

- Advanced technology used by the system includes an intuitive, web-based and mobile-ready design, flexible spatial mapping capability, user configurability, and automated document creation.
- The solution is self-sustainable, allowing agency staff to perform many system configuration actions without technical support; for example, designing forms and workflow processes.
- Support for many of the critical federal and state environmental permitting programs identified by DWWM.
- Supports data exchange with the US EPA via the OpenNode2 platform.
- Is already CROMERR compliant.
- nVIRO is supported by a growing community of environmental agencies. This enables sharing of ideas, new capabilities and assets (e.g., federal data collection forms, documents, data flows etc.).

Solution Overview

Windsor proposes implementation and configuration of its **nVIRO** solution to satisfy DWWM's system modernization effort.



Windsor has successfully implemented these products in agencies around the US. Because many of the challenges have already been met in other agencies' technical environments, implementing this software for DWWM would be a straightforward and simple proposition.

nVIRO has been designed and is being deployed in other states as a cross-program Enterprise Permitting and Regulatory Compliance system. This includes support for Water, Air, Land and Waste Management, and Environmental Health Program Areas.

Windsor's COTS solution provides the functionality DWWM has requested. It has been proven multiple times for state environmental agencies, and includes the following critical capabilities:

- support for public interactions (e.g., Electronic Permitting, FOIA, Public notices)
- support for agency media/regulation specific procedures and data needs
- meets EPA's complex and ever-growing data validation rules and system integration protocols
- recognizes and balances program-specific needs with agency standardization
- support for rapid user-adjustment in response to regulatory change or agency process reengineering (such as the current regulatory agency shift to e-government and an automated mobile workforce)

A consolidated multi-user base solution: nVIRO was built to support the spectrum of key stakeholders, including external agency "customers" (licensees, regulatees,), internal agency staff, 3rd party partners (e.g., agency contractors), and the general public. Wherever reasonable, nVIRO uses the same user interface for these different stakeholders, which reduces redundancy and improves communication between these parties.

An environmental regulatory agency specific solution: nVIRO was carefully designed and engineered to exactly support the unique combination of needs of agencies such as DWWM. This includes advanced capabilities such as:

- A robust environmental regulatory data architecture, built specifically for the unique complexities of environmental regulatory needs, and designed based on hundreds of combined years of Windsor consultant expertise building both agency-wide and program-specific environmental information management solutions

- Compatibility with EPA's often arduous system interface and policy/procedural requirements, including the protocols of the Exchange Network, the vagaries of feeder systems such as ICIS-NPDES, ICIS-AIR, RCRAInfo, etc., and the processing rules for CROMERR.

An enterprise solution that elegantly embraces program specific needs: The biggest challenge with enterprise solutions for environmental agencies is that they typically sacrifice either program-specific needs (by forcing programs into a vanilla solution), or long-term sustainability when they result in a semi-custom, monolithic, agency-specific, limited-life solution. Windsor has employed a powerful, innovative solution that achieves the best of both solutions (program specific support, sustainable agency-wide solution) without the shortcomings of either.

By employing advanced dynamic user-configurable capabilities, nVIRO supports the inclusion of program specific data entry terminology, data entry forms, workflows, document templates, notifications, and reports with ease and elegance. **Not only does this support far easier migration from existing legacy systems to nVIRO, but it also dramatically reduces the long-term maintenance costs, as programs are able to make 90+% of needed modifications to the system resulting from regulatory or policy change themselves, with no need for vendor or IT support.** This "low code" strategy has become popular across many (governmental and private sector) industries, and Windsor incorporated its principles from the earliest stages of nVIRO product development.

By using this strategy, nVIRO offers the significant benefits of a single enterprise, on-line solution, while still being highly responsive to unique program needs, while providing the program staff with the information management autonomy they need to remain agile as their needs evolve.

To address the agency's challenges, DWWM is embarking upon an effort to modernize its legacy systems through integration into a single system that provides significant enhancements to data access and workflow management, and provides a unified and consistent environment for DWWM staff and the regulated community, both in the office and in the field. This effort offers the ideal opportunity to embrace the technological advances that are revolutionizing the way environmental agencies manage and use data, and interact with their constituents, customers and the regulated community.

DWWM needs a solution that is highly configurable and that allows the use of portable devices for field work and with both online and offline access to data input, retrieval and printing. Windsor wants to help DWWM deploy a state of the art solution that will be a model of governmental ability to monitor the State's programs, while also easing burdens on the regulated community. Such a solution has the potential for laying the groundwork for much farther-reaching improvements in the use of technology agency wide.

The envisioned solution must be able to unify the Agency's core functional data management needs, while adapting to the inevitable regulatory and programmatic changes. It must provide a comprehensive and intuitive picture of the state's conditions and activities relative to DWWM, without constraining future advances in data analytics and manipulation.

Meeting DWWM's Needs

The nVIRO solution provides all the software necessary to meet DWWM's needs:

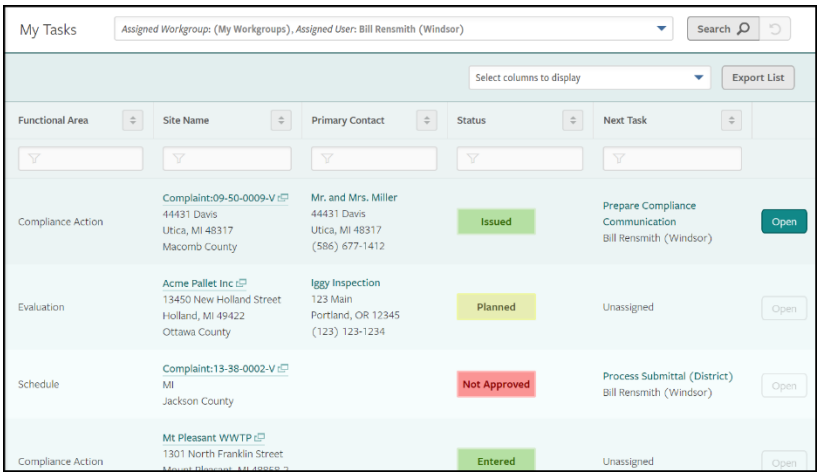
- Configurable Workflow Automation
- Easy-to-use, low-code Forms Development
- Electronic-Facing Electronic Permit Application and Program Forms for quick and efficient processing of Notice of Intents and Terminations and Self-Monitoring Programs
- Electronic Compliance Reporting Schedules

- Single Sign-on Integration
- Online Payment Integration
- Document Templates and Generation
- Electronic Field Inspection Forms
- Reporting Engine for serving User Configurable Reports

The products and key modules that comprise the nVIRO solution are briefly described below.

Core Data Management

***nCORE** / a complete site, permit, and compliance data management system*



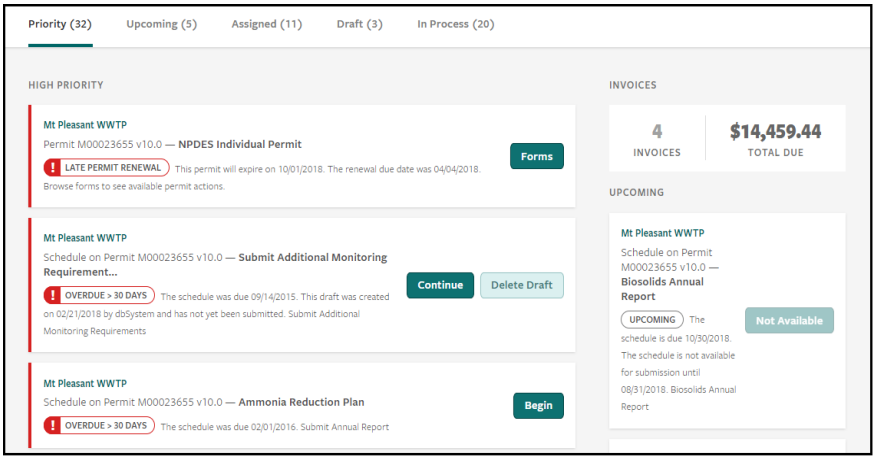
nCORE is a foundational application of the nVIRO solution. It is the central hub for Data Management throughout the regulatory life-cycle. It offers full integration of permit, compliance, and enforcement functionality; workflow management dashboards to guide the permitting, compliance, and enforcement activity processes; and management of permit application/pre-application entry and review processes.

Key areas managed by nCORE include:

- Management of information related to Sites or other regulated entities
- Processing of Applications for Permits, Licenses, or Registrations
- Processing Service Requests, Complaint, and Incidents
- Compliance activities, including evaluations or inspections, identification of violations, and compliance / enforcement actions
- Administrative functions that support configuration of the application such as: Form processing rules and workflows, Event-based Notifications, Permit types, Document types, Customized lookup data, User Management and Security

"My Account"

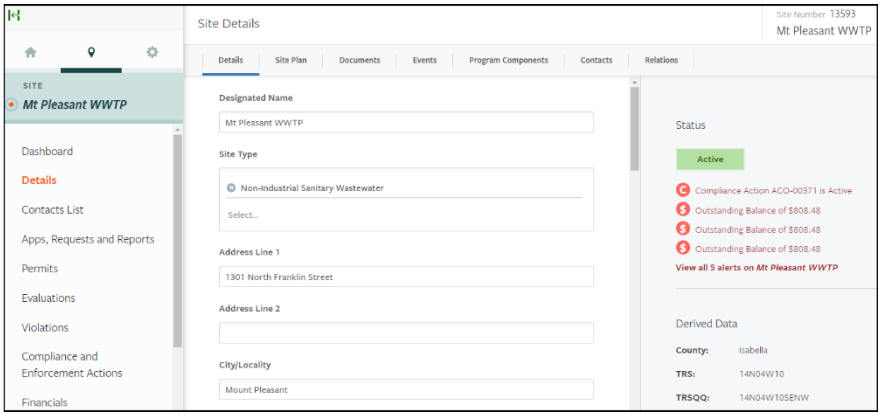
***My Account** / Web based external portal to allow members of the regulatory community to manage all aspects of their permit and interactions with the State*



The "My Account" module provides external users with access to their sites, projects and permits. Using the My Account Dashboard, external users can view and monitor the status of permit renewals, required reports, outstanding payments, and more.

Site/Person/Organization Module

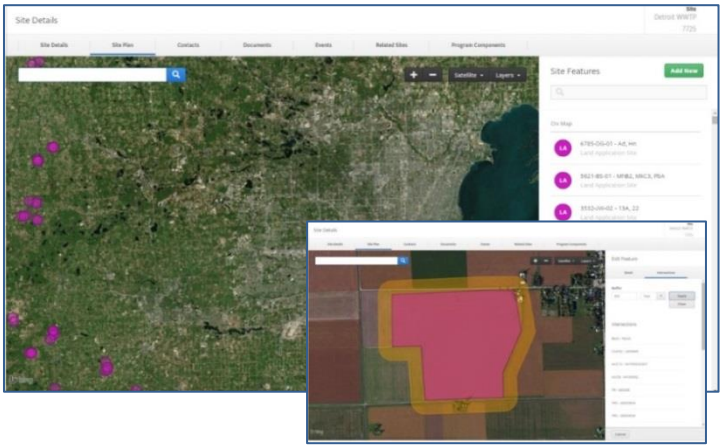
***Site / Person / Org –** Management of permitted entities*



The Site/Person/Organization Module is a central component of the nCORE application. Within nCORE, Applications, Permits/Licenses/Registrations, Evaluations, and Compliance Actions are related to either a Site, Person or Organization. This module provides an intelligent search capability, and upon selection of a Site, Person, or Organization a contextual menu is presented to navigate to all entities related to the selected context.

Site Plan

***Site Plan** / Web based GIS solution for managing, editing and reviewing site (Source) features*

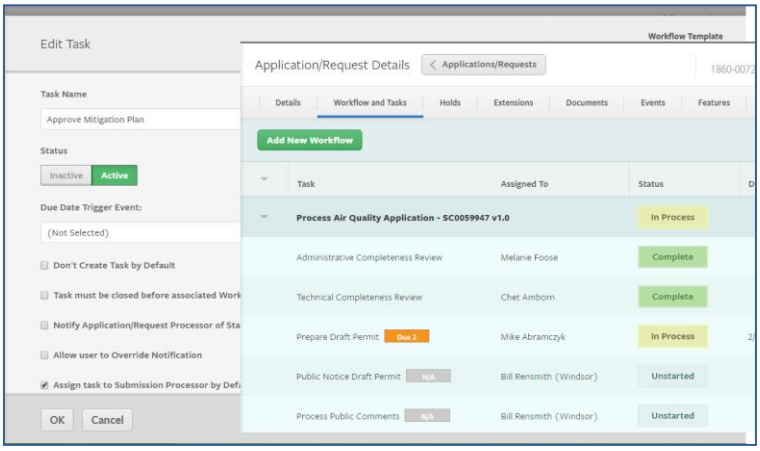


Supporting spatial management of sites, Site Plan integrates with ESRI ArcGIS or other mapping services, providing the ability to define spatial storage of points, lines, and polygons. It enables buffering and intersection analyses for selected layers on a map such as aerial imagery, congressional districts, other sites, sensitive resources, etc. It also supports export of GIS data in formats such as CSV, ESRI JSON and KML, and can be deployed for internal and/or external system users (allowing regulated entities to administer their own Site Plan of permitted / proposed features).
Site Plan allows users to:

- Define a site location and various site features by drawing them on a map in nCORE. Locations can be defined as points, lines or polygons.
- Apply GIS layers to the map to help with analysis of potential environmental impacts.
- Measure geographical areas and distances
- Apply buffers to mapped features and list / report feature intersections with various GIS layers
- Print the site map (or any section of the map)

Workflow Management

***Workflow Engine** / Toolset to define workflows and support task assignment and monitoring*



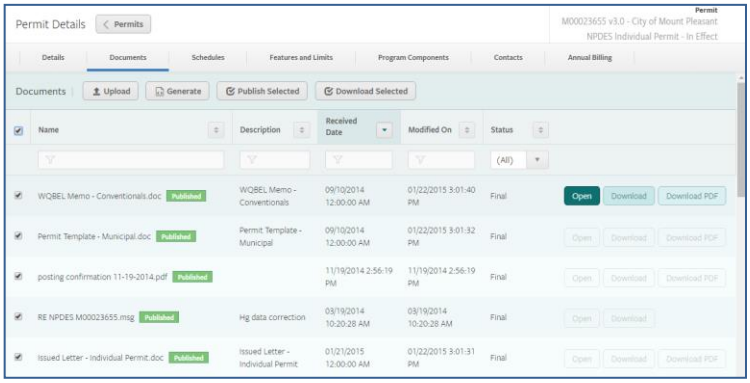
nVIRO's workflow designer allows users to define workflows and support task assignment for any combination of regulatory function (application processing, permitting, compliance etc.) and program.

Workflows can be assigned to any entity/component within the system. Staff can create and manage workflow templates upon which component workflows are based. Workflows drive many aspects such as My Tasks, with visual indicators, and various system messaging and reminders to ensure work is completed in a timely manner. The Workflow Engine allows creation and editing of workflow templates, associating custom

workflow templates to the various permit types, inspection reports, informal/formal enforcement actions and any other functional program areas. Resulting tasks can have due date dependencies on other tasks, and tasks can be manually created or adjusted as the situation demands. Resulting tasks are shown on the assignee's My Tasks dashboard with visual indicators as notifications as due dates near or pass

Document/File Management

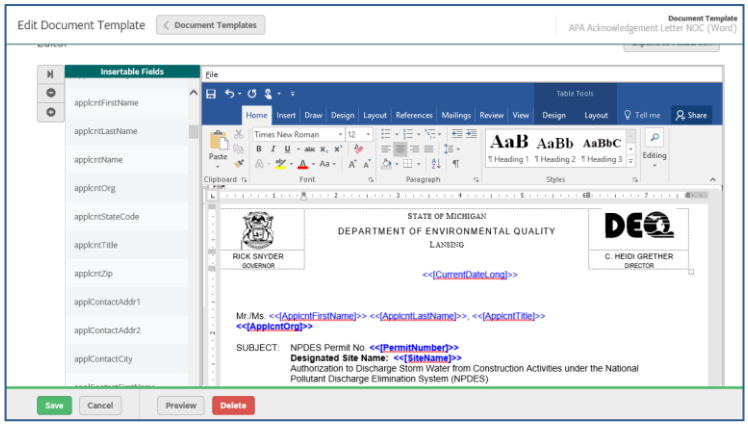
***Document Management** / a feature rich document management solution*



Documents generated by the system, outside the system, as well as any file (.jpg, .pdf) provided by agency staff or external entities are managed within the context of the related entity/component (e.g. Permit, Application).

Document Generation

***Document Generation Engine** / create document templates for automatic generation of permits and other documents*

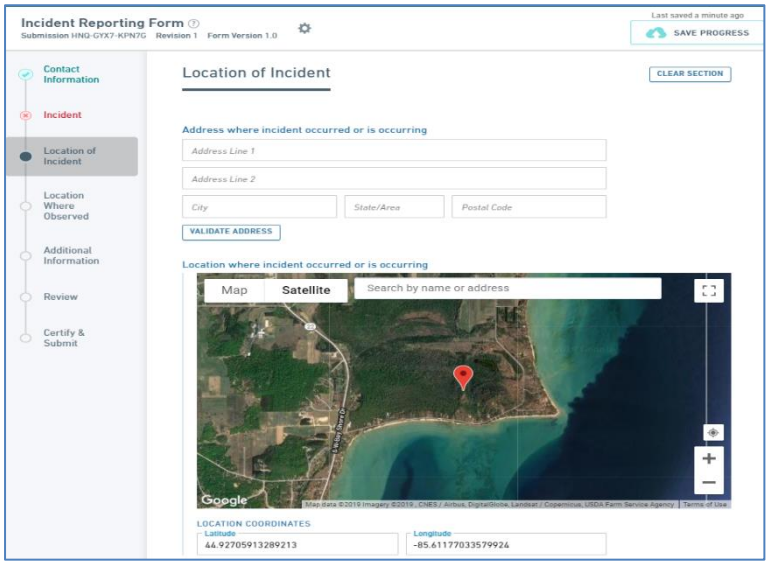


Documents can be generated using Microsoft Word templates (managed by program staff) and can import any data point in the system, permitting the construction of complex yet relevant documents such as permits/authorizations, enforcement actions, and letters. Staff can further edit the documents natively within nVIRO using a Microsoft Word compatible format and user interface. Generated documents are automatically loaded to the document/file management module.

Documents generated by the system, outside the system, as well as any file (.jpg, .pdf) provided by agency staff or external entities are managed within the context of the related entity/component (e.g., Permit, Application).

Electronic Forms

***nFORM** / a complete package for the management of online submissions for permit applications, requests and complaints*



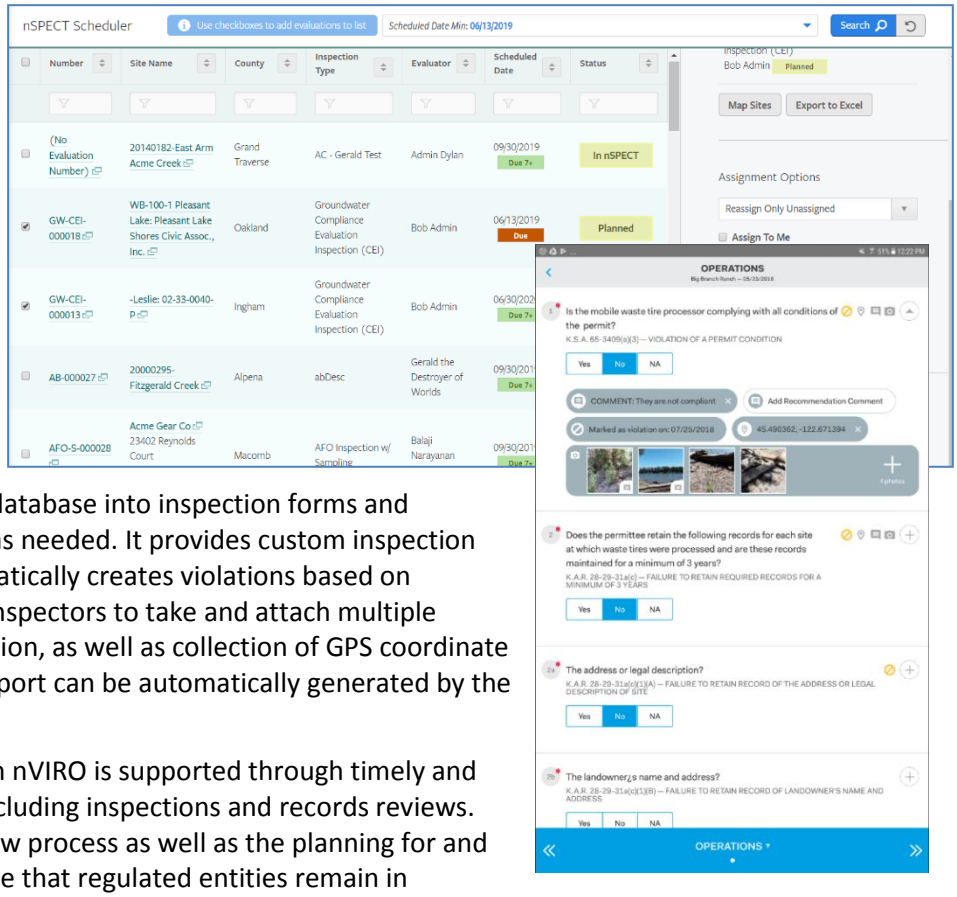
Agency staff can **design and publish their own electronic forms** such as permit/license applications, certifications, and compliance reporting submissions, making them available for use by the regulated community or general public. Customers can then submit relevant applications and reports through an ADA compliant, CROMERR ready, secure submission wizard.

The submission wizard provides an exceptional user experience, guiding the user through the completion of often complex dynamic forms, ensuring ease of use and accuracy of the data. Submissions can be made on any device including mobile devices such as phones, tablets, or specialty devices such as Chromebooks.

Once the form is submitted, agency staff can collaborate with the submitter to refine and gain clarity on the submission. Staff comment and note in-line on submissions as well as communicate with the submitter through automated notifications and specific emails as processing is completed. The external customer has visibility into the processing of their submissions and can respond to requests by staff by revising and resubmitting the application and supporting documentation as necessary, all while maintaining CROMERR submission compliance (when required).

Mobile Inspections

nSPECT / *a comprehensive mobile inspection application.*



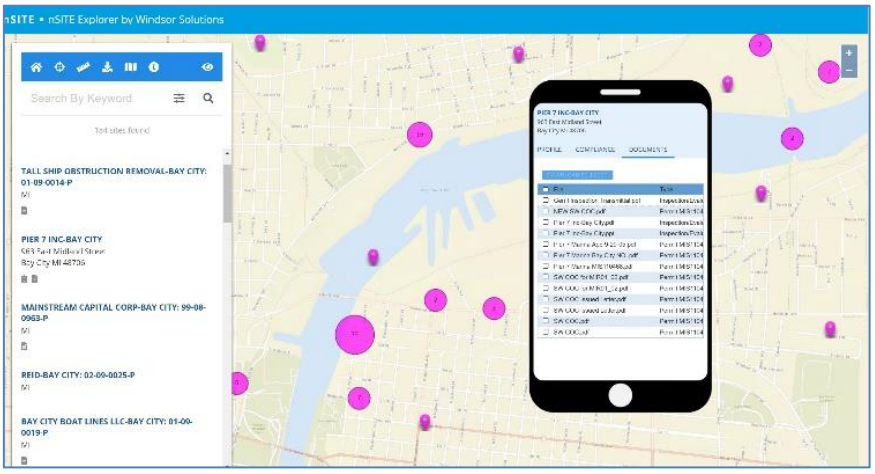
nVIRO includes a mobile data collection tool that enables inspections in the field using a mobile device such as a tablet.

The field inspection component allows users to collect data in **both online and disconnected mode**. Data can be prepopulated from the main database into inspection forms and returned from inspection forms as needed. It provides custom inspection form creation and design, automatically creates violations based on question responses, and allows inspectors to take and attach multiple photos for each question/inspection, as well as collection of GPS coordinate data. The resulting inspection report can be automatically generated by the system.

Monitoring for compliance within nVIRO is supported through timely and effective evaluation processes including inspections and records reviews. nVIRO supports the records review process as well as the planning for and execution of inspections to ensure that regulated entities remain in compliance.

Community Access

nSITE Explorer */ a powerful tool for internal and/or external user data exploration and discovery*



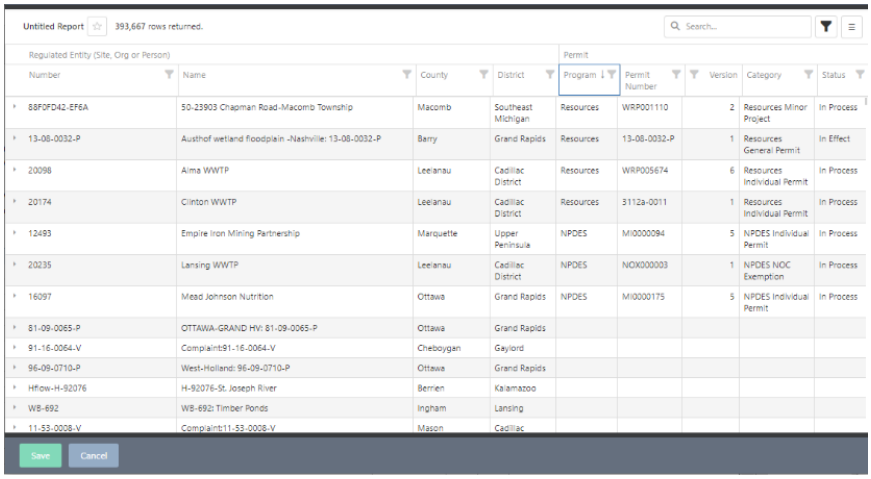
A geospatially enabled viewer provides the regulated entities, staff and the public-at-large with access to what is happening in their state. Agencies can choose to expose as much or as little data as desired or mandated, which can include facility based information, site plans and features, permits and supporting documentation, chemicals stored, compliance reports, evaluation records, violations and enforcement actions.

A **powerful search capability** enables entities to perform their own discovery and has the potential to reduce the volume of Freedom of Information Act requests that an agency has to directly deal with.

For staff, they can easily deal with duplicate sites via a merge tool. Similarly nVIRO supports the ability to split out sites as needs dictate.

Dynamic Reporting and Data Hub

***nVISAGE Dynamic Reports** / provides a flexible reporting environment to allow staff to manage their programs*



nVISAGE allows users to perform queries against the nVIRO "Data Hub." The Data Hub provides an easy to understand model for querying of nVIRO data. Using nVISAGE, users may select data from multiple Data Hub data sources (or custom data sources), apply sort / selection / filtering criteria, and share reports with other users (in nVIRO Shared folders). Users running reports may apply sorting and filtering and download report data to Excel.

nVISAGE can also be integrated with SQL Server Reporting Services and SQL Server Analysis Services to provide a consistent interface for running more complex formatted reports.

Project Approach and Schedule

The project scope is reiterated in the section below. Deliverables are described in the Services and Deliverables section which follows within the context of the related project activities. These activities correspond to Windsor's standard approach to nVIRO Configuration and Deployment.

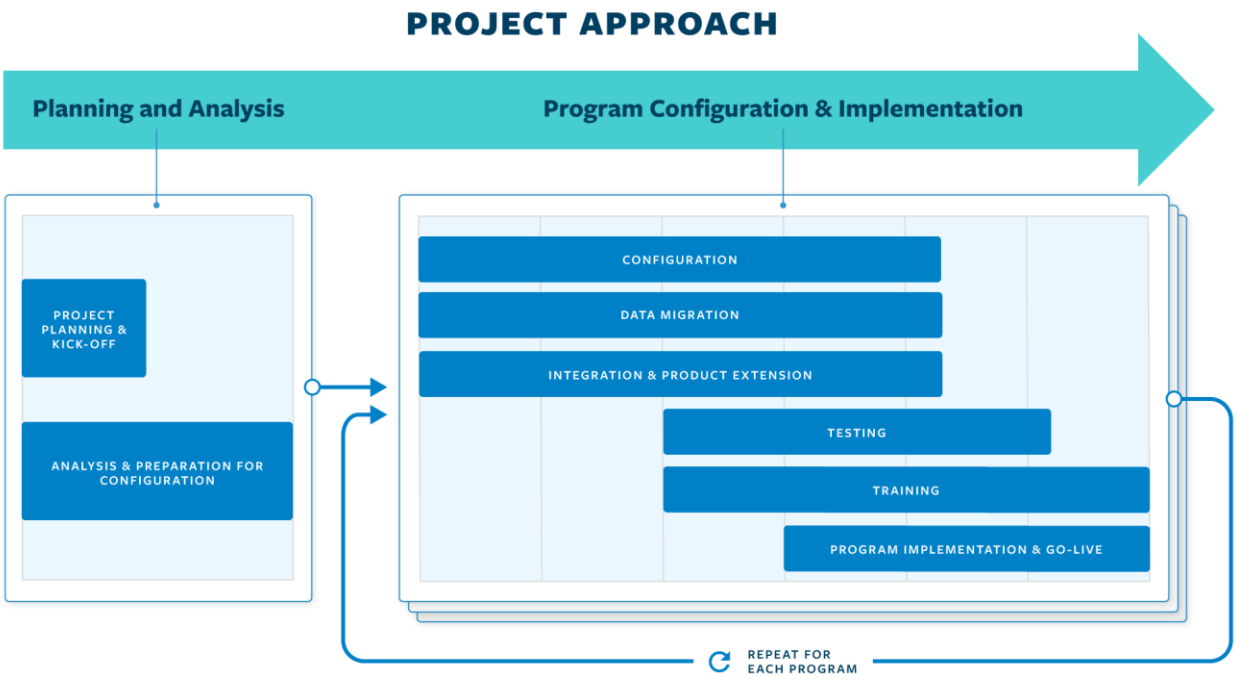
The agency has specified in the CRFQ that the scope of work is to be implemented within a 24-month period (or sooner), followed by five years of maintenance and support. DEP requires development for several programs to happen with features rolling out in an Agile fashion.

Approach Overview

As with any software development and implementation effort, this project will experience new requirements being discovered, things once thought important will later be determined to no longer be, and unforeseen process and technical challenges will arise. To address these challenges in a flexible responsive manner, Windsor will use a priority driven Agile approach for the implementation of nVIRO process configurations, converted data, and integration development and system enhancements. Windsor has proposed a project scope and budget that will without a doubt deliver a solution that will meet priority program requirements. Managing the effort in Agile manner will ensure that the project can adapt to changing program and user requirements as well as explore and incorporate DEP's security requirements

In an Agile effort, requirements are analyzed and defined as User Stories during the Analysis and Planning Phase and prioritized for delivery during the Program Configuration and Implementation Phase. As opposed to a waterfall implementation approach, the Agile approach provides incremental and iterative delivery of business processes, data, and system functionality, providing users system access, feedback, and refinement throughout the implementation process. DEP will drive the prioritization and decision-making process.

The following diagram depicts Windsor's approach to nVIRO Configuration and Implementation. The depicted project activities are described in the sections which follow, with corresponding deliverables and other work products produced.



nVIRO provides a highly configurable solution for Permitting, Licensing, Registrations and Compliance. Thus, a significant portion of the implementation effort will be focused on configuration of the application to support the various DEP programs. Successful program configuration requires an understanding of the program processes, legacy data (limited for DEP), as well as any special program-specific needs. Windsor's approach to this is to conduct an initial Analysis Phase, followed by multiple Configuration and Implementation Phases to incrementally transition of programs into the nVIRO Solution.

Successful implementation will require extensive training and significant DEP participation, including identification of dedicated staff who understand application functionality and configuration. This is essential to positioning the agency to be able to support and modify application configuration after the project is complete. A critical success factor to achieving this end is training of staff who will perform these roles. This will be accomplished initially by formal training. However, the best way to learn is by doing, and identified staff will be engaged as part of the implementation team, actively participating in configuration of the application throughout the project, and by providing end-user training via a train-the-trainer model.

Analysis Phase

Windsor's project approach includes conducting an initial ***Analysis Phase*** to establish a solid foundation for work planning, configuration, and implementation. During the Analysis phase, a number of key activities will be conducted collaboratively with DEP to establish an overall Implementation Plan:

Base nVIRO Configuration and Deployment. A base implementation of nVIRO with initial DEP configuration will be implemented in a Windsor technical environment to support analysis and configuration activities

Program Assessment: Windsor Analysts will meet with the programs to conduct an Assessment. This will consist of a series of meetings with each program, to understand their processes and core data. Analyst will walk through nVIRO functionality to identify any new capabilities that may need to be addressed. The Program Assessment will also produce an evaluation of the relative level of effort for each program based upon program size and volume/complexity of configuration items. This assessment will drive the prioritization, and implementation efforts.

Legacy System Analysis: Legacy systems will be reviewed and analyzed to develop initial (high level) mapping of core data entities needed for data migration planning. DEP has noted that many of the proposed program areas currently employ paper-based processes. As a result, the Legacy System Analysis effort will be limited in scope.

In addition, DEP has identified several systems with which nVIRO will interface in real-time to provide operational data, such as ERIS for Site and Responsible Party data as well as targeted permitting data necessary to support Water inspection processes, or WVOASIS for status invoice and payment status. These systems and data integration needs will also be analyzed and defined.

Security Assessment: DEP has identified the need to ensure alignment of the nVIRO implementation with NIST best practices. DEP recognizes this is about DEP operational practices as much as it is about software development and implementation. A security needs assessment will be held with DEP and Windsor staff to determine DEP's requirements to address the DEP's NIST compatibility requirements. Windsor is familiar with the NIST requirements and has addressed these and similar security concerns for the nVIRO product with other clients. Any system functional requirements needing to be addressed will be incorporated into project scoping, planning and prioritization.

System Enhancements: The Program Assessment and Legacy System Analysis will likely identify new features that will be analyzed and assessed for feasibility, impact and business value.

Product Backlog: Features identified requiring product enhancements will be catalogued and reviewed with DEP. Based on that review, 'stories' may be identified such as integration with other systems or development/extension of product features. Windsor will work with DEP to prioritize and plan these stories for development based on business value within the project budget.

Environment Planning: Windsor technical architects will meet with DEP IT staff to plan technical environment details, tasks, roles and responsibilities.

Program Prioritization: DEP would like to see the several program areas implemented in parallel. Windsor appreciates the criticality of demonstrating success rapidly and delivering working software at the earliest possible juncture, and sees no issue with meeting the 24 month timeline.

The assessment will assess the best approach to program implementation. This may involve staging configuration and implementation for agency programs in parallel as requested, possibly several sequentially, based upon the results and recommendations from the Program Assessment.

In addition, for each program area, a rough order of magnitude estimation will be made to aid in planning of configuration and implementation budgets.

Implementation Plan: The above activities are all critical inputs to another key outcome of the Analysis Phase, which is an overall Implementation Plan for configuration and implementation of the system. This plan will include a refined project schedule, clearly defined roles and responsibilities for configuration, and budget allocations for each program configuration, implementation, integration, and any product enhancement/extension work.

Configuration and Implementation Phases

Following the Analysis Phase, the Program Configuration and Implementation Phases will be executed for one or more programs. This Program Configuration / Integration cycle will repeat for each program based upon the sequencing defined by the implementation plan

During the ***Program Configuration Phase,*** the focus is analysis of the specific program processes and data, and configuration of the system to support those processes (e.g., applications, workflows, documents). In parallel, data analysts will focus on migration of data from legacy systems. This is followed by beginning to end process testing, data verification, and training in preparation for implementation.

The approach for management of scope during the Configuration phase is to utilize Agile development principles to prioritize both development and configuration work. The focus is on the highest business value activities first, working within the project and program implementation budgets established.

Once the Program Configuration Phase is complete, the application will enter the ***Implementation Phase***. This is a relatively short phase focused on end user training, the planning, preparation and execution of data migration, and application deployment to production.

Training and Support Strategy

nVIRO is a comprehensive and highly configurable solution. A key to successful implementation is training of not just end-users of the system, but of staff who will be responsible for managing the configuration of the system and various components throughout its lifecycle.

One of Windsor's goals with nVIRO is to enable clients to become self-sufficient. This requires they understand the various configuration options, understand how the components interrelate, and are able to provide significant input to the configuration – working with users to develop forms, document templates, etc.

There are different approaches as to how each organization may wish to support configuration in the long run. Some agencies prefer to centralize this function, others may distribute certain aspects of configuration (such as form and document template configuration) to program specialists. Windsor will work with DEP to understand the desired and approach develop an overall training plan that meets those goals and governance strategy.

Regardless of the configuration support strategy, Windsor assumes that DEP will identify staff to dedicate to the project as part of the configuration team. These staff will learn the application functionality and the various aspects of system configuration. By learning the application early in the project and participating in the configuration, the identified staff will become experts in the system, positioning DEP for a successful support model following completion of the final transition to nVIRO. This also positions staff for a **train-the-trainer model**, where Windsor trains key DEP project staff, who then provide training to end users during the Implementation Phase.

Based upon the overall training plan, Windsor will provide training to the identified key staff through a variety of methods including classroom training, remote training via web conference, and training videos. Training materials will be made available to DEP staff, and Windsor analysts will be available to support configuration and training staff throughout the project.

The phases and activities are described in further detail in the sections that follow.

Project Approach

Analysis and Planning

Project Initiation

During the Initial Project Planning Phase, Windsor will collaborate with DEP staff to initiate the project, plan and schedule analysis sessions, define the project environment, and deploy the base application in a Windsor test environment to support process configuration / implementation.

Project Kickoff

Windsor will work with DEP to review the baseline Project Schedule, and confirm the Project Scope and the Project Management Plan. The Project Management Plan will include Issue Management, Risk Management, and Change Management sub-plans.

The project schedule will be maintained throughout the project. Refinements to the plan (e.g., technical environment tasks) are anticipated as a result of Analysis activities.

The Windsor Project Manager will work with the DEP Project Manager to schedule a Project Kickoff meeting as well as on-site meetings needed for Process Analysis, System Integration Analysis and Environment Planning, and Legacy System Analysis.

Deliverables:

- *Project Management Plan*
- *Project Schedule*

Project Environment

The project environment will be established during the planning phase. This includes definition of a project repository for storage of documents and the establishment of the issue tracking system (JIRA). Key DEP staff will be provided access to Windsor's JIRA system and an overview of its use within the project.

Deliverables:

- *JIRA Issue Tracking Configured*

Base Application Deployment / Configuration

Windsor will work DEP to establish a base implementation of the nVIRO application to work with during the Analysis Phase. This application will be used for demonstrations, and Program Assessment. Initial configuration will include branding of the application for DEP (e.g., colors, logos) and other core configuration needed to ready the application for analysis sessions.

Deliverables:

- *Base Application Environment Configured (Windsor Environment)*
- *Base Application Software Deployed and Configured (Windsor Environment)*

Analysis

Windsor Analysts will meet with the program on-site to conduct a three-pronged analysis. This will consist of a series of meetings with DEP staff, to understand and define requirements (User Stories) for the process configuration and implementation, system integration, and data conversion.

Process Analysis

During the Process Analysis, Windsor Configuration Analysts will meet with Program staff to identify all aspects of configuration work to be performed, this includes analysis and definition for Workflows, Schedules, Workgroups, Permit Types, Action Types, Form Routing, Deadlines, Application Forms, Document Templates, Inspection Forms, and other configuration options. As a result of these sessions, all process configuration items will be identified and inventoried.

In addition, Windsor will review existing (base) nVISAGE reports with Program staff in the context of business processes and other business requirements to identify any additional reporting requirements needed to support the Program.

Deliverables:

- *Business Process Definition Requirements with Configuration Items (as Stories)*
- *Report Requirements (as Stories)*

System Integration Analysis and Environment Planning

Windsor technical staff will conduct Analysis and Planning sessions for each of the technical integrations between nVIRO and DEP systems including Active Directory, Responsible Party (ERIS), wvOASIS (financials), SAP Business Intelligence (data warehouse) ApplicationXtender (document management).

Finally, Windsor will meet with IT staff to plan and schedule implementation and configuration of the technical environments. They will assess various hardware and software requirements, security, networking and firewalls and plan for establishment of (at a minimum) User Acceptance Test and Production environments.

Deliverables:

- *Integration Functional and Design and Configuration Requirements (as Stories)*
- *Hardware/System Environment Configuration Requirements Document*
- *Hardware/System Environment Configuration Stories Defined*

Legacy System Analysis

The current scope of programs areas to be addressed in this project are largely paper-based and do not manage data in systems. The one exception is the Hazardous waste program area which currently manages data using the USEPA's RCRAInfo system. Data will need to be extracted from this federal system to address several of the stated Hazardous Waste business needs. In addition, program data from other systems such as ERIS and the BI Warehouse will be necessary to support several program needs (e.g. permit conditions for field inspections).

Windsor data analysts will meet with DEP system staff to identify data needing to be converted/linked from DEP systems into nVIRO. This will include high level mapping between systems and walk-through of source systems to identify data points for conversion.

Certain data will be mapped directly to nCORE 'core entities', other program specific data will need to be mapped to 'program component' forms for configuration. Program component forms are nFORM forms that may be added to nCORE core entities (such as Applications, Permits, Compliance Actions) to extend data maintenance for a given program area. High level mappings will be defined as Data Migration Stories.

In addition, the strategy for extraction of data from DEP systems will be defined. As Windsor has converted from RCRAInfo into nVIRO for other clients, past data migration routines will be reviewed for applicability and reuse.

As a requirement of Legacy System Analysis and subsequent data conversion, it is assumed Windsor will be provided access to a test version of the DEP systems starting the first weeks of the project.

Deliverables:

- *Data Migration Plan*
- *Data Migration Stories*

Define Product Backlog

Work items identified from Process Analysis, System Integration Analysis, and Data Conversion Analysis will be added to the project issue tracking system (JIRA) as 'User Stories' which constitute the Product Backlog for the DEP nVIRO Implementation.

As stated above, Windsor will use an Agile approach in the implementation of process configurations, converted data, and integration development. User stories will be prioritized to deliver stories with the highest benefit to end users, while also considering factors such as risk and development dependencies. A project checkpoint will be held in which Windsor will also evaluate available project resources relative to the baseline backlog established at this point to confirm key program objectives are addressed using the available resources. Windsor will work with the DEP right-size the baseline backlog to meet the project resource and key program objectives.

DEP staff will be provided access to JIRA enabling tracking of story development. Prior to implementation of a story during the Program Configuration and Implementation Phase, Windsor will work with DEP to define the detailed acceptance criteria. As stories are implemented, stories progress through a defined JIRA workflow which includes workflow steps for user testing and feedback.

Deliverables:

- *Project Checkpoint with prioritized backlog to address key program objectives relative to available project resources*
- *Stories defined within JIRA Tracking System and available to DEP:*
  - *Business Process and System Configuration Stories*
  - *System Integration Stories*
  - *Report Development Stories*
  - *Product Enhancement Stories*
  - *Data Migration Stories*

Implementation Plan

The above activities are all inputs to another key outcome of the Analysis Phase, which is an overall Refined Project Schedule and Plan for configuration and implementation of the system. A project checkpoint meeting will be held to review the updated plan, schedule, and scope of the JIRA stories.

Deliverables:

- *Refined Project Schedule and Plan*

Environments

Windsor will coordinate with DEP IT staff to validate the User Acceptance Test and Production Environments. It is assumed that DEP IT will perform base Server, OS, Networking, Database Software installations, and support troubleshooting of any environment related issues. Once the environments have been configured, Windsor prepare and deploy the nVIRO software and databases, and verify application deployment and integrations in the DEP environment. As development of integrations with legacy systems progresses, or new nVIRO versions are released, Windsor will schedule and deploy updates as appropriate. This task will be dependent upon DEP's decisions addressing cloud or on premise hosting.

Deliverables:

- *User Acceptance Test Environment Configured*
- *User Acceptance Test Application Deployment*
- *Production Environment Configured*
- *Production Application Deployment (for Environment Verification)*

Program Configuration and Implementation

The focus of the Program Configuration Phase includes all of the activities to ready the application to support the Program. Key activities include configuration of the system to support the specific program processes and data, conversion of data from legacy systems, user testing, and training.

Process and System Configuration

Based upon the process analysis, application modules and components will be configured. Configuration will be focused on enabling processes from initiation to completion. For example, an application form and fees are configured to enable application submission, initiating a process; the workflow is configured to process the application; program component forms may be configured to capture program specific data; document templates are configured for the documents produced by the process such as permits or related letters; and users / user groups are configured. Once a process has been fully configured it may be moved forward for user testing and verification.

Deliverables:

- *Program Stories Implemented (Process and System Configuration Stories)*

Product Integration

Based on the development backlog, Integration stories are elaborated and scheduled for development and testing. Windsor will develop and test the various integration stories, and deploy to the User Test Environment for full integration test. Upon completion of integration testing, stories will be made available for user test.

Deliverables:

- *Product Integration Stories Implemented*

Report Development

Based on the development backlog, report stories are fully elaborated and scheduled for development and test. Windsor will develop and test the various reports, and deploy to the User Test Environment for user testing.

Deliverables:

- *Report Stories Implemented*

Product Enhancements

Windsor works regularly with clients to define and schedule product enhancements. Approved enhancement stories are added to the nVIRO product backlog and developed as part of a regular product release cycle. During the release cycle, stories from the nVIRO product backlog are scheduled into 'Sprints', which are two week development increments where multiple stories are managed through full design, development and testing life cycle. The final sprint in a product release focuses on regression testing and release packaging. New product release cycles are typically 4 months in duration.

Deliverables:

- *Release Notes*
- *Release Demonstration*

Release Deployment

Once the release is available, it is made available for deployment to client User Acceptance Test environments for functional testing.

Deliverables:

- *Deployment to User Test Environment*

Data Migration

Data Migration will be performed in two main increments. First, 'core' data such as Sites, Permits, Evaluations, Compliance Actions, and Contacts will be migrated. Second, Program specific data conversion will be developed, which typically requires development of 'Program Component' forms to hold and manage this data within the application.

By establishing the core data first, users may begin review of converted data while the program specific data conversion is being developed in parallel. This also provides the advantage of making data available to leverage during testing of business processes that have been configured within the system.

Data migration typically takes multiple iterations of conversion, review and adjustment. Thus, multiple mock conversions of data into the User Test Environment will be performed prior to final production conversion. Again, these activities may be limited due to the limited scope of DEP's data migration needs.

Core Data Migration Development

Following Legacy System Analysis and mapping of data, data conversion programs are written to convert the data from the source systems into nVIRO. Programs for data mapped directly to 'core entities' are developed first, establishing an initial set of data for review and testing.

Deliverables:

- *Core Entity Data Migrated (Migration Script Execution)*

Program Component Migration Development

To enable conversion of data that will map to program components, the program components must be defined in the system and configured as component forms in nFORM. Once the component forms are complete, data conversion programs are written to convert data from the legacy systems into the program components.

Deliverables:

- *Program Components Configured*
- *Program Component Migration (Migration Script Execution)*

Mock Conversion Cycles

Once Core Data Migration has been completed, mock data conversion cycles are run to populate converted data in the User Test database and made available for data verification and process testing. As additional conversion programs are added to convert into program components, or identified data conversion issues are resolved, additional conversion cycles are run and the data in the User Test environment is refreshed. Mock conversion cycles would typically be run every other week, or more frequently as production implementation nears.

Deliverables:

- *Mock Data Conversions to UAT Environment*

Test

As various components of the application (process, data, and functionality) are made available in the application, the DEP Program Liaison coordinates User Testing to define and execute the Test Management Plan. Testing will be executed to verify that 1) the forms, workflows, documents, and related configuration items support the related processes; 2) data has been converted accurately from the legacy system; and 3) that any product integrations support the processes as defined.

Test Planning and Preparation

Windsor will work with the DEP Project Manager and Program Liaison to define the plan for execution of testing. The Test Management Plan will describe the processes for testing, use of JIRA (per the Issue and Defect Management Plan), training requirements for testers, test scripts needed, estimated resources needed and timing of execution of various types of tests. DEP is responsible for user acceptance test script creation. Windsor will assist DEP in identifying User Acceptance Test Scripts to be written.

Deliverables:

- *Test Management Plan*
- *Test Schedules*
- *Test Script Identification*

Configuration / Process Testing

When a process has been configured for a program, it is then ready to be made available for user testing. Front to back user testing is then conducted to verify the process flow from the initiating process trigger (e.g., Form Submission) through the workflow steps, population of any process specific data (program components), creation and generation of documents and finalization.

Deliverables:

- *Processes Stories Tested / Issues Resolved*

Data Verification

As data is made available from both configuration and mock data conversion cycles, it is made available in the User Acceptance Test environment for user review. Issues identified in the data conversion are recorded as issues in Windsor's issue tracking system (JIRA) and are addressed by the Windsor Data Conversion Lead. As issues are corrected, the User Acceptance Test environment is refreshed with the corrected data.

Deliverables:

- *Data Conversion Stories Tested / Issues Resolved*

Functional Testing

As new versions of nVIRO components are released, the release is made available (deployed) in the User Acceptance Test environment for testing. New capabilities may include interfaces with DEP systems, new product integrations, reports, etc. Any issues identified are recorded in Windsor's issue tracking system and are addressed based upon criticality – either as hot patches or addressed in subsequent releases.

Deliverables:

- *Product Integration Stories Tested / Issues Resolved*
- *Report Stories Tested / Issues Resolved.*

Training

Training Planning

In preparation for go-live implementation for a given program or programs, a Training Plan should be developed to identify users to be trained, the user's roles (e.g., Permit Writer, Compliance Officer, Agent, Administrator), and map the corresponding training delivery based on those roles. The training plan should include scheduling of training sessions, pre-training requirements, and communications to end users.

Deliverables:

- *Training Management Plan*
- *Training Schedule*

Key Program User Training

As programs enter the Program Configuration phase, key program users will be identified and provided access to the User Test environment. This includes the Program Liaison. These users will need to be

trained on nVIRO so that they are able to effectively use it during Process Testing and Data Conversion verification. One or more of these key users should also be identified as Program point contacts for first line user support after Implementation / Go-live.

Deliverables:

- *Key Program User Training*
- *Key Program User Training Materials*

End User Training

End user training is delivered according to the training plan. This will include hands-on classroom training and may be supplemented by available training videos and remote training sessions via web conference.

Deliverables:

- *End User Training Sessions*
- *End User Training Materials*

Administrative Training

Windsor staff provide training to the key DEP staff responsible for Administration of the application. Due to the Pilot nature of this project, this will focus on the key Administrative areas identified as necessary to support the Pilot in production. Training materials will be made available to DEP staff, and Windsor analysts will be available to support staff post go-live.

Deliverables:

- *Administrative Training Sessions*
- *Administrative Training Materials*

Implementation: Production Data Conversion / Application Deployment

Windsor develops detailed step-by-step plan for production data conversion. This typically requires a 'work cut-off' milestone where end-users cease performing related work in the current system(s), allowing a data extract and conversion to initiate. The elapsed time for data conversion varies based upon the number of source systems, volume of data, data transfer requirements, and complexity of data transformation. During conversion, status milestone/check-points are communicated. Contingency plans are developed enabling back-out of changes in the rare event of a critical failure.

If Applications updates need to be deployed to the production environment, they may be deployed in conjunction with Data Conversion, or independently.

Once the data conversion and application deployment processes are complete, Windsor performs a 'smoke test' validation to ensure the application is performing properly. At this point the application is made available for user access.

Windsor will provide go-live support (both on-site and off-site) during the first week of production. This is viewed as the minimum support required to ensure smooth transition to nVIRO. As specified in the Request for Project Services, additional support and/or maintenance is designated as out of scope of this procurement and will be addressed separately.

Deliverables:

- *Deployment Plan*
- *Deployment Schedule*
- *Production Deployment Execution and Go-Live support*

Post-Implementation: EPA Exchange Network Data Flows

Because the new production ICIS-NPDES flows from nVIRO must dove-tail with the existing production flows in ICIS-NPDES, the flows are implemented and validated after initial production deployment. Each ICIS-NPDES payload will be enabled and monitored incrementally in sequence to ensure a smooth transition for each payload type. Since payloads are interdependent, the sequential deployment is necessary to ensure each module operates correctly.

For RCRAInfo, any data that is to be submitted must be done after a post-production cut-off of data, where data entry in RCRAInfo has ceased and Hazardous Waste data management occurs exclusively in nVIRO. Processes to extract data to the OpenNode2 RCRAInfo Translation staging tables will be developed, tested, and migrated to production. This effort will leverage existing RCRAInfo data exchange functionality developed for several of Windsor's other customers, and adapted to meet DEP's needs.

Deliverables:

- *Production ICIS-NPDES Flows*
- *Production RCRAInfo Flows*

nVIRO Integration with OpenNode2

nVIRO is a commercial off-the-shelf (COTS) software product utilized by environmental agencies across the US to perform permitting, compliance, inspections, and data management functions in an integrated fashion. Windsor is the sole provider of the nVIRO software, licensing, deployment, implementation, and post-production support.

nVIRO is based on Windsor's integrated, modular suite of functions including: Customer Online Portal, Centralized Regulated Entity Management, Document Generation and Management, Spatial Data Management, Workflows and Notifications, Mobile Field Data Collection, Reporting and Data Inquiry, Financial Data Management, along with reporting to the EPA to support Exchange Network data flows.

Windsor engineered nVIRO to seamlessly utilize the OpenNode2 data exchange platform. EPA's data needs and system interface protocols are complex and can only successfully be supported by a system designed with this critical requirement built in.

The mechanism of data submission to (and receipt from) EPA is the Exchange Network. Windsor is, by far, the most experienced implementer of these data exchanges from States to/from EPA. Furthermore, Windsor built, and continues to support, the most commonly used EN Node solution, called OpenNode2, also used by DEP.

nVIRO was built to implicitly support the types of data needs and validation required by EPA, and to fully integrate with OpenNode2, so that nVIRO clients can readily and effectively exchange data with EPA systems such as ICIS-NPDES, ICIS-Air, or RCRAInfo.

Vendor and Team Qualifications

This section provides an overview of the relevant experience of the proposed project team and Windsor in general. The experience of individual staff members is described below, followed by several project descriptions that are relevant to this project.

Windsor has assembled a highly experienced and extensively qualified team for this project. The individuals listed below have each worked with the nVIRO software in the capacity proposed on this project, and have additional relevant experience in the business area.

Brief biographies and client references are listed below. Resumes are presented in Appendix B.

Proposed Team Qualifications

Account Manager - Steve Rosenberger

Steve is a senior director at Windsor and is the West Virginia Account Manager. He will be responsible for maintaining corporate oversight of all issues related to DEP as a client and will act as a liaison between the State and Windsor. Steve manages state agency accounts across the US and is also Windsor's staff resource director, having responsibility for maintaining appropriate staffing levels on all Windsor project efforts around the country.

Steve brings a combination of both information systems development skills and extensive experience working with, and for, government agencies. Steve has extensive experience implementing systems for both the Solid and Hazardous waste program areas and has been intimately involved in the development of the RCRAInfo data flow since its inception. Prior to joining Windsor, he was a Business and Systems Analyst and Environmental Permit Manager for the City of Portland Bureau of Environmental Services.

Project Manager - John Kostakos, PMP

As required by the RFQ, Windsor will utilize a *PMP-certified project manager with at least three implementations of the software*. Windsor proposes John Kostakos as Project Manager. John is a Project Management Institute (PMI) certified Project Management Professional (PMP) and Certified Scrum Master (CSM) with over 25 years of experience, successfully delivering mission critical enterprise applications for a diverse range of clients and industries. His exceptional leadership capabilities and hands-on skills span all aspects of the System Development Life Cycle. Since joining Windsor, John has managed multiple nVIRO projects – the $4+ million MiWaters project for the State of Michigan DEQ and the $8-million South Carolina DHEC agency-wide ePermitting project, and Construction Storm Water ePermitting implementation for Indiana DEM. All of these projects utilize the same agile approach and nVIRO components as the proposed system (such as nCORE, nSPECT, nFORM, nVISAGE, nSITE Explorer). John has managed projects ranging from a few hundred thousand to over $24 million in size.

John also acts as Project Advisor on all nVIRO deployments (for example, Kansas DHE, Wyoming DEQ, Alabama DEM, North Dakota DOH, Oregon DEQ, and an upcoming project for New Hampshire DEP), as well as the overall product development cycle.

John has extensive project oversight experience with a focus on scope management, risk management, and cost control to ensure on-time, on-budget delivery. He has a wide-ranging system development background including requirements management; business process and data modeling; as well as application design and implementation. In addition, John is skilled in defining and implementing

incremental and iterative system development processes to improve project tracking and ensure product quality.

From a management perspective, John brings strong oral and written communication skills. He is adept at interacting with staff and executive management at all levels of corporate and client enterprises.

Configuration and Team Lead - Bill Rensmith

Bill is a project manager, analyst, and configuration manager for Windsor's nVIRO software products. Bill is the team lead responsible for implementation and configuration of Windsor's nVIRO family of applications (ePermitting, Inspections, Compliance) across all of Windsor's clients. Bill has extensive experience developing user stories and designing functionality for functional areas across the breadth of the environmental spectrum, including data modeling, user interface design, and business rule definition.

Bill is also the lead analyst responsible for implementation of Windsor's nVIRO software for Indiana DEM's Construction Stormwater Modernization project, Michigan's MiWaters implementation for the Division of Water Resources, South Carolina DHEC's agency-wide ePermitting project (implementation for 40 divisions), and other nVIRO deployments. Bill brings extensive experience with the OpenNode2, ICIS-NPDES data flows, as well as the NPDES program area, including inspections, compliance and enforcement.

Technical Architect - Ted Morris

Ted is a senior technical architect at Windsor Solutions with over 20 years of professional software development and management experience spanning a wide range of technologies, platforms, and enterprises. Ted holds a Master's Degree in Engineering from Stanford University and is currently serving as the primary technical architect on the nVIRO software projects across the US, including for the states of Michigan, South Carolina, Kansas, Wyoming, and Indiana. During the past several years, Ted has acted as the principal engineer and architect of OpenNode2, which provides simultaneous support for the latest EPA Exchange Node Specifications, including v1.1, v2.0, and v2.1. OpenNode2 was designed to provide a robust, multi-tiered, distributed, and highly-extensible application architecture utilizing Inversion of Control (IoC) and Aspect-oriented Programming (AOP).

Ted is also active in many of Windsor's custom, distributed services and solutions that integrate server-side technologies with client-side desktop and web-based applications. Many of these solutions provide sophisticated and intuitive querying, editing, and visualization of extremely large environmental datasets.

In addition to the overall architecture of the solution, Ted will be responsible for ensuring the system meets all security requirements and will develop the security documentation.

Lead Analyst - Mike Abramczyk

Mike is a Data Analyst and Integration Architect with nine years of experience working with environmental data, the last six of which have consisted of managing the data platforms, migration, and integrations, including financial and security, for Windsor's nVIRO software for Indiana DEM, Michigan DEQ, South Carolina DHEC, Wyoming DEQ, and other clients. Prior to joining Windsor Mike worked as a data analyst for a large environmental engineering firm, including work as a data scientist during the investigation of the Deepwater Horizon Natural Resource Damage Assessment. Mike's background in

environmental data management and information systems coupled with his formal training in mathematics and economics give him a unique analytical perspective.

Mike is the lead data and systems integration analyst for the Indiana Department of Environmental Management's Stormwater Modernization effort utilizing the nVIRO software platform. He has led data conversion design sessions between client database administrators and Windsor conversion developers, designed the conversion infrastructure, and defined high-level data mappings. Mike has also designed key financial and security integration points, including interfaces with external payment processors, and Microsoft Azure Active Directory and B2C services.

Mike has a wide breadth of environmental program knowledge, spanning Water, Air, and Land and Waste Management program areas, as he was recently engaged in an analysis effort to document business processes for each area. He has helped design and build Windsor's eDMR solution for Wastewater Limit tracking, and is currently engaged in design efforts to integrate nVIRO with RCRAInfo. Mike has additional experience in project planning, budgeting and scheduling, resource management, and team facilitation. He has been instrumental in the rollout and support of nVIRO for Michigan's DEQ Water Resource Division, South Carolina DHEC's agency-wide ePermitting system, and other nVIRO deployments.

Additional Staff

In any large implementation and integration project, a number of additional staff will be utilized depending on the project phase and needs. Windsor has a deep and experienced staff of IT professionals including developers, analysts, testers, GIS, and user experience experts who will be involved at various stages of the project.

Relevant Experience

The consultant for this project must bring expertise not only in software, but in environmental regulatory data management – this is key to the project's success. We believe no firm can match Windsor's experience and breadth of knowledge in this area.

This section of our response describes some selected projects previously conducted by Windsor, which illustrate our relevant experience implementing state agency and ePermitting and regulatory compliance systems utilizing nVIRO and related software products.

Regulatory Entity Experience

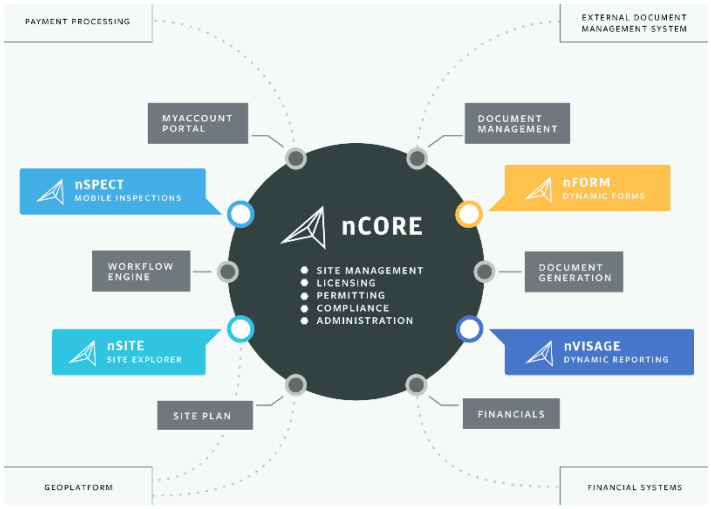
Windsor has worked exclusively with public-sector environmental agencies at the state, federal, county, and tribal levels since our formation two decades ago. We have completed projects for environmental agencies nearly every US state, as shown on the accompanying map. These projects have ranged in size from a few thousand to several million dollars, and from a small website design project to an agency-wide environmental data management system.

A partial list of our state environmental agency clients is presented below.

Windsor Clients (State Environmental Agencies)	
Alabama Department of Environmental Management	Minnesota Department of Natural Resources
Alaska Department of Environmental Conservation	Mississippi Department of Environmental Quality
Arizona Department of Environmental Quality	Missouri Department of Natural Resources
Arkansas Department of Environmental Quality	Montana Department of Environmental Quality
California Environmental Protection Agency	Nebraska Department of Environmental Protection
California State Water Resources Control Board	Nevada Department of Environmental Protection
Colorado Department of Public Health and Environment	New Hampshire Department of Environmental Services
Connecticut Department of Energy and Environmental Protection	New Mexico Environment Department
Delaware Department of Natural Resources and Environmental Control	New York Department of Environmental Conservation
Environmental Council of States	New York Department of Health
Georgia Department of Natural Resources	North Carolina Department of Environmental Quality
Hawaii Department of Health, Environmental Health Administration	North Dakota Department of Health
Idaho Department of Environmental Quality	Ohio Department of Health
Illinois Department of Public Health	Ohio Environmental Protection Agency
Indiana Department of Environmental Management	Oklahoma Department of Environmental Quality
Iowa Department of Natural Resources	Oregon Department of Environmental Quality
Kansas Department of Health and Environment	Oregon Department of Geology and Mineral Industries
Massachusetts Department of Environmental Protection	South Carolina Department of Health and Environmental Control
Michigan Department of Environmental Quality	Vermont Department of Environmental Conservation
Minnesota Department of Public Safety	Washington Department of Ecology
Minnesota Pollution Control Agency	Wyoming Department of Environmental Quality

ePermitting Project Experience

nVIRO Agency-wide ePermitting System - South Carolina Department of Health and Environmental Control



The South Carolina Department of Health and Environmental Control (DHEC) is charged with protecting public health, coastal resources, and the state's land, air and water quality as authorized under multiple state and federal laws and regulations. DHEC supports communities in promoting health, providing vital healthcare and other direct services, monitoring pollution, coordinating disease control, carrying out the agency's inspection and regulatory responsibilities, responding to environmental emergencies, and protecting public health and the environment in numerous other ways.

For many years, DHEC utilized a centralized information management system, EFIS (Environmental Facility Information System) to support these services. EFIS provided permitting, financial, inventory, complaint tracking, documentation processing, sampling and monitoring, and violation/enforcement information necessary for the issuance and subsequent tracking of permits and associated regulatory activities. The system was custom developed in-house for the agency by two different suppliers in 1997. The EFIS infrastructure was aged and lacked the functionality (e.g. external web access, online payments, reporting) the agency needed to support its mission. Furthermore, the system lacked flexibility requiring significant development effort to make system changes.

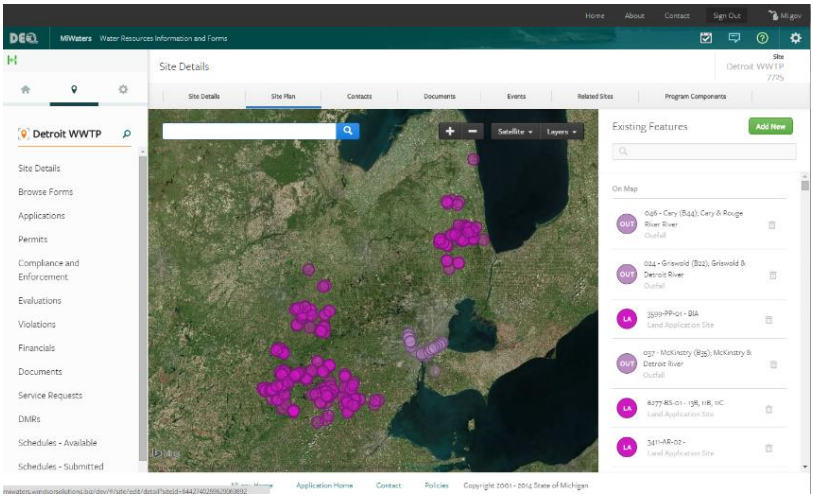
DHEC contracted with Windsor to migrate EFIS and several ancillary systems into Windsor's nVIRO solution. This solution is comprised of several key modules:

- **nCORE** – a configurable web application supporting external user access, application processing, permit/license issuance, compliance and enforcement, and administrative functions
- **nFORM** – a dynamic form application that supports online electronic form submission and management
- **nSPECT** – a tablet based mobile inspection and data collection application
- **nSITE Explorer** – a powerful GIS based data inquiry for internal staff, the regulated community and the general public
- **nVISAGE** – a dynamic reporting solution for accessing application data

The ePermitting implementation project configures nVIRO for DHEC, integrating with several state systems (such as payment processing, general ledger, ESRI ArcInfo), and will ultimately migrate data for forty programs spanning six Bureaus – Air Quality, Water, Land and Waste Management, Environmental Health Services, Ocean and Coastal Resource Management, and Health Regulations. In addition, Windsor will enhance certain nVIRO functionality to meet specific DHEC needs.

Windsor is following an Agile approach for development and implementation. Two pilot programs were implemented in early 2017, followed by several additional programs each quarter. Ultimately the system will be rolled out to 40 programs.

nVIRO MiWaters Online Permitting and Compliance System – Michigan Department of Energy, Great Lakes & Environment



The Michigan Department of Energy, Great Lakes & Environment (EGLE) Water Resources Division (WRD), like many regulatory organizations, has increasingly become dependent upon information systems to manage regulatory compliance. Over many years, legacy applications were developed in a non-integrated fashion resulting in disjointed and redundant data across multiple systems. In addition, the fragmentation of the legacy applications could not support consistent permitting and compliance processes across program areas.

The MiWaters system was built to consolidate and replace over 25 existing systems used by WRD, to bring consistency to permitting and compliance processes, and to significantly enhance WRD's capabilities through advanced technologies (e.g. GIS), enhanced public access to information, and improved data integrity.

Primary capabilities provided by the MiWaters system include:

- Site Management
    - Management of Site Plans related to environmental interests (e.g. Permitted)
    - Integration with GIS for mapping of Site Plan Features as points, lines, or polygons.
    - Site centric view of environmental activities (Permits, Enforcement Actions, Inspections, Complaints)
- Service Request Processing
    - Integration with nSPECT for submission of Permit Applications, Service Requests, and Complaints
    - Request processing and fulfillment
        - Permit development and/or modifications
        - Request fulfillment
        - Tracking of Complaints
    - Public Notice of proposed permit Applications and/or newly issued Permits
    - Processing paper-based Applications, Requests, Submissions

- Permit Maintenance
    - Schedules of Compliance
    - Permitted Features (e.g., Outfalls) and Feature Limits
    - Dynamic program-specific data components based on permit type
    - Contact Management
    - Related Documents
- Permittee Reporting Requirements
    - Electronic submission of Permit required reporting (via nFORM) based on Schedules of Compliance specified in the Permit or Compliance/Enforcement Action
    - Electronic Submission of Discharge Monitoring Reports
- Compliance and Enforcement
    - Evaluation of permit reporting submissions
    - Automatic violation generation for late / missing permit report submissions
    - Planning and scheduling of Site Inspections
    - Field Inspection data capture, reporting and violation generation (via nSPECT)
    - Tracking of Compliance and Enforcement Actions including escalations
- Complaints/Incidents
    - Recording and processing of Complaints or Incidents
    - Instantiation of Inspections, Permitting, or Compliance/Enforcement Actions from Complaints
- Financial Tracking
    - Application Fee Assessment
    - Invoice Generation
    - Payment Processing
    - Payment Status Tracking
    - Refund Request Processing
- Other Water Resources related functionality
    - Financial Instruments
    - Conservation Easements
    - Mitigation Banks
- EPA Reporting (ICIS / NPDES)

Other general features and capabilities of MiWaters include:

- External site for regulated community (registered users)
- Public Inquiry including GIS based inquiry

- Workflow and Tasking
- Automated Document Generation from user-defined document templates
- Integrated Document Management (upload/download)
- User Notifications – to both internal staff and registered external users (regulated community)
- Extensive configuration and administrative functions
- Contact Management
- User management
- System Announcements
- Online help

nVIRO Kansas Environmental Information Management System (KEIMS) - Kansas Department of Health and Environment

The Kansas Department of Health and Environment (KDHE) Bureau of Air (BOA) previously used the iSTEPS software product to support Kansas and federal air emissions permitting and compliance programs. This software managed data about air contaminant point sources permitted under both state and federal (Title V) permitting programs.

During 2016, KDHE conducted a requirements analysis project to explore alternative options for the replacement of the remaining permitting and compliance management functionality in iSTEPS with a new system that will also support the automated submission of compliance data to the US EPA ICIS-Air system. During this requirements analysis project, BOA staff defined the high-level business and technical requirements for the new system and discussed several implementation options for the desired air permitting and compliance data management system.

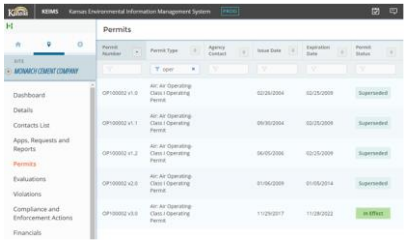
Following these discussions, BOA staff concluded that the preferred implementation approach for the desired air permitting and compliance data management system, would be to implement and configure the **nVIRO** environmental data management system provided by Windsor Solutions, Inc. (Windsor). The nVIRO software was implemented for KDHE and branded as the **Kansas Environmental Information Management System (KEIMS)**.

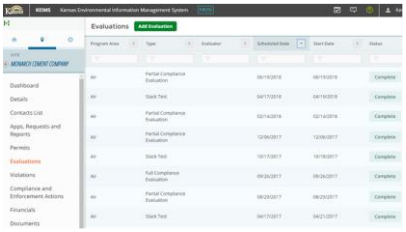
The KEIMS system supports a variety of different environmental regulatory programs and provides all the core functional capabilities required by BOA, for example, source data management, permit data management, compliance inspection and report data management, enforcement data management, workflow management, document generation, and electronic reporting.

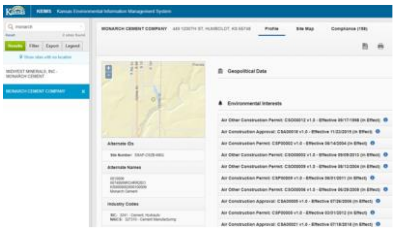
The nVIRO-based system is also highly configurable, allowing it to meet many common program needs without the need for customization. Some key configuration steps during the implementation of the software for BOA included:

- Electronic forms allowing online submission of construction and operating permit application forms, as well as required periodic compliance reports.
- Business workflows to support processing of permit applications, compliance reports, evaluations (inspections), and compliance (enforcement) actions.
- Document templates for basic permit structure and content generation and for other letters and notices to be generated by the new system.
- Reports to meet the inquiry functions needed by BOA staff.

Finally, a significant data migration effort was undertaken to populate the new KEIMS system from several legacy program systems.







The final system was implemented in September 2018 after several months of testing by program staff. Windsor is continuing to provide post-implementation support to the BOA and new releases of the product are scheduled for later in 2020 and beyond.

Following this implementation of KEIMS for the Bureau of Air, KDHE commenced two new projects to roll out the software to additional programs. As of 2020, the Bureau of Environmental Remediation and the Bureau of Water are on the same nVIRO software platform. The BER deployment includes the management and exchange of RCRAInfo data with EPA.

nVIRO IT Modernization Pilot Project – Indiana Department of Environmental Management (IDEM)

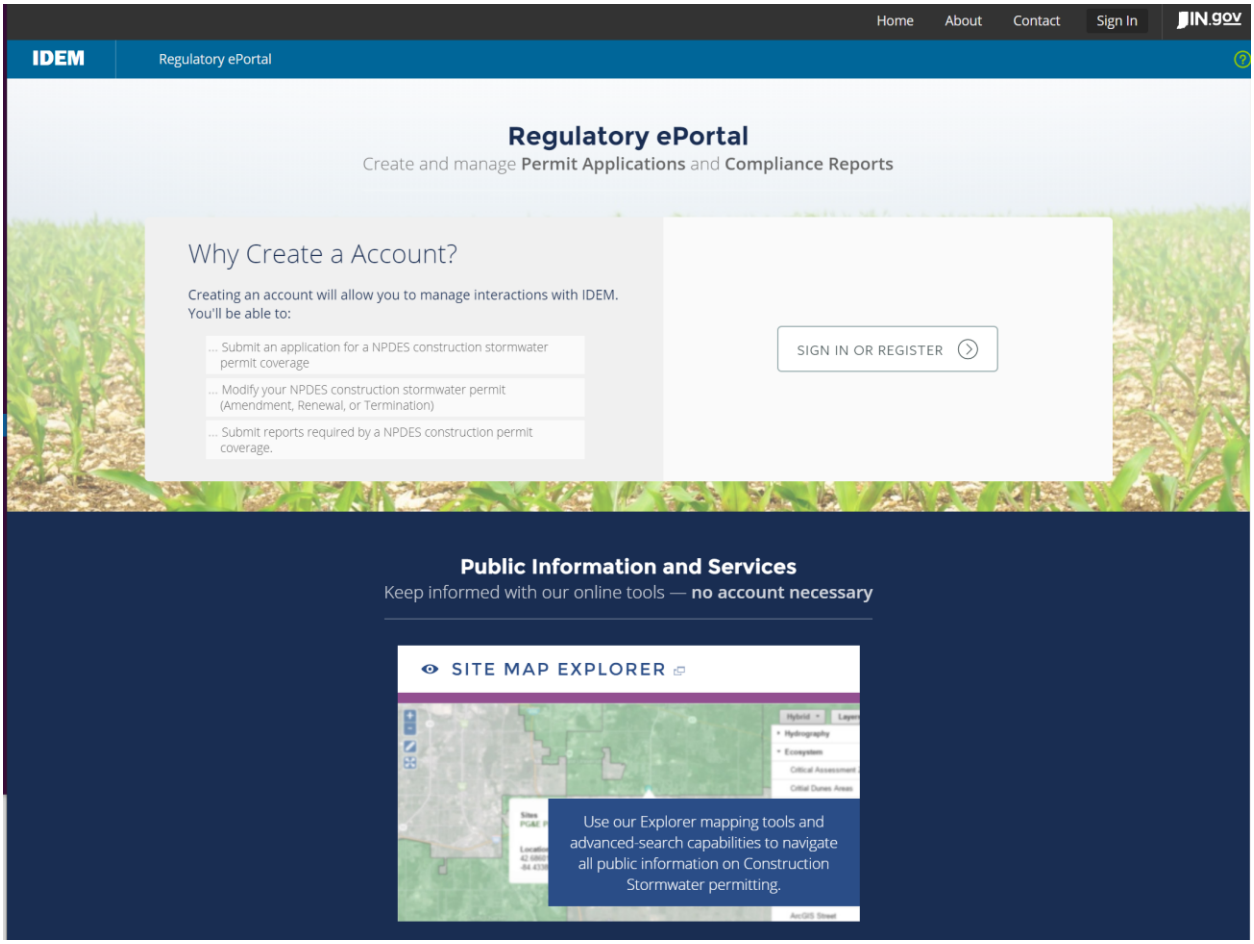
Windsor led the modernization effort at Indiana Department of Environmental Management (IDEM) by implementing nVIRO for the Construction Stormwater/NPDES program area. This project is the first step in what is hoped to be a larger initiative that will ultimately replace the agency's existing enterprise system. The project kicked off in October, 2018 and the system was implemented in production in April, 2019. In addition to streamlining internal workflow, nVIRO allows the regulated community to apply for permits online, monitoring processing, and initiate permit modifications, renewals, and terminations, and submit monitoring reports.

Windsor worked with IDEM technical staff to develop custom integrations with the State's information systems. For payments, Windsor integrated with IDEM's online payment portal, Virtual Payment Services (VPS). In addition, the system was enhanced to use the State of Indiana's Azure B2C-enabled web portal for external user authentication and authorization. Windsor also integrated nVIRO with State of Indiana's Azure AD-enabled web portal for internal user authentication.

Stormwater program data was migrated from the IDEM's existing TEMPO database into nVIRO. Windsor worked with IDEM data experts to understand the structure of the TEMPO data, develop a migration plan, and develop data conversion code. Converted data was validated through a collaborative testing process with IDEM program staff.

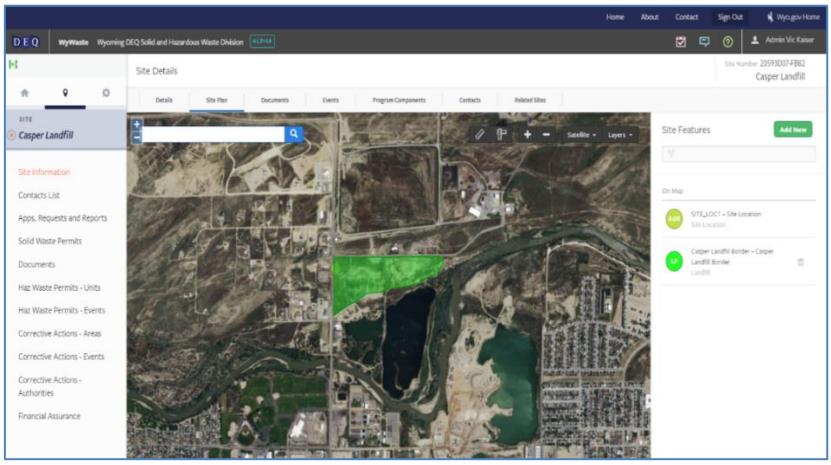
One of the goals of the project was to reduce the overall agency processing timeline. To meet this goal, Windsor developed several custom workflow and processing metrics reports that IDEM can use to track program efficiency.

Within the first 6 months of live operation, over 1,500 submissions had been processed using the new system and nearly $100,000 in fees had been collected. Staff have reported a high level of satisfaction with the system. While paper applications are still the most common form of submission, these have been transitioning to online electronic submissions as the system is adopted by the external community.



nVIRO WyWaste System – Wyoming Department of Environmental Quality

The Wyoming Department of Environmental Quality (WDEQ) Solid and Hazardous Waste Division (SHWD) contacted with Windsor to develop an integrated solution ("WyWaste") for five programs: Solid Waste, Hazardous Waste, Inspections & Compliance, Voluntary Remediation, and Orphan Sites. Drivers for this project included the need to replace aging legacy systems and the desire to provide a holistic view of activities at a location. Windsor proposed the re-use and customization of the recently completed nVIRO system, which provided many of the components needed for WyWaste. This included application / service request processing, sophisticated mapping functions, workflow templates, document generation, and compliance tracking.



The first WyWaste release was deployed in November 2016 and provided data management functions for the Solid Waste, Hazardous Waste, Voluntary Remediation, and Orphan Sites programs. Future releases will assimilate Inspections & Compliance data and will also provide accessibility to the general public for online submissions and data access.

Significant functionality is also provided through integration of other Windsor Solutions modules into the WyWaste nVIRO solution:

- **nFORM** – supports online electronic form submission and management
- **nSPECT** – provides mobile inspections and data collection
- **nSITE Explorer** – delivers powerful GIS based data inquiry

Primary capabilities provided by the WyWaste system include:

- Site Management
    - Management of Site Plans related to environmental interests (e.g. Permitted)
    - Integration with GIS for mapping of Site Plan Features as points, lines, or polygons.
    - Site centric view of environmental activities (Permits, Enforcement Actions, Inspections)
- Application / Service Request Processing
    - Integration with nFORM for submission of Permit Applications or Service Requests
    - Processing paper-based Applications, Requests, Submissions
- Solid Waste Permit Maintenance
    - Schedules of Compliance
    - Permitted Features
    - Dynamic program-specific data components based on permit type
    - Contact Management
    - Related Documents
- Hazardous Waste Permit Maintenance
    - Management of Events / Milestones by Unit
- Corrective Action Maintenance
    - Management of Events by Area
    - Tracking of Certificates of Concern Over Life of Corrective Action Process
- Financial Assurance
    - Cost Estimate Tracking by Regulatory Program
    - Management of Financial Instruments

Other features and capabilities of WyWaste include:

- Workflow and Tasking
- Automated generation of documents from user-defined document templates

- Integrated Document Management (upload/download/edit) and document editing
- User Notifications
- Contact Management
- User management
- System Announcements
- Extensive configuration and administrative capabilities
- Online help

nVIRO Alabama Department of Environmental Management AEPACS Implementation

The State of Alabama Department of Environmental Management (ADEM) desired to upgrade and modernize its existing permitting and compliance software solutions by implementing Windsor Solutions' (Windsor) nVIRO product, a complete environmental permitting, compliance, and enforcement software solution. ADEM named their implementation the Alabama Environmental Permitting and Compliance System (AEPACS).

The solution includes the following nVIRO modules: nCORE, nFORM, nSITE, nSPECT, nVISAGE and OpenNode2.

The AEPACS implementation project is being implemented in a phased approach, configuring and implementing nVIRO for one or more environmental programs at a time. Programs being implemented include Construction Stormwater (CSW), Coastal Area Management, Industrial, Industrial General Permits, Small Mining, Mining, Municipal Separate Storm Sewer Systems (MS4), Pesticides, State Indirect Discharge (SID), Underground Injection Controls (UIC), Water Quality Certification (WQC), Stage 1 Air, Scrap Tires, Recycling, Grants, Remediation and Underground Storage Tanks (UST).

In addition, the implementation includes integrations with the state's online payment processor, Laserfiche document management, an ADEM authentication portal and EPA's CROMERR Shared Services.

nVIRO Oregon DEQ Complaints Management System

The Oregon Department of Environmental Quality (DEQ) collects, tracks, and manages citizen reports of air, water, and land pollution issues, including notifications of spills of environmentally hazardous materials, and complaints related to poor environmental conditions. Information about spills and complaints is currently managed in an information system which has limited functionality and which employs outdated technology.

DEQ wished to provide the public with a new Web-based system that will allow an interested party to submit a pollution complaint and to track the status of the investigation of complaints and spills. In addition to enhancing the services provided to the public related to known environmental issues, the new system also streamlines the tracking and investigation process for DEQ staff and expedite the resolution of reported issues. The new system provides many benefits, including:

- Increased public participation
- Improved public access
- Enhanced transparency
- Improved data quality

- Reduction in DEQ staff workload
- Better relations between the agency and the public

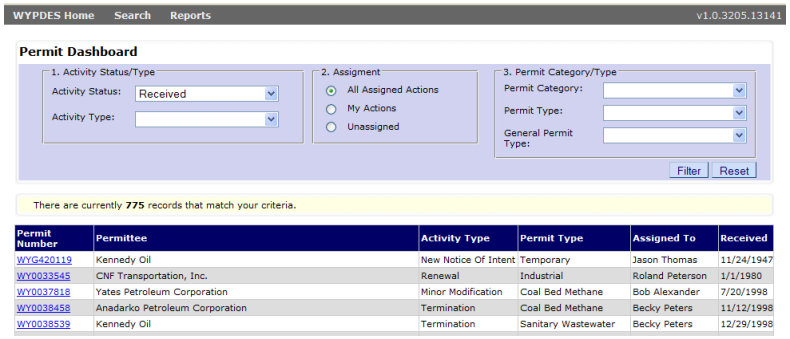
DEQ acquired the nCIDENT system developed by Windsor to replace the agency's current pollution complaint tracking system. nCIDENT is a comprehensive complaint tracking and management solution that provides easy access and transparency to the public and complainant as well as being a robust management tool for agency staff. nCIDENT is a scaled-down version of Windsor's nVIRO collection of integrated environmental data management software solutions.

The project kicked off in February 2018, and the system went live in June 2018. Windsor is currently providing support for the product.

Windsor's NPDES Projects

Windsor's expertise in the NPDES subject area is unmatched. Several of the ePermitting projects described above were primarily for the NPDES or Storm Water programs – Michigan's MiWaters, Indiana's Construction Storm Water, South Carolina DHEC's ePermitting system, and Alabama's AEPACS system were all in the NPDES realm. Additional non-nVIRO NPDES projects are described below.

WYPDES Water Permit System, nSPECT Integration – Wyoming DEQ



In May 2006, Windsor conducted a comprehensive assessment of the Wyoming Department of Environmental Quality's (WDEQ's) existing National Pollutant Discharge Elimination System (NPDES) permitting system with a view to understanding compliance with the EPA's Integrated Compliance Information System - National Pollutant Discharge Elimination System (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 data exchanges from the WDEQ NPDES system to the EPA ICIS-NPDES system.

As the result of this assessment, WDEQ recognized that the information systems and business processes that were currently used to maintain the NPDES program would require modernization to support the eventual flow of information to the new EPA ICIS-NPDES system. In addition, WDEQ could see that its programs would benefit from additional modifications to the existing information systems and business processes to streamline and enhance data collection and management.

In August 2007, WDEQ initiated an enterprise-wide Information Technology Initiative Implementation Project that included a task aimed to establish a fully integrated information system that will consolidate existing separate Wyoming NPDES Program systems into a single data repository and provide a powerful and secure data collection, management and access interface for all program information. This new system, named WYPDES, enables the WYPDES Program to fully comply with the data synchronization requirements of the EPA ICIS-NPDES data exchange.

WYPDES was implemented in the late fall of 2008. The system covers all aspects of facility and permit management, including effluent limits, discharge monitoring reports, inspections, violation tracking and enforcement actions. It also features robust document generation capabilities and customizable

reporting. The WYPDES system features comprehensive support for permit application tracking and permit creation, modification, and renewal. Several different types of discharge permit are supported, including various individual permits as well as general permits.

WYPDES fully supports permit management workflows. Each permit application follows a specific lifecycle from receipt to final permit issuance. Reports help WDEQ management determine which permits are upcoming, late, or recently completed. In addition, WYPDES is integrated with a document management infrastructure, allowing permit writers to attach supplemental information directly to the inspection record.

Windsor was responsible for all planning and management, requirements gathering, design, development and testing activities.

The WYPDES system utilizes Microsoft technologies, including the .NET development environment, SQL Server 2008, and Sharepoint 2007.

nSPECT Mobile Inspection Integration

The WDEQ Water Quality Division (WQD) uses the WYPDES system to manage all aspects of the National Pollution Discharge Elimination System (NPDES) program for the State of Wyoming. The WYPDES system allows WQD staff to manage information about individual and general permits, permit conditions, and compliance monitoring and enforcement activities. WQD wished to extend the WYPDES system by establishing a mechanism to enable regional inspection staff to record inspection results electronically while onsite at a facility.

WDEQ selected the nSPECT solution developed by Windsor Solutions, Inc. (Windsor) to meet WQD's needs for remote field inspection data collection and contracted with Windsor to customize and install nSPECT for WDEQ, and to integrate the system with the existing WYPDES system.

The new system is a browser-based, device-independent mobile inspection application that can be used by field inspectors to quickly and efficiently conduct onsite inspections, and it replaces the use of paper forms that were used to record inspection results previously

nSPECT allows program staff to customize field forms to meet their data collection needs, and to deploy these to the mobile devices without technical assistance. The field inspectors always have the most current data forms on their mobile device, and the system integrates with the WYPDES system to prepopulate desired data on the forms before the visit takes place. The application allows data to be collected either online or offline, synchronizing automatically with the nSPECT data server when a secure connection is reestablished. The system also allows the user to take photos and capture GPS coordinates using the built in capabilities of the mobile device. Inspection reports may be customized and printed from the nSPECT system.

Electronic field data collection is expected to result in significant benefits to WQD in terms of improved data quality, and reduced staff time needed to process paper inspection forms into the WYPDES system.

Windsor was responsible for managing the project and all analysis and development activities. Windsor worked with WQD inspectors to conduct multiple rounds of field testing of the software, and with WDEQ technical staff to implement the system in the agency's technical environment.

The nSPECT integration project commenced in April 2014 and was completed in May 2015 with the final production implementation.

Georgia Environmental Protection Division – Georgia Pollution Discharge Elimination System (GAPDES)

Windsor designed and implemented a water National Pollutant Discharge Elimination System for the State of Georgia Environmental Protection Division (EPD).

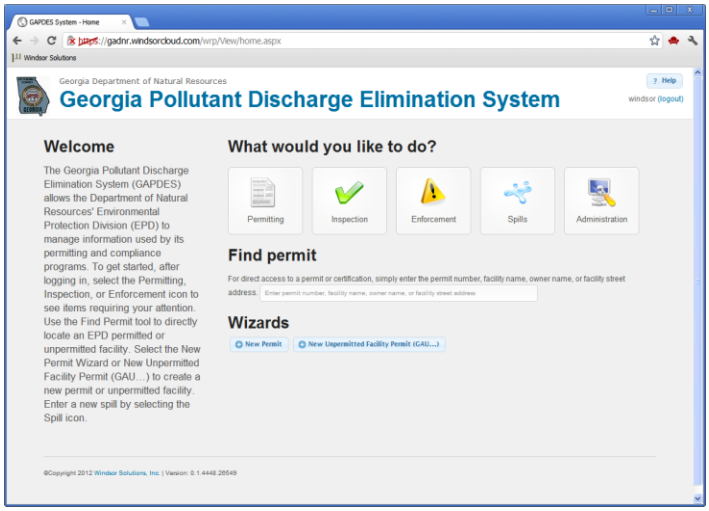
The solution provided for the EPD made extensive use of proven solutions that were already developed by Windsor to solve the specific challenges expressed by the EPD. The ability to reuse these capabilities ensured that the GAPDES project was delivered in a tight time frame and also with a rich set of functionality.

Specific functionality developed to meet the individual needs of EPD include:

- extensive enhancements to make the application fit their construction storm water permits
- geospatial viewers for facilities, permitted outfalls, and spills
- screens to enable GAPDES to fully support the Safe Dams program
- dynamic definition of custom fields to track construction storm water notices of intent
- advanced permitting features to enable support of active and inactive limit sets for the lifecycle of the permit
- generation of permit, inspection, and enforcement documents that conform to existing EPD templates
- an online inquiry interface with custom shareable filters and export capability (Excel and comma-separated-values supported)
- customizations to enable a cloud-hosted implementation

GAPDES manages all information about the EPD's National Pollutant Elimination System (NPDES) permit, compliance, and enforcement program implementations, including:

- Permit applications
- Permits
- Inspections
- Enforcement actions
- Spills tracking



GAPDES is a fully-integrated information system that consolidates existing separate EPD applications into a single data repository and provides a powerful and secure data collection, management and access interface for all program information. This Internet- based, cloud-hosted application was developed using Microsoft's .NET Framework and MySQL, but it was architected for compatibility with other database platforms.

EPD permitting staff uses GAPDES to manage the complex NPDES permit and water quality certification application process, ensuring that all required information is captured. Permit documents are automatically generated by the system, saving valuable time while promoting consistency and accuracy within the branch. Facilities and outfalls can be mapped using dedicated geospatial viewers, providing important context such as proximity to impaired waterbodies.

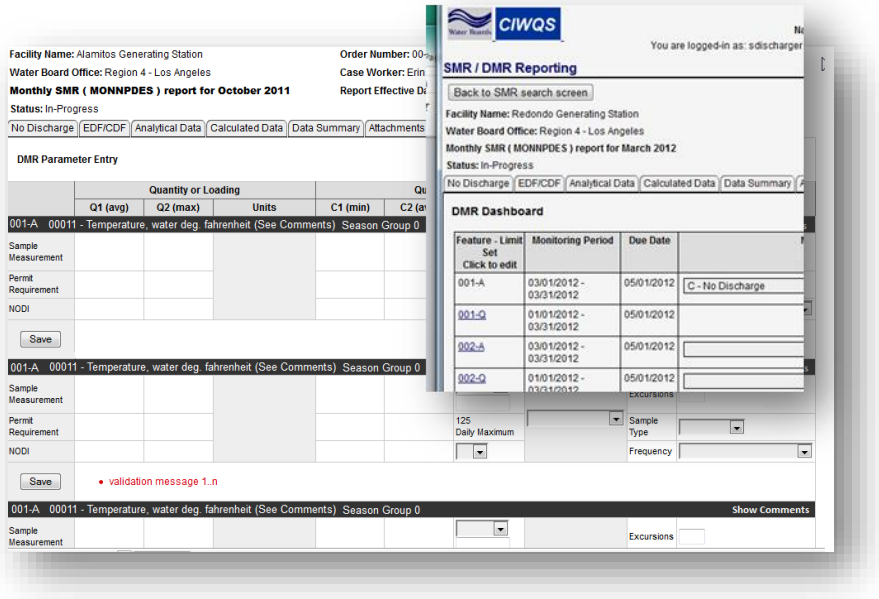
EPD compliance staff uses the system to schedule and record inspections, as well as generate post-inspection reports. GAPDES also provides robust functions to log single-event and permit violations and manage enforcement actions. Spills can be tracked in the system, and these can be integrated with the existing permits and facilities recorded by permitting staff. Spills can also be plotted on a map, showing their relationship to existing facilities, outfalls, and impaired waterbodies.

The GAPDES solution interfaces with OpenNode2 to participate in the ICIS Data Flow on the Exchange Network.

Permits and other documents needed by the program are supported through the use of document templates and Windsor's reporting engine.

California eSMR Discharge Monitoring Reporting System

In 2011, the California State Water Resources Control Board (SWRCB) contracted Windsor to implement a web-based solution for the capture of federal Discharge Monitoring Reports (DMRs) for California facilities permitted to discharge under the National Pollutant Discharge Elimination System (NPDES). This solution, known as eSMR 2.5, also automated the exchange of the captured DMR data with U.S. EPA using the Exchange Network. SWRCB had previously developed a solution, known as eSMR 2, for the capture of reports pertaining to State discharge monitoring regulations. Windsor extended this solution to also support the capture of federal NPDES DMRs, providing a single point of contact for facilities to report to both state and federal regulators. Data can be reported either through a user interface or through the upload of formatted data.



The allowable limits for NPDES permits are maintained by a U.S. EPA system known as ICIS-NPDES. In order to simplify the entry of DMR data for facilities, an automated download of ICIS-NPDES permit limit data (also known as an 'empty slot file' or ESF) data was implemented as part of the project. Downloading the ESF data allows the eSMR 2.5 solution to compare and validate DMR data that has been entered or uploaded by the facility against the pre-defined permit limits and conditions that apply, and highlight any exceedences that may have occurred. Once DMR data entry has been completed and reviewed by the responsible party at the facility, the submittal goes through a certification process and is forwarded to U.S. EPA via the exchange network for further validation and import into the ICIS-NPDES system.

The exchange network plays a central role in this solution, as the mechanism for delivery of current permit limits and condition from U.S. EPA to SWRCB, and also the subsequent delivery of submitted,

certified DMRs from SWRCB to U.S. EPA. Windsor's OpenNode2 solution has been deployed in California and is being used for all ICIS-NPDES related data exchanges.

The eSMR 2.5 solution was deployed in production and SWRCB in November 2012, with a gradual rollout to all regulated facilities following afterwards. Future enhancements planned for eSMR 2.5 include the implementation of a CROMERR-compliant electronic submittal certification process.

Alabama DEM NPDES Mobile Inspections

The Alabama Department of Environmental Management's (ADEM) management gave NPDES program the objective to implement a mobile inspection application by the conclusion of fiscal year 2016. The ADEM staff evaluated the available solutions as well as the feasibility of building a custom solution. The ADEM selected Windsor Solutions and the nSPECT product as their preferred option.

Windsor managed all aspects of the project execution. The Windsor and ADEM team performed workflow analysis, inspection form analysis, and an assessment of the integrating NPDES information system (COTS). Based on these analysis activities, a set of enhancements was developed and implemented to support the integration between nSPECT and the NPDES system.

Highlights:

- Used primarily for performing Construction Storm Water inspections
- Two -way integration between nSPECT and the NPDES solution; inspection forms are pre-populated with information from the integrating system and data is pushed back into the system post-inspection.
- Project demonstrates the robustness of the nSPECT integration model as the integration occurred with a COTS system, into which interfaces to program components is limited.
- Resulting inspection documents are loaded to the Department's document management system.
- Program managers have reported a 30% efficiency gain when compared to the manual efforts previously required to execute an inspection to completion (plan inspection, gather information, execute inspection, develop inspection report, integrate photos, perform data entry, upload documents). For this efficiency gain they received an Environmental Council of States (ECOS) 2017 State Program Innovation Awards State Leadership and Creativity award for innovative use of technology:
    - https://www.ecos.org/wp-content/uploads/2017/08/Press-Release-2017-ECOS-Innovation-Awards.pdf

Since going live in December 2015, over 4,716 inspections have been performed and integrated with their NPDES information system using nSPECT. Because of nSPECT, ADEM has performed an additional 1,415 inspections that otherwise would not have occurred.

Environmental Council of States – ICIS-NPDES Data Flow Support to States

Under ECOS' General Support Contract NE-GEN-03A, Windsor Solutions, Inc., provides technical support for the Exchange Network. Windsor also maintains the OpenNode2 software and develops data exchange software (plugins) for all major flows on the Network.

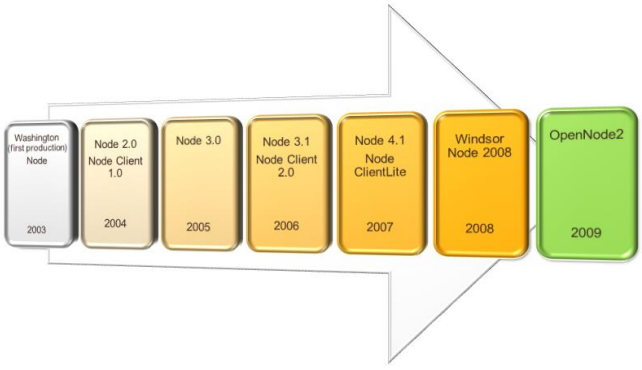
As an important element of the implementation of the new EPA ICIS-NPDES system, EPA OECA asked ECOS to provide resources under this contract to allow Windsor to assist states with the transition to

reporting to the new system through electronic submissions over the Exchange Network. ECOS requested that Windsor develop a new plugin for the OpenNode2 platform to support the flow of data for each of some 47 ICIS-NPDES data families, and then to pilot the implementation of this new plugin with the Washington Department of Ecology. The plugin was then made available for free to the Exchange Network community.

Following the development and initial pilot implementation of the new ICIS-NPDES plugin, ECOS requested that Windsor continue to provide assistance to many states, including DEQ, with the implementation of the data flow. This support work is continuing as more states begin to automate their data submissions.

Windsor's Exchange Network Leadership and RCRAInfo/NPDES Dataflows

A key factor in the success of a National Environmental Information Exchange Network (NEIEN, or Exchange Network) project is an in-depth knowledge of the program. In this respect, no other firm can match the depth and breadth of expertise that Windsor brings to the table. Windsor has been developing and implementing Network Nodes for partners since 2003, for both .NET and Java environments. During that time, our Node has evolved through multiple iterations to accommodate the advances in the underlying technologies, as well as Windsor's ever expanding experience with challenging and new and innovative data exchanges. The following figure illustrates this version evolution.



As a recognized leader in existing Exchange Network Node and data flow deployments, we believe that Windsor is able to bring the necessary experience and skills to successfully provide the services required for any NEIEN project. Windsor has been closely involved with the design and implementation of the Exchange Network from its inception through to the current functional revisions. Some of Windsor's specific achievements have been:

- The first engineers to successfully implement a fully functional production Node and the company with the most experience with production Node operation. The majority of the Exchange Network is now powered by Windsor developed tools and applications.
- The first company selected from among all leading Network Node providers to support the open-source Exchange Network Node. Windsor's OpenNode2, already powering the majority of state Exchange Network partners, is now freely available as an open-source product.
- Implementation of many regulatory environmental program data flows including RCRAInfo, EIS, AQS, OWIR-ATT, Beaches, FacID, ICIS-NPDES, SDWIS, TRI, UIC and WQX.
- Implementation of many innovative new data exchanges between partners that have served to dramatically illustrate the potential and power of the Exchange Network, including eManifest, the Homeland Emergency Response Exchange (HERE), the Juvenile Migrant Salmon Exchange (JMX) and the Pacific Northwest Water Quality Data Exchange (PNWWQX).
- Leaders in the advanced technologies and practical application of Web services, XML data exchange, data warehousing, and automated data cleansing.
- Recent implementers of a Tribal "SuperNode" for the Northwest Indian Fisheries Commission (NWIFC), as well as the United South and Eastern Tribes (USET).

Windsor's latest Network Node solution was selected by a broad consortium of leading Network agencies during an open and competitive bid process that included all the leading Network Node solutions available. Windsor's latest generation open source Node, coined "OpenNode2," was funded through a 2008 multi-state Challenge Grant and allows states, counties, and tribal groups to exchange data with EPA and other Exchange Network partners at a substantially reduced cost. OpenNode2 is currently in production operation with a large number of Exchange Network partners and has proven to be a robust and reliable engine in a variety of configurations. OpenNode2 simultaneously supports both the 1.1 and 2.0 versions of the Node Specifications, and works in either .NET or Java environments and with a wide range of supporting databases including Oracle and SQL Server. OpenNode2 was officially announced and released to all Network Partners at the Exchange Network User Conference in Atlanta in April 2009 and has since been available for download.

OpenNode2 builds upon Windsor's long-standing support for the Exchange Network. The "build once – share many times" approach is consistent with Windsor's philosophy of encouraging reuse and collaboration among Network Partners. The selection of Windsor's solution validates our long-standing approach to the implementation challenges over the last several years and is another reason Windsor is behind the majority of Exchange Network Node deployments throughout the United States.

The table below lists selected deployments of Windsor Nodes on the Exchange Network. As the Node has been available as an open source product for several months now, other agencies and tribes unknown to Windsor have self-deployed OpenNode2, and these numbers are constantly increasing. The following table presents some (but by no means all) of the Exchange Network partners utilizing OpenNode2:

OpenNode2 Users (Partial List)	
Alaska Department of Environmental Conservation	Nebraska Department of Environmental Quality
Arizona Department of Environmental Quality	Montana Department of Environmental Quality
Arkansas Department of Environmental Quality	Nevada Division of Environmental Protection
California Climate Action Registry	New Hampshire Department of Environmental Services
California Environmental Protection Agency	New Mexico Environment Department
Colorado Department of Public Health and Environment	New York Department of Environmental Conservation
Connecticut Department of Environmental Protection	New York Department of Health
Delaware Department of Natural Resources and Environmental Control	North Dakota Department of Health
Georgia Department of Natural Resources	Northwest Indian Fisheries Commission
Gulf of Maine Ocean Observing System	Ohio Environmental Protection Agency
Hawaii Department of Health	Oklahoma Department of Agriculture
Idaho Department of Water Resources	Oklahoma Department of Environmental Quality
Iowa Department of Natural Resources	Oregon Department of Environmental Quality

Illinois Environmental Protection Agency	Snohomish County, Washington
Indiana Department of Environmental Management	Stillaguamish Tribe of Indians
Kansas Department of Health and Environment	United South and Eastern Tribes
Marianas Islands Department of Environmental Quality	US Geological Survey
Massachusetts Department of Environmental Protection	Washington Department of Ecology
Minnesota Pollution Control Authority	Washington Department of Natural Resources
Missouri Department of Natural Resources	West Virginia Department of Environmental Protection

Not only has Windsor been on the forefront of Node development but they have also been heavily involved in flow innovation, having been responsible for the development of several of the most successful data exchanges on the Network. Many of these exchanges are now available along with OpenNode2, which is provided along with plugins needed to implement the RCRAInfo, ICIS-NPDES, ICIS-Air, FRS, EIS, AQS, WQX, SDWIS, and many other data flows. Other more creative data flows that have been developed by Windsor include the HERE Network, the Pacific Northwest Water Quality Exchange, and e-Manifest.

Specific to the RFQ's request for RCRAInfo expertise, the proposed Project Advisor, Steve Rosenberger, brings extensive relevant experience to this project. **Steve developed the *Flow Configuration Document* and the *RCRAInfo Data Submission Overview and Challenges,* both based on his extensive experience integrating with RCRAInfo,** under contract with the State of Michigan.

Due to Steve's extensive experience with RCRAInfo and the Exchange Network, he was asked to **continue to serve on the project as ECOS' representative for RCRAInfo flow support**. In this role Steve has provided advice and guidance to the different States that are bringing the RCRAInfo flow on-line and providing guidance to EPA in their efforts to migrate flow responsibility to be under their purview.

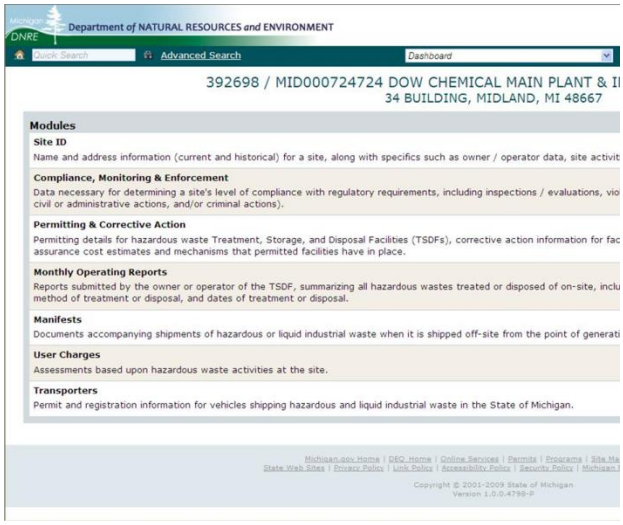
Relevant projects are described below and references follow.

Environmental Council of States – General Support Contract

Windsor has been engaged by ECOS since 2004 to support the Network Steering Board (NSB) with various Exchange Network implementation efforts. As part of this engagement, Windsor has conducted many activities, including:

- Support for various states' ICIS-NPDES data management and NPDES data reporting
- Development of much of the Network's technical flow design policy and guidance documentation
- Design of the Flow Configuration Documents (FCDs) and XML schemas for many data flows including **RCRAInfo**, ICIS-NPDES, DMRs, FRS, EIS, TRI, WQX, AQS, and several others
- 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.

Waste Data System, Michigan EGLE (formerly DEQ)



The Michigan Department of Environmental Quality (MDEQ) Resource Management Division (RMD) contracted Windsor to perform a multi-phased project for the development of an integrated cross-program waste management system.

Prior to this project the Division maintained nine separate internal information systems in addition to staff having to hand-key data into EPA's Resource Conservation and Recovery Act Information (**RCRAInfo**) system for the management of hazardous waste information. The first version of the MDEQ's Waste Data System (WDS) was delivered by Windsor Solutions for production use in 2001.

In 2009 the MDEQ contracted with Windsor Solutions to redevelop the WDS in current technologies. In the intervening period between initial production release and 2009, both web and database technologies had advanced significantly as to warrant the investment of resources for an application that was so critical to the day to day work processes of the Division.

The current implementation of the WDS is a web based application based on the Microsoft .NET Framework with data being managed and reported upon using the Microsoft's SQL Server platform and its associated services (Reporting Services, Integration Services).

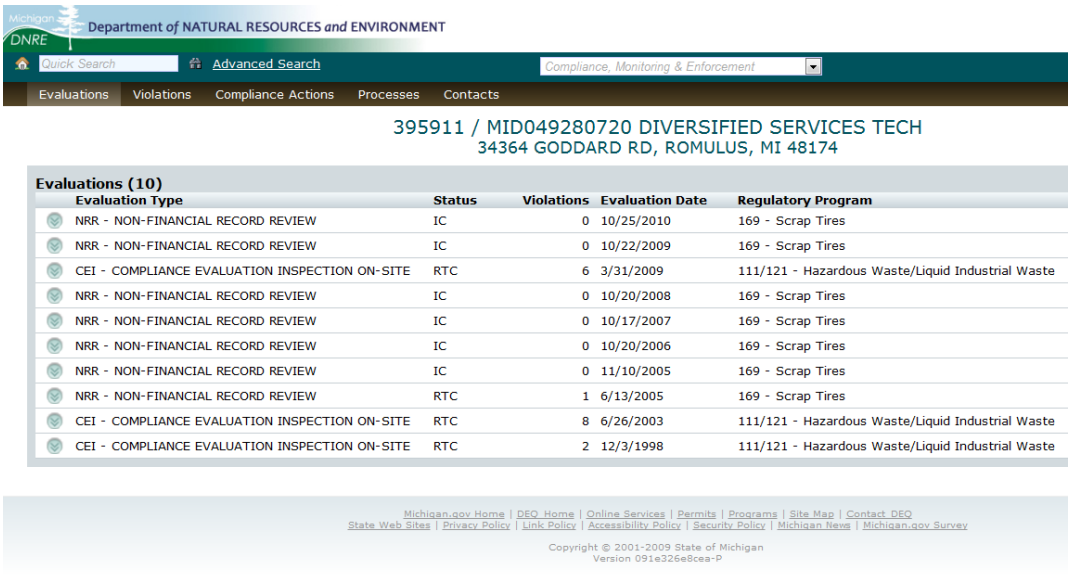
The application is available both internally and publicly (http://www.deq.state.mi.us/wdspi/Home.aspx) with sensitive data being removed from the publicly available version. The division has found that making the data publicly available has resulted in a significant decrease in the number of information requests submitted by the public, freeing up resource-limited staff to address other pressing matters.

Programmatically, WDS manages data for the following areas:

- RCRA Hazardous Waste Generation and Management
  - Hazardous Waste Notification (Site Identification)
  - Hazardous Waste Manifest Management and Tracking
    - 2.7 million hazardous waste shipments managed over 20 years
    - Integrated with User Charges to accurately assess annual hazardous waste fees.
  - Treatment Storage and Disposal Facility (TSDF) Permitting
  - TSDF Financial Assurance
  - TSDF Corrective Action
  - TSDF Monthly Operating Reports
  - Annual Reporting (Biennial Reporting to EPA)
  - User Charges (Fees) with integration to agency-wide financial systems
- Hazardous Waste and Liquid Industrial Waste Transporters
  - Permits
  - Fleet Registrations
  - Fees
- Solid Waste Management
  - Construction Permitting

  - Operating Licenses
  - Disposal Areas
  - Financial Assurance
  - Quarterly Monitoring Reports
  - Annual Landfill Reports
  - Recycling and Reutilization
  - Surcharges (Fees)
- Scrap Tires
  - Hauler//Collection Site Registration
  - Financial Assurance
  - Grants for Cleanup and Redevelopment

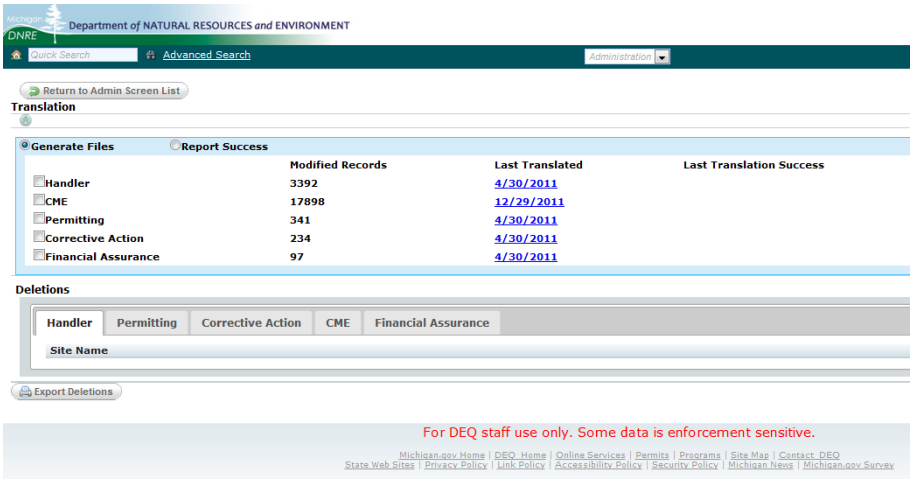
Data for both the Site Identification and the Compliance Monitoring and Enforcement activities are managed in a cross-programmatic manner. This allows staff and the public to have an integrated view of the regulated activities and compliance history at a site.



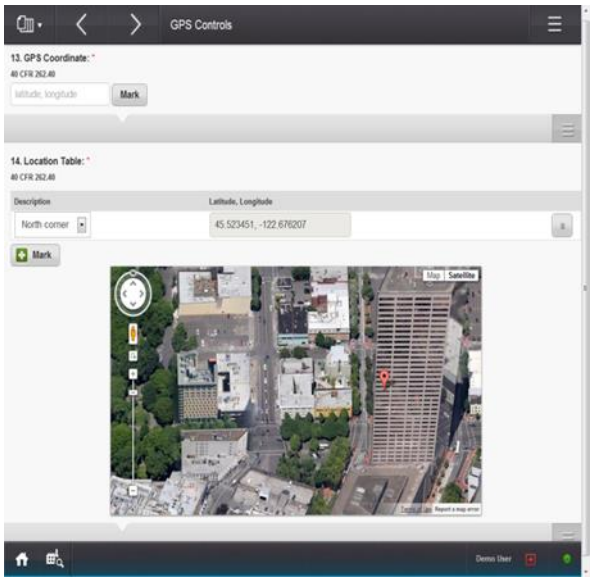
WDS also has implemented a proven approach to submitting data through the Exchange Network to EPA's Central Data Exchange (CDX) for incorporation into **RCRAInfo** for the following RCRA subject areas:

- Handler
- Compliance Monitoring and Enforcement
- Permitting
- Corrective Action
- Financial Assurance

Each of the corresponding modules within WDS was designed with this objective in mind and the MDEQ has been **successfully translating data to RCRAInfo since 2001** (originally flat files).



RCRA Hazardous Waste Mobile Inspections Application and RCRAInfo Data Exchange



In January 2011, Windsor completed a strategic assessment of the agency's Resource Conservation and Recovery Act (**RCRA**) Systems. This effort focused on areas of the waste programs where the greatest potential for agency gain was envisioned. Compliance monitoring activities was a key priority due the redundant data entry processes and poor level of automation. The selected initial system implementation goals were:

- Improve the quality of data on inspections, violations, and return to compliance activities by reducing or eliminating re-entry of data into different information systems
- Reduce the effort (and cost) for inspectors to complete the forms and documents needed for an inspection and return to compliance activities.

Windsor implemented and customized the nSPECT mobile inspection application for the Bureau of Waste Management in the Kansas Department of Health and Environment. The application reduces or eliminates duplicate entry of inspection data and simplifies the workflow process for producing inspection reports.

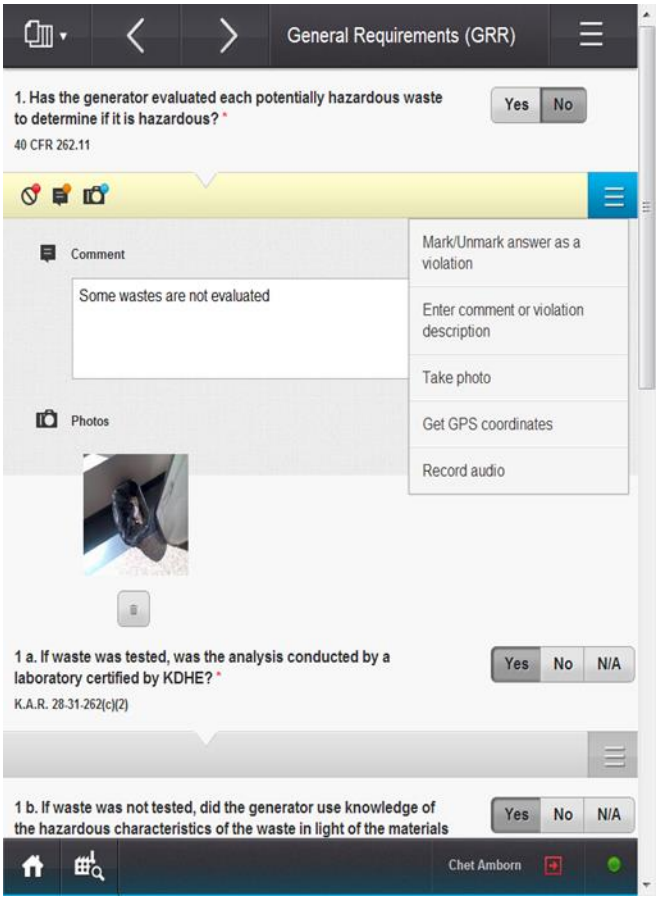
Prior to going on-site for an inspection, an inspector downloads forms and data from a central server to a tablet computer (such as an Apple iPad, Microsoft Windows tablet, or Android tablet). Inspection forms are completed at a facility site regardless of whether or not there is Internet connectivity. When Internet connectivity is available, data from the tablet computer is automatically uploaded and synchronized with the central server.

Inspection requirements checklists are completed by the inspector using a suite of data entry controls for each question. Comments about violations can be entered at the time a citation is recorded or later on the inspector's office computer after the checklist is uploaded to the nSPECT data server server. Multiple checklists can be used depending on the permitted activities at the facility being inspected.

Data on a facility is pre-populated on a "cover page" form from the Department's data system (nFORCE). Comments about the facility, participants involved in the inspection, concerns, record requests, and exit briefing discussions can be entered on the tablet computer or back at the office.

The work involved in completing the inspection is done on an inspector's desktop/laptop computer. The inspector can request that the inspection be reviewed by a supervisor. This moves the inspection into a review queue for either the specified inspector or for a supervisor to grab the next available inspection for review.

nSPECT generates the inspection report for the inspector presenting question responses, violation cited, photos taken and any other data collected by inspector.



When the inspection is completed, the inspector completes it in nSPECT and the data from the inspection is pushed into the nFORCE system (developed by Windsor), creating all the inspection information, citing the violations and storing the inspection report within nFORCE.

Periodically (at least once a month) the inspection data is sent to the USEPA'S **RCRAInfo** system through the Exchange Network (http://www.exchangenetwork.net/), using OpenNode2 developed by Windsor. The automated flow from nSPECT to nFORCE to RCRAInfo has eliminated dual data entry previously employed on the inspection forms to inspection reports to entry into RCRAInfo.

nSPECT has reduced an inspector's work in all three stages of the workflow process—Pre-inspection, on-site inspection, and post-inspection. Performance improvements include:

- Reduce the cost and effort in recording data and preparing inspection report documents
- Reduce the lead time for preparing an inspection report and returning to compliance.
- Improve data quality through the use of standardized, paperless forms for data entry.

This development project was performed using the Agile/Scrum methodology. End-users provided feedback every sprint by interacting with actual running software. Several key features were discovered and added during development by the team.

Vermont ICIS-NPDES Data Flow Implementation Project

The Vermont Agency of Natural Resources (ANR) Department of Environmental Conservation (DEC) manages the NPDES program for the state of Vermont. Windsor has assisted DEC with exchange network data flows including RCRA hazardous waste manifests (eManifest), ICIS-Air, ICIS-NPDES, and DMRs. As a NPDES program delegated state, DEC operates a Waste Water Inventory (WWI) database to track NPDES Permits, inspections, and enforcement actions. For many years, the EPA Region 1 office

maintained DEC's NPDES data in the EPA Permit Compliance System (PCS). When EPA replaced PCS with the modernized ICIS-NPDES System, DEC sought to take over stewardship of their NPDES data at EPA by automating the flow of NPDES data from the DEC WWI database to ICIS-NPDES.

To tackle this transition, DEC contracted with Windsor Solutions, Inc. (Windsor) in August, 2012. Windsor met with DEC staff in Burlington, VT in September to define the mechanics of the automated data exchange and to develop the detailed mapping of data elements from DEC's database to the ICIS-NPDES data format. Over the next three months, Windsor worked in concert with DEC to refine the WWI system to track the data required by ICIS-NPDES and to identify needed improvements to data quality. Windsor also developed a detailed flow design document, describing the mapping of data from WWI to ICIS-NPDES.

To move the data from WWI to ICIS-NPDES, Windsor worked with DEC staff to install and configure the OpenNode2 software in the DEC environment. Windsor installed the ICIS-NPDES flow components, developed the data exchange software to map data from WWI to the ICIS-NPDES format, and initiated submissions to EPA's ICIS-NPDES test environment. Windsor worked closely with DEC data experts to review processing reports, identify issues with WWI data or translation logic, make corrections, and retest. Through this iterative process Windsor and DEC were able to refine the flow in preparation for transition to a production flow.

When the full batch capabilities of ICIS-NPDES went live on December 10, 2012, Windsor initiated the data exchange from WWI to ICIS-NPDES. The transition went smoothly as the data for hundreds of VT NPDES permits began flowing to ICIS. Windsor continued to work with DEC data stewards to monitor and troubleshoot the data exchange for several months following the transition to production. DEC is now smoothly flowing data to ICIS-NPDES and no longer relies on EPA Region 1 staff to maintain their data.

References

As requested by the RFQ, the following client references are provided for DEP's information. Windsor encourages the agency to contact references and learn as much as possible about both the software proposed and the staff who will run the project.

nVIRO References

Michigan Department of Energy, Great Lakes & Environment (EGLE)
MiWaters Project

Sarah Ehinger
EhingerS1@michigan.gov

South Carolina Department of Health and Environmental Control
Agencywide ePermitting System

Leslie Yasinsac
yasinsle@dhec.sc.gov

Wyoming Department of Environmental Quality
WyWaste Project

Steve Girt
steve.girt@wyo.gov

NPDES References

Alabama Department of Environmental Management
NPDES Mobile Inspections Project

Eric Cleckler, ADEM
ecleckler@adem.state.al.us

Wyoming Department of Environmental Quality
WYPDES Project

Steve Girt
Wyoming DEQ
steve.girt@wyo.gov

Michigan EGLE
MiWaters Project

Sarah Ehinger
EhingerS1@michigan.gov

RCRAInfo Data Exchange References

Environmental Council of States General Support Contract

Kurt Rakouskas
Environmental Council of States
krakouskas@ecos.org

Michigan EGLE Waste Data System

Rich Conforti
confortir@michigan.gov

Kansas Department of Health and Environment

Christine Mennicke
Environmental Program Administrator
Bureau of Waste Management
Christine.Mennicke@ks.gov

System Development Life Cycle Requirements

As directed by the RFQ, the vendor awarded this contract must manage the system development using Agile or SCRUM sprints and task backlog prioritization that incorporates information security and privacy considerations. In this section, Windsor describes how we will handle the following requirements as part of the project:

a. Define and document information security and privacy roles and responsibilities throughout the system development life cycle

b. Identify individuals having information security and privacy roles and responsibilities

c. Integrate the organizational information security and privacy risk management process into system development life cycle activities

Role Definition in System Development Life-cycle

For a high level description of the Agile / Scrum processes and methods that Windsor uses to document requirements and define stories within the Agile framework, please refer to the next section, *Project Documentation* below.

Security is an integrated aspect of the nVIRO implementation process. During implementation and configuration of nVIRO for a program, business processes are analyzed, defined and documented based on information gathered during facilitated sessions with program staff. This methodology for capture of requirements for a process drives identification and definition of multiple configuration stories needed to implement the process within nVIRO.

Security and Privacy Roles and Responsibilities

Capture of the various user roles (security) associated with the process and any related security access needs or other privacy requirements is one aspect of the definition process. These security needs are recorded in configuration or development stories as appropriate and added to the project backlog.

For new system development, security and user access to the new capability are also captured in the story. For example, a new system capability may be developed. As part of the development, a new security role may need to be defined to provide the ability to grant this new capability to specific users only. This security requirement is explicitly captured in the story definition and acceptance criteria.

As part of go-live implementation, individual user accounts are created and assigned to corresponding security roles.

Windsor has also developed processes to invite external parties such as permittees/responsible parties to create accounts and associate them with existing permits. The timing of when external parties are invited should be considered as part of the implementation planning process and included in transition planning and external communications.

Organizational Security Risk Management

Given the ability to define security groups and associated roles within nVIRO and to assign named users to one or more security groups, there is significant flexibility within the system to support DEP's desired organization security model.

Since security requirements and role definition is built into the process analysis, any requirements identified that are not supported will be called out as stories and prioritized using the Agile process. Prioritization of stories should include assessment of any organizational security or privacy risks. If identified risks are significant, they should be escalated and tracked as part of the overall project risk assessment.

Project Documentation

This section describes how Windsor will handle the delivery of the following documentation during the course of the project:

a. Business requirements, business process flow diagrams and functional requirements

b. Requirements traceability throughout the project to assure the testing and delivery of all requirements.

c. Client dashboards or reports with project status artifacts, such as burn-down charts or other progress tracking tools

d. Issue logs and defect tracking for quality assurance

e. Post-launch service desk or issue reporting for live production system issues

Business Requirements - Process and Functional

For a discussion of the approach that will be used to gather and assess requirements please see the discussion *Approach Overview: Analysis Phase and Analysis and Planning.* The following discusses the mechanisms for traceability and accountability.

Windsor manages project scope using Agile Scrum principles to prioritize both **software development** and **software configuration** work. The focus on the highest business value activities first, working within the project and program implementation budgets established.

In Scrum requirements are defined in Stories. Stories describe new features or functional changes to accomplish a goal. The stories serve as the main focal point or anchor describing the functional enhancements or changes to be developed. The set of stories identified which have not been developed comprise a 'backlog' that is 'groomed' and prioritized and approved for development in collaboration with the client. Windsor utilizes a software development management tool (JIRA) to define stories and manage the story backlog.

Stories may be defined using multiple techniques including facilitated discovery meetings, high level design meetings, and story review/walkthroughs. Each story contains the documentation necessary to develop and trace the story through the full development life cycle. If the story relates to a high level system requirement, that requirement may also be defined in JIRA and traces established from the requirement to the related story or stories. From a detail requirements perspective, information captured in a story includes:

- Summary - A clear title for the story
- Description - A clear textual description of the story
- Acceptance Criteria - A list (checklist) of criteria that must be implemented and tested
- Supporting Information - Where needed to supplement or clarify the story, images, tables, or document attachments may be included in the JIRA stories. Examples of supporting information may include a flow diagram, user interface wireframes, spreadsheets, or whatever is needed to communicate the requirements.

Software Development Stories

High priority stories are estimated using a rough order of magnitude measurement called "story points" or via a rough estimated hours effort, and an estimate may subsequently affect a story priority. For

example, a high effort / low benefit story will naturally receive a lower priority than a story that is low effort / high benefit. Prioritization also takes into account factors such as risk and development dependencies. High priority stories that have been groomed and approved for development are added to the product backlog and queued for a product release.

Software development sprints are typically two weeks in duration. Stories are moved from the product backlog to the sprint backlog as part of sprint planning. As stories are developed, the story is tracked through statuses representing the development lifecycle (Ready to Develop, In Development, Code Review, Ready to Test, Testing, Done).

Product development stories are delivered in the next nVIRO product release and made available for client testing.

Client specific integration stories that do not require product changes may be developed, tested and delivered for testing independent of nVIRO product releases.

Software Configuration Stories

Windsor also defines software "configuration" stories. Program implementation in nVIRO is focused on implementation of *business processes* within the nVIRO ecosystem. This implementation largely consists of configuration of various components within nVIRO to implement the business process.

Business processes are analyzed, defined and documented during facilitated sessions with program staff. Windsor has developed a methodology for capture of requirements for the process which drives creation of configuration stories needed to support the process.

A simplified example of this is configuration for a permit application process. The permit application process may be comprised of:

- an application form for the specific permit type
- processing rules for the application form (such as routing, deadlines)
- a workflow task template for workflow assignment
- a permit document template for document generation
- permit schedule templates for the permit type
- permit validation rules

Once captured and verified, a process configuration story is created in JIRA with linkages to configuration stories for each of the configuration items (e.g., forms, workflows, templates) that comprise the process.

During configuration, each of the processes configuration stories are developed and tested by Windsor business analysts. As soon has the process has been fully configured and tested, it is made available for process execution review and testing by business users.

Requirement Traceability

As described in *Business Requirements* above, requirement traceability is established with user stories in JIRA. Each story is defined with acceptance criteria and tracked through its development lifecycle to ensure the acceptance criteria has been met. This is standard in all areas of delivery from product development, to client specific custom functionality and integrations, and configuration of business processes. If high level project / system requirements are defined, those requirements may also be defined in JIRA for the purpose of traceability and/or input to prioritization of related/traced stories for development of process configuration.

JIRA is also used to track issues identified with software or any configuration component of the solution.

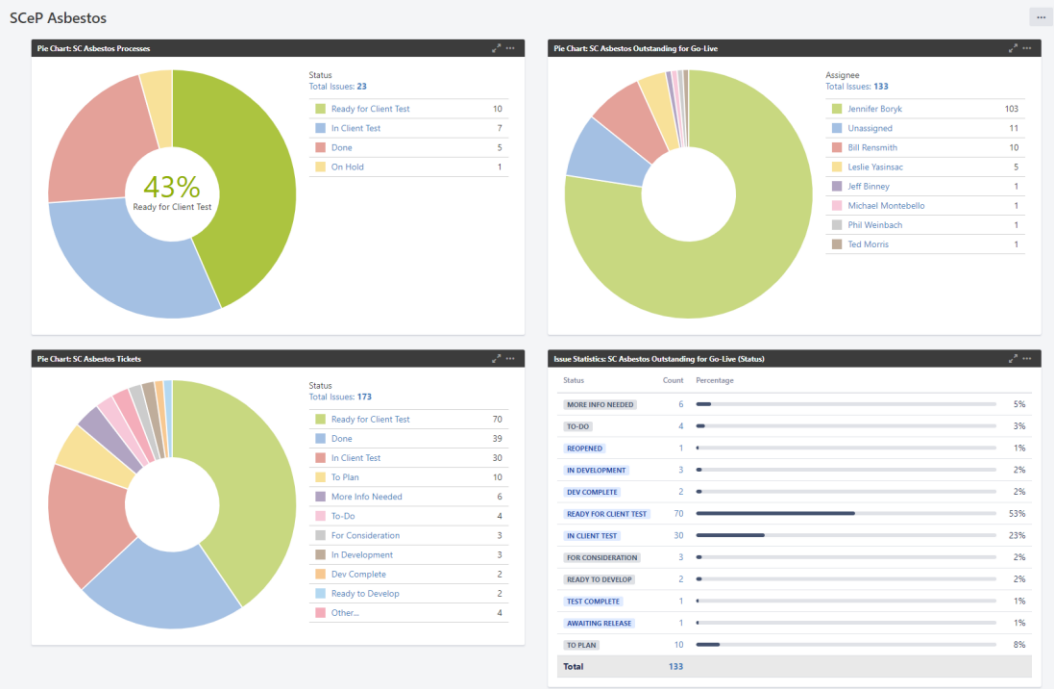
Dashboards and Status Tracking

Windsor uses JIRA to track sprint status for system development as well as configuration development stories and issues.

As a standard part of a program implementation, Windsor establishes tracking dashboards in JIRA to monitor status for the specific program. The dashboards display status of overall process completion, as well as status of the detail configuration stories.

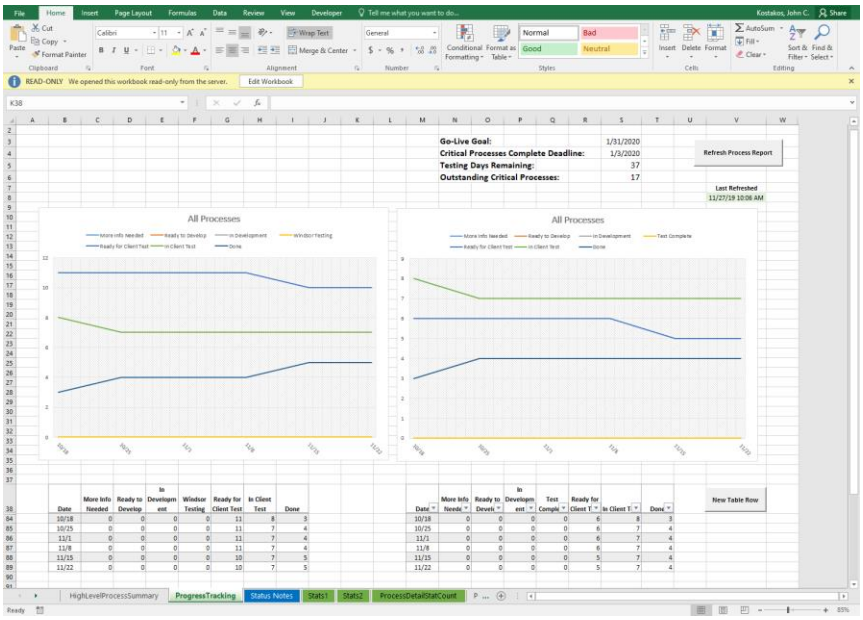
Dashboard widgets provide drill down capability allowing users to drill into and view lists of issues or individual issues. These may be customized to include any type of story, issue, bug, risk or other record tracked in JIRA.

Example Program Process Implementation Tracking Dashboard:



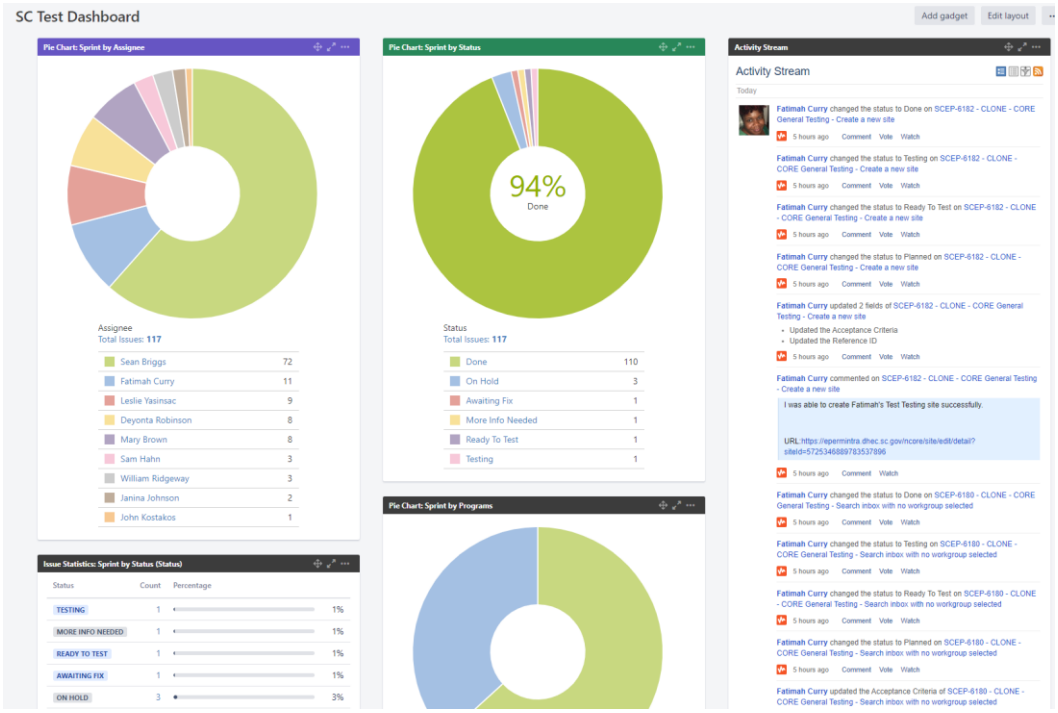
Windsor has also developed a standard progress tracking spreadsheet for program implementation that extracts additional details from JIRA and produces some tracking graphs not supported by JIRA. The spreadsheet is used during weekly checkpoints with the program to review progress (burndown) with users discuss any open issues. This is established at the time the first process(es) are released

Example Process Tracking Spreadsheet:



Windsor has also worked with clients to support independent testing of new software releases. This includes providing access to JIRA to define and track test cases that they wish to execute in a user test environment prior to deploying the new release to production. Release Test Tracking Dashboards have been established to support this effort.

Example Release Test Tracking Dashboard:



Issue Logs and Defect Tracking

Issues and bugs are logged and tracked in JIRA. Issues may be queried based on any JIRA field for review and tracking. JIRA has the ability to prioritize issues and categorize them in a variety of manners so that they may be reviewed and tracked at the appropriate level.

Users are automatically notified (via email) of any updates, comments, or questions on issue they reported or are assigned to. Other users have the ability to 'watch' issues and receive notifications. This greatly enhances timely communications and awareness of issue updates

Post-Launch Service Desk and Issue Reporting

Windsor has implemented Atlassian Service Desk for post-production issue reporting. This integrates with Atlassian JIRA and does not have associated end user licenses fees for issue reporting. Alternately, Windsor could work with DEP to continue utilizing the full Atlassian JIRA Suite.

System Documentation

As part of the project, Windsor will deliver system documentation meeting the following:

a. Secure configuration, installation, and operation of the system, component, or service

b. Effective use and maintenance of security and privacy functions and mechanisms

c. Known vulnerabilities regarding configuration and use of administrative or privileged functions

Configuration, Installation and Operations

Windsor provides documentation of nVIRO functions via its support site. The support site is an online reference that is accessible to all nVIRO users. It includes documentation on online nVIRO configuration options, and server task monitoring.

Specific documentation is also provided for the configuration, installation and deployment of the application for individual clients. This is provided in a customized nVIRO Technical Configuration Guide containing server specifications, initial server configuration, and deploy instructions. Application settings are documented for each environment.

All sensitive application configuration data is encrypted using 256-bit AES encryption algorithms and cannot be accessed by general IT staff.

Fine-grained user permissions allow all data within nVIRO to be secured and accessible to only authorized users.

Maintenance of Security and Privacy functions

See the following section *(End-User Security Documentation)* for an overview of security and privacy functions and mechanisms.

System Vulnerability Assessment

To identify any vulnerabilities, Windsor has worked with clients who have performed penetration testing on-site for their nVIRO implementation. The results of penetration testing were reviewed and analyzed by Windsor architects and either addressed through application / system changes, or identified and concurred with client security architects as false-positives.

With new nVIRO releases, Windsor performs regression testing using various test user accounts with varying security configurations to ensure user access to data or functions has not been affected.

All database access will be locked down to the pre-defined, specific nVIRO application user accounts only.

End-User Security Documentation

End-user security documentation will cover the following:

a. User-accessible security and privacy functions and mechanisms and how to effectively use those functions and mechanisms

b. Methods for user interaction, which enables individuals to use the system in a more secure manner and protect individual privacy

c. User responsibilities in maintaining the security of the system and privacy of individuals

User Accessible Security Function Documentation

Windsor provides documentation of nVIRO functions, including security functions, via its support site. The support site is an online reference that is accessible to all nVIRO users.

The following provides an overview of the security mechanisms and customization capabilities in nVIRO.

Security Management Overview

Security functions in nVIRO can be broken down by user type.

- **Public users** can only access public-facing features such as the Site Explorer and public notice search. These users do not have user accounts in the system and so the user management functions do not apply to them.
- **External users** are those users who need access to the system to work with one or more permitted facilities. Typically, these users are facility owners and/or their representatives, permittees, consultants, etc.
- **Internal users** are staff members of the regulatory agency for which nVIRO has been implemented. Internal users can access different parts of the system according to the security groups and workgroups of which they are members.

User accounts in nVIRO are managed by internal administrators that have the appropriate roles/permissions. Many user-management functions are the same for all types of users, but there are some that only apply to internal users and others that only apply to external users. These differences are noted throughout the text, where applicable.

Public Users

nVIRO provides a number of publicly accessible functions such as Public Notice Search, Public Notice Comments, Complaint/Incident Reporting, and a map based Site Information Portal (Site Explorer). These are publicly accessible and do not require users to create accounts to access the functions.

External Users

External user accounts are created through self-registration--that is, each external user creates the account himself or herself. However, to carry out tasks within the system for a particular site, the user needs to be authorized for that site.

External Users may have one of three roles (authorization levels), each providing a different level of access to a site:

- Viewer - Can view site information but not make changes.
- Editor - Can fill out forms and reports. May require certifier permissions to submit, depending on the form.
- Administrator - Can edit site information, invite other users to join the site, inactivate users, modify user permissions, and request CROMERR “certifier” permission for users.

Users may be granted access to a site in one of two manners: a) invitation from an Internal (Agency Staff) user, or b) invitation from an External Admin User.

Invitation from Internal (Agency Staff User)

If a site doesn't have any external users associated with it, an internal user (with appropriate permissions) can send an invitation to an external user, specifying the user as an Administrator on the site, which enables them to manage access for other external users on the site.

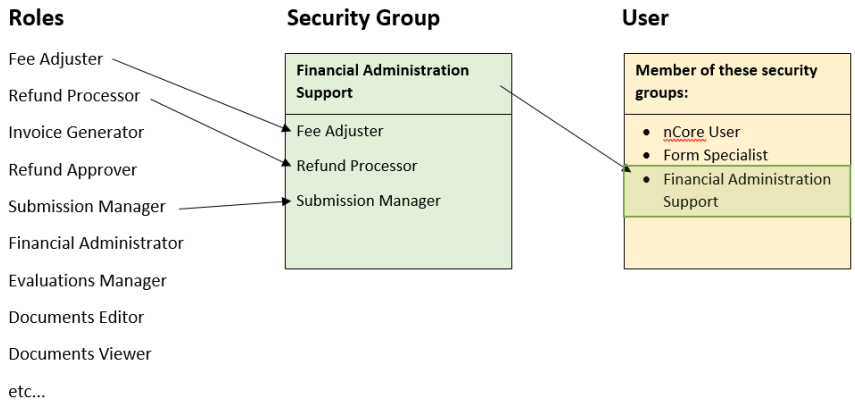
Invitation from an External (Admin) User

An external user with the Administrator role for a site may invite other users to the site and can assign them the appropriate permissions. Those permissions may include Viewer, Editor, or Administrator level access.

Internal Users

Internal user accounts are created by internal users having the appropriate administrative permissions (i.e., Security Administrator roles).

Security groups are the basic structure through which the nVIRO system manages users' ability to access resources and edit data. As shown in the diagram below, the system contains a set of roles, which provide permissions to carry out certain actions in the system. These roles are grouped together in various combinations to create security groups. Users are then added to one or more security groups to provide them with the sum total of the permissions that are contained within those groups.



nVIRO comes built with a default set of security groups. However, these may be modified (adding/removing related roles), deleted, or new security groups may be defined.

Windsor will work with DEP to review the default security groups and assess whether groups need to be modified or new groups need to be defined to address specific program needs. Changes will be defined and tracked as stories in JIRA.

Role Scope and Workgroups

Roles provide different levels of access to specific record types. Workgroup level roles work in combination with user workgroup membership to determine user access.

Role	Permissions
Evaluations - Manager - **Mine**	This permission gives a user access to the active evaluation that he/she is assigned to as the processor or via assigned tasks.
Evaluations - Manager - **Workgroup**	This permission gives a user access to any active evaluation assigned to a workgroup in which they are a member.
Evaluations - Manager - **Global**	This permission gives a user access to any active evaluation in the system.
Evaluations - **Administrator**	This permission gives a user access to any evaluation in the system regardless of status

Depending on the organizational approach most staff would at least be provided access to their own assigned work, and may be provided full workgroup level access. Some organizations may wish to limit workgroup level access to one or two people in a workgroup such as supervisor.

Windsor will work with DEP to review the security group and role definitions to address specific program needs. Changes will be defined and tracked as stories in JIRA.

Confidential Information

nVIRO also has the ability to designate certain types of information as 'Confidential'. This capability exists for any documents and for any Compliance/Enforcement Action. When an authorized user designates something (e.g., a document) as confidential, they become what nVIRO refers to as the 'confidential owner'. As confidential owner, the user may grant access to the item to named users, giving them view, edit, or owner authorization.

User Interaction Methods

User interactions in the system are governed by nVIRO security through a combination of Security Roles (enabled through Security Groups as described above), Workgroups, and Workflow Tasks. These combinations ensure that a user has access to maintain only the data that he/she should maintain.

At the lowest level, a user may be granted access to a particular *record type* (such as a permit application) through a security group (e.g., Application Processor). Access to the *record type* does not necessarily grant the user access to an individual permit application *record*. Access to the application record is granted in a number of ways:

- through *direct assignment* as the 'processor' of the application
- through *assignment of a workflow task* related to processing the application
- through a special 'workgroup' role (e.g., Application Processor - Workgroup), that gives the user access based on membership in the workgroup assigned to the record

- through a special ‘global’ or ‘administrator’ roles

Note that security groups may be configured to include *any* nVIRO role.

Individual Privacy

nVIRO maintains minimal PII data, and that is limited to data that is absolutely necessary for the agency. For user accounts, this includes name, contact information, email address. Access to maintain this information is limited to the individual and users who have Administrator authority. Individual users (user accounts) may maintain their own information.

All data within nVIRO is protected with fine-grained, role-based user permissions which ensure data is only viewable and/or editable by permitted users. Sensitive data, such as user passwords or other sensitive user-identifiable data is displayed using normal “hidden” character web controls.

Secure access by an individual to their account is dependent on whether nVIRO is integrated with third party security services (e.g., AD) and thus the rules/policies for user account creation, password expiration, account locks, etc. may be implemented in a third party application or within nVIRO configuration.

Security Management Responsibilities

nVIRO has built in integration with Active Directory security services for authentication of users and will be configured to work with DEP’s AD implementation. In addition, Windsor will work with DEP to integrate with ERIS for external authentication.

Integration with nVIRO is not anticipated to affect any current DEP user responsibilities for the management of Active Directory accounts. As Windsor is not currently familiar with ERIS, any related user responsibilities will need to be defined as part of the security design.

Maintaining security for users within the application (authorization) is performed by individuals granted security administrator roles. A user with a security administrator role has the ability to maintain user information and grant access through assigning the user membership in one or more security groups.

Security and Engineering Practices

This section describes Windsor's approach to security and engineering practices. Security requirements are addressed within the context of the various areas of system implementation. These may be functional or technical requirements depending upon the driver.

Functional Security Requirements

As part of implementation and configuration of nVIRO for a program, business processes are analyzed, defined and documented during facilitated sessions with program staff. This methodology for capture of requirements for the process which drives creation of configuration stories needed to support the process. This includes capture of the various user roles (security) associated with the process and any related security access needs. These are captured as part of this process and recorded in configuration or development stories.

For new system development, security access for the new capability is also captured as part of a story. For example, a new system capability may be developed that requires definition of a new security role. This security requirement is explicitly captured as part of the story definition and acceptance criteria.

Whether for configuration or new development, the stories progress through the corresponding development lifecycle which includes development, testing and deployment for user testing and verification.

Technical Security Requirements

Technical security requirements may be captured as configuration stories or new stories for development.

Technical configuration stories may address security requirements related to configuration of the application environment including server, database, or communications requirements. Supplementary requirement artifacts such as architecture diagrams may be developed where needed to clarify specific requirements.

If related to a new integration or new system capability, the security requirements are captured in the story description and acceptance criteria. The story is prioritized for development and progresses through the development lifecycle.

Development Security Requirements

All nVIRO development follows Agile methodologies, such as utilizing development backlogs, boards, and prioritized tasks; two-week development sprints; short and early release cycles; code reviews; continuous builds, integrations, and deployments; designated development and QA environments; and strict deployment guidelines and workflows to UAT and Production.

In addition, the nVIRO product and development teams use an integrated set of industry-standard tools such as JIRA, Git, Gitlab, Jenkins, Slack, Visual Studio, etc. for communicating and tracking assets, tasks and issues throughout the SDLC.

Developer Security Testing

As part of the project, Windsor will perform security testing that confirms the required security controls are implemented correctly, operating as intended, enforcing the desired security policy, and meeting established security requirements for the project. This includes the following:

a. Create and implement a security assessment plan

b. Perform unit, integration, system and regression testing

c. Produce evidence of the execution of the security assessment plan and the results of testing

d. Implement a verifiable flaw remediation process

e. Correct flaws identified during security testing

As part of the project, Windsor will perform security testing that confirms the required security controls are implemented correctly, operating as intended, enforcing the desired security policy, and meeting established security requirements for the project.

Security Assessment Plan

As discussed in the sections above, all new features and enhancements to the nVIRO product undergo a security review process with Windsor architects and product managers to ensure that there are no vulnerabilities introduced and to confirm that the proper user access roles and permissions are applied. All code development also requires secondary code review before it can be deployed from development to QA/Alpha. All security issue tracking and management is done using our integration with JIRA during the feature request, development, testing, and deployment phases.

In addition, Windsor, in association with their clients' IT departments, performs periodic security vulnerability testing and scanning of the deployed nVIRO applications using commercial, best-in-class products such as Netsparker for agency hosted deployments. For Windsor hosted deployments, vulnerability scanning would be executed under Windsor's direction by a third-party provider. Windsor would work with the DEP to establish the parameters under which this scanning would be executed, in accordance with the earlier executed NIST assessment.

Windsor also upgrades and patches the underlying frameworks utilized by nVIRO, such as .NET, if any significant vulnerabilities are discovered in those frameworks.

Once nVIRO's new features and enhancements have been reviewed, approved and developed, Windsor has a full and complete QA testing department and distinct testing environments setup and configured to verify functionality and configuration for each nVIRO client. Windsor will work with the DEP to ensure that the security assessment plan is congruent with the DEP's NIST objectives.

Unit, Integration, System and Regression Testing

Windsor follows an Agile-based SDLC and adheres to industry-standard, best-practice development methodologies, which include unit testing, continuous build and deployment, comprehensive feature & issue tracking, and separate QA testing environments for each nVIRO client. This ensures that new features and enhancements added to each nVIRO versioned release work without issue as expected. As part of each nVIRO release, our QA department performs integration and regression testing multiple times over the release cycle to both ensure correct functionality of the applications and to catch issues early so that they can be corrected.

Security Assessment Plan and Testing Results

Windsor's QA department tracks and fully tests all new features and enhancements as part of the process lifecycle defined within JIRA. This includes testing for security or user access vulnerabilities. Each story (or identified issue) is tracked through its lifecycle, which includes testing steps and results to correct issues before release.

Flaw Remediation Process

Any issues or flaws that are found in either UAT or Production would be recorded in Windsor's issue tracking system (JIRA) and prioritized for resolution. These types of issues, of course, adhere to Windsor's rigorous development workflow discussed above for remediation into nVIRO.

Correction of Flaws Identified During Security Testing

Any flaws identified during security testing are prioritized for correction, either during a release cycle or after a versioned release of nVIRO has been deployed. Any flaws or issues that are deemed significant would be fixed with high priority for all released nVIRO products using Windsor's patching mechanisms, and, of course, would be immediately fixed for any code under current development.

Pricing

The following summary of Windsor's pricing is based on the requirements outlined in the RFQ and addenda, including the Q&A. Windsor assumed the same level of support each year (up to 720 hours, to be billed only as utilized by the client).

Price Summary

Lot/Line	Description	Amount $	Note
1	Electronic Epermitting System	$2,903,500	Per Q&A, this line is for initial implementation and customization.
2	Post-launch maintenance period - 12 month post-launch maintenance period after the last features have been deployed. Hours are estimated at 60 hours per month for 12 months for a total of 720 hours. Vendor will only bill for actual hours used.	$114,480	Post-Launch period begins after acceptance and production deployment of the first program.
3	nVIRO Software Suite Enterprise Licensing or Equal - This includes maintenance and support for the first year	$144,000	Annual License Fee: $144,000 (Includes License and patch support for programs specified.) Support: First year support covered in line 2 above
4	Software Support renewal for yr 2	$268,360	Annual License Fee: $151,000 Support: Up to 720 hours @ avg rate of 163/hr = $117,360
5	Software Support renewal for yr 3	$279,240	Annual License Fee: $159,000 Support: Up to 720 hours @ avg rate of 167/hr = $120,240
6	Software Support renewal for yr 4	$290,120	Annual License Fee: $167,000 Support: Up to 720 hours @ avg rate of 163/hr = $123,120
7	Software Support renewal for yr 5	$301,000	Annual License Fee: $175,000 Support: Up to 720 hours @ avg rate of 175/hr = $126,000

Hourly Rates

As requested by the RFQ, hourly rates for both offsite and onsite work are presented in the following table.

Windsor Solutions Resource Type/Function	Regular Hourly Rate	On-site in WV Hourly Rate
Project Manager	$219	$265
System Architect	$219	$265
Lead Bus Analyst	$199	$245
Sr Bus Analyst	$152	$198
Developer	$124	$170
Data Analyst	$152	$198
Business Analyst	$124	$170

Note: Above rate table contains 2020 rates. Rates increase 2% at the beginning of each calendar year.

Appendix A - Product Licensing

This product licensing agreement is for licensing of full nVIRO Suite inclusive of the following applications components:

- nCORE
- nFORM
- nSPECT
- nSITE Explorer
- nVISAGE / Data Hub

License

A **License** covers unlimited enterprise usage for the programs identified below:

- Solid and HW Permitting
- Groundwater Program(s)
- Water and Waste Mobile Inspection and Enforcement
- Environmental Complaint & Comment Intake Management
- Hazardous Waste Mobile Inspections and Enforcement

Up to three instance installations (up to two test and one production).

Expansion to additional programs may require additional Licensing.

Version upgrades

The annual license includes rights to all software version upgrades. Version upgrades contain new or changed functionality and bug fixes.

Emergency Patches

As needed, emergency patches may be provided to address critical production issues. The annual license includes rights to all emergency patches and deployment scripts. Client must keep up to date (within two production releases) to receive emergency patches.

Termination

Failure to renew the annual license will not terminate product use. However, if annual license is not maintained, to obtain future upgrades, the licensee must back pay annual license fee(s) from the date of license expiration, plus any additional Windsor effort (at Windsor Standard Rates) to support multi-version upgrades.

Exclusions

A license is specific to the software rights as stated above.

Maintenance or support for activities such as testing, troubleshooting, licensee specific application configuration, release packaging, release or release patch deployment, or training may be covered by a separate Maintenance and Support agreement.

License Fee

License fee is to be paid prior to effective date each year.

Year	License Fee
Year 1	$144,000
Year 2	$151,000
Year 3	$159,000
Year 4	$167,000
Year 5	$175,000

Appendix B – Staff Resumes

John Kostakos, PMP

Project Manager

Employment History

Project Manager, Windsor Solutions, Inc.
2013-present
Project/Account Manager, Hewlett Packard Enterprise Services (via acquisition from: EDS, Saber, Covansys, Claremont Technology Group)
1993-2013
Development Lead, Perot Systems
1990-1993
Systems Engineer, Electronic Data Systems (EDS)
1986-1989

Education

B.A. Economics – University of Washington, Seattle
1985

Achievements

PMI Project Management Professional (PMP); Agile Scrum – Certified Scrum Master; Rational Unified Process - Certified Consultant

About John

John is a PMI certified Project Management Professional (PMP) and Certified ScrumMaster (CSM) experienced in successfully delivering mission critical enterprise applications for a diverse range of clients and industries. His exceptional leadership capabilities and hands-on skills span all aspects of System Development.
John has extensive project management experience with a focus on scope management, risk management, and cost control to ensure on-time, on-budget delivery. He has a wide-ranging development background spanning requirements management; business process and data modeling; application design and implementation. In addition, John is skilled in defining and implementing Agile as well as incremental/iterative system development processes to improve project delivery and ensure product quality.
John possesses strong oral and written communication skills and is adept at interacting with staff and management at all levels of corporate and client enterprises.

Key Projects

nVIRO Product Manager	*Windsor Solutions, Inc.* *2016 - Current*
nVIRO Agencywide ePermitting Project Project Manager	*South Carolina Department of Health and Environmental Control* *2016 - Current*

nVIRO MiWaters *Project Manager*	*Michigan Department of Environmental Quality* *Water Resource Division* *2013 - Current*
nVIRO Construction Stormwater	*Indiana Department of Environmental Management* *2019-2020*
Next Generation Tax System *Project Manager*	*Washington Employment Security Department* *2008-2013*
ORION Retirement System	*Oregon Public Employee Retirement System* *2005-2008*

Detailed Project Descriptions

nVIRO Product

Windsor Solutions
Product Manager: 2016-Current

John is the product manager for development and implementation of nVIRO – Windsor's enterprise permitting and compliance solution. nVIRO is a highly configurable product providing full integration of permit, compliance, and enforcement functionality across regulatory programs. It is integrated with nFORM to provide dynamic form design and entry for the permitting process, and nSPECT for mobile inspections. John's responsibilities include planning and managing nVIRO release activities based on Agile/Scrum process framework. As the Product Manager, John is responsible for establishing and driving the product vision, strategy and, in collaboration with nVIRO clients, defining the product roadmap that is used to inform the Product and Sprint Backlog.

Agencywide ePermitting System

South Carolina Department of Health and Environmental Control (DHEC)
Project Manager : 8/2016 - Current

John is project manager responsible for implementation of Windsor's nVIRO family of applications (ePermitting, Inspections, Compliance) across all of DHEC's Environmental Bureaus (Air Quality, Environmental Health, Land and Waste Management, Water, Ocean and Coastal Resource Management).

- Led the Gap Analysis and Planning phases for the project to identify customization and configuration needs and plan implementation.
- Currently directing activities to implement the system for 40+ environmental programs.

Regulatory ePortal

Indiana Department of Environmental Management
Product Manager: 9/2018 - 5/2019

John provided project management oversight for implementation of nVIRO for Indiana's Construction Stormwater program. This was a pilot production implementation with Indiana, laying the foundation for future program implementations in nVIRO. Project scope included multiple integrations including integration with federated identity management (Microsoft Azure AD and AD B2C) for both internal and external users, online payment vendor, and GIS; as well as nVIRO configuration and data conversion to support Construction Stormwater.

MiWaters

Michigan Department of Environmental Quality - Water Resources Division (WRD)
Project Manager : 7/2013 - Current

John led a large system development (MiWaters) that consolidated and replaced over 25 existing systems used by WRD, bringing consistency to permitting and compliance processes. MiWaters (the initial deployment and foundation of the nVIRO software) significantly enhancing WRD's capabilities through advanced technologies (e.g., GIS, mobile inspections), enhanced public access to information, and improved data integrity.

- Led project startup including development and acceptance of all project plans
- Directed requirements phase, establishing requirement review and analysis process, workflow design, user story identification and requirement traceability
- Defined functional design method including user interface prototyping and functional design specifications for DEQ review and approval.
- Established incremental delivery approach based on Agile/Scrum, resulting in design, development, test and delivery of nine pre-production application releases to DEQ over the course of 15 months.
- Led team in successfully planning and executing the production implementation.
- Managing ongoing application maintenance and enhancements

Next Generation Tax System

Washington Employment Security Department
Project/Account Manager : 7/2008 – 5/2013

- Responsible for $24M services contract to develop a custom Unemployment Insurance Tax System, replacing aging legacy mainframe and subsidiary applications with an integrated .Net application.
- As Account Manager, responsible for contract management, project financials, change controls, and customer relationship management.
- As Project Manager, responsible for project planning and execution, issue and risk management, and performance reporting to Project Sponsor and Steering Committee.
- Created Project Management Plans including processes for issue, risk, and requirements management, and change control.
- Established requirement management plan including project life-cycle requirement traceability.

- Created and maintained estimation models and developed schedule for project planning efforts.
- Defined and implemented iterative and incremental development strategy based on Agile Scrum.
- Directed completion of major deliverables including System Requirements, Architecture Design, Software Components, and Data Conversion.
- In Development Manager role, responsible for all NGTS development. Led development teams to successfully deliver software components for multiple project iterations on time and on budget.
- Created scope document and schedule generation tool for development iterations, and developed an internal time tracking system for earned value management.
- Other concurrent responsibilities include personnel management (hiring, goal setting, mentoring, performance evaluation) and serving as Retirement and Labor representative to SLED Delivery "Centers of Excellence".

"ORION" System

Oregon PERS
Project Manager : 2005 - 2008

- Managed multiple implementation stages of $17M project to replace a mainframe retirement system with a custom Java EE based system.
- Worked in collaboration with the Oregon PERS executive team to steer the successful implementation of three major project stages.
- Established a quarterly maintenance/enhancement release approach and led implementation of over a dozen releases concurrent with major project stage development.
- Established Project Management Plans and directed implementation of supporting processes. Implemented Requirements Management approach and traceability for contractual requirements from project initiation to system implementation.
- Managed ongoing contract changes and amendments for customer-requested enhancements to the implemented system.
- Provided weekly status to the Oregon PERS Executive Management and the Project Steering Committee.
- Implemented an earned value management approach and tracking system to gather weekly progress updates from team members and update the project schedule.

HB2020 Project

Oregon PERS
Project Manager : 2003 - 2005

- Assumed management for the final phases of a Retirement System application framework customization project at Oregon PERS that supported a new retirement plan established by the Oregon State Legislature. This project formed the foundation for the ORION system implementation that followed

- Led implementation of Membership and Benefit functionality for the new plan.
- Established support desk for transition of employers to web-based wage reporting and implemented employer problem tracking system and associated procedures.

Transmission Reservation System

Bonneville Power Administration
Requirements Manager/Business Analyst : 2002

- Led team in the definition of Use Cases, Business Rules, Business Object Models, and User Interface Prototypes.
- Defined requirements management process and traceability guidelines.
- Established use of Rational tools for managing requirement specifications and traceability.

Insurance Management System

TruePaws
Requirements Manager : 2001

- Established use case requirement methodology for this insurance subsidiary of Banfield Pet Hospitals. Improved requirement clarity and precision through effective use of modeling tools and traceability between requirements and functional test cases.

Pension Administration System

Oregon PERS
Project Manager : 1998 - 2001

- Successfully delivered $7 million multi-team project encompassing business process reengineering, requirements definition, enterprise architecture definition, technical framework development, application proof of concept, client knowledge transfer, and software selection.
- Responsible for project planning, delivery, financials, vendor coordination, and staffing.
- Implemented the Rational Unified Process (RUP) as software development methodology, introducing incremental / iterative development techniques.
- Directed architecture infrastructure proof-of-concept to create a J2EE compliant programming framework, and validate integration with workflow and imaging systems.
- Led project steering committee meetings with client executive management to manage project progress, risks and issues.
- Defined winning proposal and statements of work leading to $5.5 million project and follow-on work.

Shop Floor Control System (COLT)

Merix Corporation
Project Manager : 1996 - 1997

- As Senior Manager, planned and coordinated project development, testing, training and support.
- Responsible for on-time delivery and implementation of the system.
- Led a team of 25+ consultants and client staff to design, develop, test, and implement a mission critical shop floor control system that facilitated expansion of plant capacity for printed circuit board manufacturing.
- Worked closely with business managers and IT to plan and coordinate training of over 500 employees and system roll-out at the manufacturer's largest production facility.
- Established help desk to support 24 x 7 manufacturing operations following initial deployment.

Multiple Projects

Oregon Department of Environmental Quality
Account/Project Manager : 1993 - 1996

- Served as designer/developer, project manager, and ultimately account manager for multiple custom development projects.
- Responsible for project planning and cost estimation, cost tracking, system design, development, implementation, technical support, and staff.
- Planned and led design, development, data modeling, data conversion, and implementation of a system to manage air quality permit processing and permit information.
- Led design and development of an Invoicing System for a state environmental agency that removed backlog and reduced invoicing cycle time from 2 weeks to 2 days.
- Adapted Information Engineering methodology to include rapid prototyping methods, resulting in higher initial development quality and increased client satisfaction.
- Transitioned agency's IEF development from a green screen to a multi-tier client/server architecture, enabling reuse of business components and increasing system usability.
- Designed and constructed significant components running on client and server platforms.

Practice Review System

Value Health Sciences
Application Architect/Development Lead : 1990 - 1993

- As development lead, directed application design and construction efforts for rule based clinical expert system used to scrutinize health claims and determine appropriateness of payments.
- Initiated first use of the Information Engineering Methodology and IEF CASE tool at Perot Systems

- Completed detailed design and construction of core system components in IEF for two major releases of the product. Developed rule engine firing logic for clinical modules in Microsoft C.
- Ported programs from Microsoft C to SAS/C in MVS.
- Integrated with IEF components in OS/2, MVS batch and CICS environments.

Claims Processing System

Emerald Healthcare
Team Lead：1989 - 1990

- Planned and coordinated installation of data center hardware, software, power, and communications to support an AS/400-based claims processing system for a remote client.
- Directed Dallas support team activities including all system operations, maintenance, enhancements, and run-time improvements.
- Identified application performance bottlenecks in nightly claims process, reducing execution time from 6 hours to 10 minutes.

Strategic Banking System

Electronic Data Systems
Systems Engineer *:* 1987 - 1989

- Designed and developed pc based applications used to specify system customization for a large banking system being developed by EDS (Strategic Banking System).

Steve Rosenberger

Project Advisor

Employment History

Consultant, Windsor Solutions, Inc.
1999-present

Senior Consultant, Emerald Solutions, Inc.
1998-1999

Business Systems Analyst, City of Portland Bureau of Environmental Services
1997-1998

NPDES Pretreatment Permit Manager, City of Portland Bureau of Environmental Services
1994-1998

Education

B.Sc. (Honors) Biology, with concentration in Ecology – James Madison University, Harrisonburg, VA
1991

About Steve

Steve brings a combination of both information systems development skills and extensive experience working with, and for, government agencies. Steve is a project manager with deep business analysis and systems design skills and possesses a strong background in the use of facilitated workshops to capture business requirements, and with the knowledge and perspectives needed to understand regulatory program analysis and implementation.
Steve has been instrumental in many software development projects as a project manager and systems analyst responsible for all aspects of successful delivery. His skills include planning, resource planning and management, business area analysis, data modeling and requirements gathering, documentation, systems design and development.

Key Projects

nSpect Mobile Inspections Product *Product Owner*	*Windsor Internal* *2012-Present*
Waste Data System Redevelopment *Project Manager*	*Michigan Department of Environmental Quality* *2009-2011*
Integrated Hazardous Waste System *Project Manager*	*New York Department of Environmental Conservation* *2006-2011*
Facility Profiler and Exchange Network *Project Manager*	*North Dakota Department of Health* *2005-2008*

Detailed Project Descriptions

nSpect Mobile Inspections product

Windsor Solutions
Project Advisor/Product Owner : 2012-Current

Steve is the project advisor and product owner for development and implementation of nSpect— a mobile inspections product for Windsor Solutions. This is a second generation system that is based on the Mobile Inspections application developed for KDHE in 2011. A mobile device (e.g. iPad) records inspection data in the field—even when no Internet connectivity is available. This application uses the latest technology and interfaces with the GPS and Camera capabilities on the mobile device. nSpect can be internally hosted by an Agency, or Windsor can host the application in the Windsor Cloud. nSpect has robust support for the two-way integration of data between a customer's data management system and the nSpect tool.
Steve's responsibilities on this project included project planning based on the Agile/Scrum methodology. Additionally, being the Product Owner Steve is responsible for driving the product vision and defining requirements that are used to create the Product Backlog. Steve is also responsible for all marketing and promotional efforts for the product.

Waste Data System (WDS) Redevelopment

Michigan Department of Environmental Quality (MDEQ)
Project Manager : 2009-2011

Steve has served the as project manager to redesign and migrate the State of Michigan's integrated hazardous waste information system. Steve and Windsor developed the first release of the system in 2000.
This project was largely scoped to migrate WDS from a legacy client-server architecture to a web-based intranet application employing a Microsoft .Net / SQL Server architecture. In addition the project addressed the integration of several public facing inquiry web applications, into the single application, facilitating client use and technical support of the application.

This application manages the full scope of the RCRA program (Handler, CME, Permitting, Corrective Action, BRS, Financial Assurance), in addition to managing data for the Solid Waste, Recycling, Scrap Tires, and Transporter programs for the Waste and Hazardous Materials Division of the Michigan Department of Environmental Quality (MDEQ).

Integrated Hazardous Waste System Development

New York Department of Environmental Conservation (DEC)
Project Manager : 2006-2011

Steve served as project manager to design and build an integrated hazardous waste information system to replace the variety of existing systems currently in place. The overall scope of the integrated system was broken down into a series of releases, each of which addresses the needs of a specific functional area of the system, for example, manifests, special assessments, annual reports and regulatory fees The redeveloped system utilizes a Web-based, n-tier J2EE architecture, including a highly flexible, database-driven data validation component.

Information Management Assessment Project

Bureau of Pesticides Management(BPM), New York Department of Environmental Conservation (DEC)
Project Manager : 2008-2009

Steve served as a project manager to the Bureau of Pesticides Management in their effort to perform an assessment of the current information systems and processes that are used to support various aspects of the pesticides management program. These focus areas included:

- Certification and training of pesticide applicators.
- Processing pesticide business/agency registrations and commercial permits.
- Inspection of the regulated pesticide community.
- Coordination of pesticide compliance and enforcement issues with NYSDEC regional offices and the United States Environmental Protection Agency.
- Reviewing and issuing permits of the application of Aquatic Pesticides.
- Reviewing and processing pesticide product registration applications.
- Administrating and implementing the Pesticides Reporting Law and the associated Pesticide Reporting System.
- Providing technical analytical chemistry support to all Division program areas.

From this effort an *Information Management Assessment Report* was produced. The assessment described the current business processes and corresponding legacy information systems of the BPM. From this a vision was developed for the future Bureau of Pesticide Management System (BPMS), based upon the expressed Bureau objectives, information needs, and desired system capabilities. From this vision of the BPMS, future workflows were developed to illustrate the manner in which the BPM would execute pesticides management in the future.
A subsequent *Implementation Plan* was developed which presented a phased approach to guide the Bureau in the realization of its vision. The assessment and implementation plan were very well received by the Bureau and the Department's executive office. The organization is currently seeking funding to proceed with the implementation plan.

Brownfields and Groundwater Program Requirements Analysis

New York Department of Environmental Conservation (DEC)
Project Manager : 2005-2006

A new law promulgated by the New York State legislature requires this agency to establish a geographic information system that incorporates information from various sources to support the remediation and protection of groundwater resources across the State.
Steve was responsible for managing the Windsor team appointed to conduct a comprehensive assessment of the needs for the new system and to develop a detailed plan for its implementation. This project included; the development of a vision for the new system which articulated the high-level functionality that must be provided, a comprehensive needs assessment using a series of joint design sessions conducted with the various staff tasked with implementing the program, both within the Department and at partner agencies, and finally a series of meetings to agree the appropriate actions that needed to realize the identified information and functional needs of the system and to develop a detailed plan for the implementation of the new system. All of these activities required intensive facilitation of large groups of stakeholders and careful consensus building.
At the conclusion of the project, a detailed implementation plan was delivered which is now being used by the Department to direct a multi-year information management effort to meet the needs of the new law.

Facility Profiler and Exchange Network Node Implementation Project

North Dakota Department of Health
Project Manager : 2005-2008

The North Dakota Department of Health (NDDoH) has contracted the services of Windsor Solutions to implement the State co-developed Facility Profiler (FP) system. The FP system is a data warehouse that stores and aggregates facility data from source environmental management databases. The system consists of two applications:

- A web inquiry system used to query facility data by key data points with associated integration to GIS capabilities.
- A web based data reconciliation application that is used to identify and reconcile duplicate facilities. In addition this application serves as the general data administrator interface to the application.

Steve led this analysis and implementation project which included: customization of the application for the NDDoH's needs, analysis and development of custom extraction and transformation routines specific to NDDoH's source systems, integrating the application with ND GIS infrastructure, implementation of the FP system as well as installation of an Exchange Network node and associated exchange of Facility Registry System (FRS) data.

Facility Profiler Expansion- Compliance Monitoring and Enforcement (CME) Warehouse Implementation

Michigan Department of Environmental Quality (MDEQ)
Project Manager *:* 2004 – Present

The FP Implementation project for MDEQ was very similar in scope to the NDDoH project, with regards to facility data. However, in addition MDEQ requested that an additional

module be added to the warehouse consisting of cross programmatic CME data; thereby providing the State integrated access to Facility and Compliance data.
Steve led the effort to not only implement the facility portion of the FP application, but also the CME warehouse conceptualization design, build, and implementation effort. The challenging portion of this project involved gaining a common understanding, language and representation of CME data. This is challenging because compliance process radically differ across the agency. To accomplish this each division's compliance processes and data management approach were assessed in depth and a common model was developed. Custom extraction transformation and load routines were then developed to transform the source data to the common model. Significant changes to core FP functionality and data presentation screens had to be implemented to accommodate the new module. A key accomplishment identified by the MDEQ Team members is the rapidity at which Windsor formulated and implemented a solution, to a problem that MDEQ had been struggling with for a long period of time.
Steve is currently managing the effort to upgrade the MDEQ to the latest version of the application which includes significant enhancements in GIS technologies including BING maps and ESRI integration.

Data Warehouse Project

Clackamas County, Water Environment Services
Project Manager : 2004-2009

Currently, Clackamas County Water Environment Services (WES) maintains many disparate data systems containing a broad scope of information including environmental, laboratory, financial and operations data. WES realized that the full potential of their data systems is not being achieved and determined that building a data warehouse to aggregate, summarize and centralize key information would provide tremendous benefit.
Steve led the WES department-wide data integration project which was in essence two projects. The first project was a needs assessment and scoping exercise which identified near and long term integration projects. Building on the first project, the second project resulted in the detailed design, construction and implementation of a simple to use integrated data access system.
The project began with an information needs assessment, followed by an in-depth evaluation of WES data systems performed in conjunction with staff interviews. Based on the findings from these activities, it was determined that the most appropriate first project would integrate monitoring data from four source systems into an initial proof of concept data warehouse. Following the successful completion of this task, it was recommended that future phases would include adding interactive mapping capabilities, then integrating financial data and lastly, operations and maintenance data. These phases continued on a yearly basis for the next several years.

RCRA Network Exchange

Environmental Council of States (ECOS)

Project Manager *:* 2004 - 2009

Steve led a project which was tasked with defining the processes and data flows that are used by States for submission of data to the RCRAInfo, the national hazardous waste information system, maintained by EPA. This flow data was implemented using XML structure data, and web services technologies to affect the communication and exchange of information. This effort replaced the older, manual, flat file data exchange with new automated Exchange Network processes and protocols, significantly reducing the overhead for State implementers. The Exchange Network is a "new approach for exchanging environmental data between EPA, States, and other partners that uses the Internet and standardized data formats. The Exchange Network consists of data exchanges between 'nodes' or portals maintained individually by participating partners (initially envisioned as State environmental departments and EPA). Once established, these data exchanges replace and complement the traditional approach to information exchange that currently relies upon States feeding data directly to multiple EPA national data systems"
During this effort Steve developed the *Flow Configuration Document* and the *RCRAInfo Data Submission Overview and Challenges,* both based on his extensive experience integrating with RCRAInfo, under contract with the State of Michigan.
Due to Steve's extensive experience with RCRAInfo and the Exchange Network, he was asked to continue to serve on the project as ECOS' representative for RCRAInfo flow support. In this role Steve has provided advice and guidance to the different States that are bringing the RCRAInfo flow on-line and providing guidance to EPA in their efforts to migrate flow responsibility to be under their purview.

Trading Partners Agreements

Environmental Council of States (ECOS)
Project Manager : 2004

Steve led an effort for ECOS to evaluate the effectiveness and over-all approach and implementation of Trading Partner Agreements for the National Environmental Information Exchange Network (Exchange Network) www.exchangenetwork.net. The project engaged a variety of stakeholders at a national level to fundamentally address the challenges that trading partners were experiencing when entering into data trading relationships. As a result of these efforts a more refined and applicable approach to developing data sharing relationships was developed.

Docket Management System Project

Washington Department of Ecology
Project Manager : 2003

Steve managed an engagement at Ecology for the systems and business process analysis and design for a new integrated Docket Management System. This project involved the facilitation of a diverse business team through requirement gathering, process analysis through iterative system design. The system is being used by a wide variety of programs

within Ecology, and necessitated skilled facilitation to seek common ground to arrive at a system design that would work for all parties while addressing the key business needs of the agency.

Natural Resources Portal Project

Washington Interagency Committee for Outdoor Recreation (IAC)
Project Manager *:* 2003

Steve managed an engagement with the IAC to build a natural resources portal supporting water quality and Salmon recovery information. This project is a multi-agency effort with the objective of implementing a web portal to be used by organizations in sharing data relevant to Washington State salmon recovery efforts. The organizations have realized that this data is housed in multiple locations, requiring significant effort to research and locate the needed data. The portal is a "one-stop" location to search for and access this information. The Portal provides graphical, simple textual and advanced query interfaces to facilitate the identification of desired information. The portal is available to the public through the States' Access Washington portal as of July 1, 2003.

Integrated Hazardous Waste System Project

Michigan Department of Environmental Quality
Project Manager：2000-2003

Steve served as a Project Manager and systems analyst for this project to design the integrated division-wide data model, and develop an integrated, data entry and reporting system. This information system supports multiple program work groups located at 10 different offices across the state. The system manages information for multiple environmental regulatory programs including:

- Hazardous Waste - Permitting and Corrective Action of Treatment Storage and Disposal facilities, generators and transporters regulated under the provisions of the Resource Conservation and Recovery Act (RCRA), and Hazardous Waste Transporter Manifests
- Solid Waste - Permitting of solid waste disposal facilities, groundwater monitoring, and financial assurance
- Scrap Tires – Transporter registrations, clean-up grants, and financial assurance
- Groundwater Discharges-Permits, Permit Limits, and Discharge Monitoring
- Compliance Monitoring and Enforcement - Manages cross program compliance monitoring activities for the entire Division, allowing for the tracking of evaluations, violations, enforcement actions and judicial cases.
- Hazardous Waste User Charge Invoicing – Automatic generation of user fees, assessed based on a broad complex data set. System then interfaces with agency's financial systems to share necessary information for accounting and legislative reporting

Utilizing the Rational Unified Process (RUP) for requirements analysis and systems development, the project emphasizes an iterative approach to developing software by

acknowledging that new requirements are identified or requirements change throughout the development lifecycle.
Requirements gathering workshops were conducted to develop business use cases, an Entity Relationship Diagram (ERD) and data dictionary and extensive prototyping was employed to develop a design that meets the specific functional needs, utilizes the right technology, and meets the DEQ's budgetary goals.
The first release of the system was implemented in mid-2001, and includes a client-server application that has been streamlined to ensure efficient data entry. For information retrieval, an Internet browser-based system has been developed to allow the user to dynamically access the many dimensions of their data. Functionality developed in the Web-based solution can then be leveraged in the development of a public access system. Due to the success of the system with the Hazardous Waste program the scope of the project was expanded to integrate additional regulatory programs and was implemented in June of 2002. Automated routines were developed for translation of complex data in the areas of: Compliance Monitoring and Enforcement, Permitting and Corrective Action and Biennial Reporting to EPA National Data Repository in October of 2002.

WIN/INFORMED Program Area Analysis

South Carolina Department of Health and Environmental Control
Analyst *:* 1998-2002

Steve was responsible for business analysis and reengineering tasks as part of a team charged with fundamentally reassessing the needs of environmental agencies for information to support the implementation of the Resource Conservation and Recovery Act (RCRA). Government environmental agencies involved in the project include the Environmental Protection Agency headquarters and regional offices and all national State environmental agencies. The project objective is to redesign the way in which the RCRA program collects and uses information about hazardous waste generation and management from the regulated community, to enable the program to meet its goals in an efficient and comprehensive way. Tasks include project planning, facilitation, business process analysis and reengineering, design and impact assessment data modeling. Responsible for reconciling competing and/or incompatible information needs for all state and EPA program implementations, with the ultimate goal of a nationally available RCRA data repository, for the facilitation of individual program needs.

Multiple Projects

City of Portland Environmental Services, Industrial Source Control
Business Analyst *:* 2997-1998

Steve was a Business Analyst/User Team Lead- involved in development of an industrial wastewater information system for the support of Portland's authorized pretreatment program. Functionality developed and implemented includes: A) Reporting requirements for permitted industries, B) Application of general and permit specific discharge limitations, automated violation notification with degree of magnitude calculation for discharge as well as

reporting violations, C) Rolling quarter significant non-compliance (SNC) calculation, D) Program wide reporting for day to day implementation, as well as Annual Reporting for submission to state regulatory program (Oregon Department of Environmental Quality ODEQ) E) Integration with third party laboratory information management system (LIMS).
As lead analyst, Steve's responsibilities included analyzing reengineering and documenting current business practices and requirements documentation for use by developers and DBA. Defined rules for data scrubbing for initial and ongoing data integration from LIMS application. Designed reports and wrote SQL for the majority of the division's reports.

Multiple Projects

City of Portland Environmental Services, Industrial Source Control
Permit Manager *:* 1994-1998

Steve was an Industrial Wastewater Permit Manager responsible for the environmental compliance of > 25 industries under the City's pretreatment program. Duties included frequent inspections of the processes and pretreatment systems, regulatory analysis and interpretation of applicable rules (40 CFR 403) for the classification of industries, permit development, identifying discharge parameters and scheduling for both city and self-monitoring events, as well as user specific limitation development. User specific limitations were developed through analysis of wastewater treatment plant capacity and headworks loading. Additional responsibilities included pollution prevention activities, as well as interface and co-inspection outreach with other regulatory programs such as industrial storm water as well as the Pollution Prevention program.

Bill Rensmith

Project Manager/Analyst

Employment History

Consultant, Windsor Solutions, Inc.
2004-present
State of Michigan, Department of Information Technology
2000-2004
Professional Technical Development
1999-2000

Education

B.A. – The Eli Broad College of Business Michigan State University, East Lansing, MI
1999
Associates Degree (Honors), Electronics Engineering Technology – ITT Technical Institute
1995

Achievements

Recognized by Michigan DEQ director Steven Chester for publishing an online directory of contacts responsible for enforcement of Michigan environmental laws and rules. 2004
Nominated for EPA Exchange Network Workgroup to represent Michigan on a US EPA workgroup developing standards for environmental data exchange using XML web services. 2003
Special Service Award from the Director of the Michigan DEQ, Surface Water Quality Division for outstanding dedication, performance and contribution. 2003
Recognized as a top trainer with Professional Technical Development. Consistently earned highest performance ratings on course evaluations. 2000

About Bill

Bill is the Technical Implementation Lead for all nVIRO projects and one of the nation's leading experts on Exchange Network technology and data exchanges. He has designed and implemented multiple data flows. He has been a key participant in the Exchange Network governance Network Technology Group (NTG) as a technical advisor. He was the key author and a significant contributor to the overall standards currently in practice with the Exchange Network including the Exchange Network XML Design Rules and Conventions (DRCs) and the Exchange Design Rules and Conventions (EDRCs).

In addition to his involvement with the Exchange Network governance, Bill has a long list of experience developing and implementing nodes and flows for Exchange Network partners including Minnesota PCA, Colorado DPH, Arkansas DEQ, Illinois EPA, and the Pollution Prevention Resource Center (PPRC) in Seattle.

Bill also has extensive experience in the water quality regulatory realm, stemming back to his tenure as a programmer/analyst for the Water Quality Program at Michigan DEQ. Since that time, Bill has designed, developed and implemented numerous NPDES data management systems, e-DMR software, surface water quality data systems, and water sampling systems for several state and county environmental agencies nationwide.

Key Projects

ICIS-NPDES XML Exchange *Project Manager*	*Arkansas Department of Environmental Quality* *2008*
ECOS Exchange Network Gen'l Support *Project Manager*	*Environmental Council of States* *2009-present*
Water Quality Assessment Reporting *Project Manager*	*Montana DEQ* *2013-2014*
MiWaters *Lead Business Analyst and Functional Team Lead*	*Michigan Department of Environmental Quality* *Water Resource Division* *2013 - Present*
Agency-wide ePermitting System *Lead Business Analyst and Functional Team Lead*	*South Carolina Department of Health and Environmental Control* *2016-Present*
Agency-wide Complaints Management System	*Oregon Department of Environmental Quality* *2018-2020*
Bureau of Water ePermitting System *Lead Business Analyst*	*Kansas Department of Health and Environment* *2019-present*

Detailed Project Descriptions

Bureau of Water ePermitting System Lead Business Analyst

Kansas Department of Health and Environment
Lead Analyst: 2019 - Present

Bill is currently working with the Kansas Department of Health and Environment (KDHE) to implement the NPDES wastewater and Stormwater programs into Windor's comprehensive enterprise agency management software, nVIRO. The system, named the Kansas Environmental Information Management System (KEIMS), is being implemented agency-wide to support a variety of environmental programs.

Bill is serving as a lead analyst for configuration and customization of nVIRO to support Kansas-specific business rules and automation for NPDES permit data management and online collection of Discharge Monitoring Reports (DMRs). Bill worked with agency subject matter experts to understand agency-specific business rules, develop customization designs to support Kansas business processes, and oversaw the development, testing and implementation of customizations and configurations. In addition, Bill oversaw the conversion of NPDES data from a combination of data sources into nVIRO, including legacy Oracle systems and the federal EPA ICIS-NPDES system.

Agency-wide Complaints Management System

Oregon Department of Environmental Quality
Project Manager, Lead Analyst: 2018 - 2020

Bill served as the lead analyst, configuration manager, and testing/deployment coordinator for the Oregon Department of Environmental Quality (DEQ) complaint management system. The system, named nCIDENT, is an implementation of Windor's comprehensive enterprise agency management software, nVIRO, which has been configured solely for the collection of pollution incidents and complaints from the public. Complaint reports are triaged, routed to the appropriate regional agency expert for investigation and follow-up. Bill met with agency subject matter experts to understand and document the business process. Bill then worked to configure the forms, workflows, document templates, and reports required by DEQ to perform comprehensive complaint management from receipt to close-out. DEQ uses nCIDENT to process over 3,000 complaints annually.

Agency-wide ePermitting System

South Carolina Department of Health and Environmental Control (DHEC)
Lead Analyst, Team Lead : 2016 - Current

Bill is the lead analyst responsible for implementation of Windsor's nVIRO family of applications (ePermitting, Inspections, Compliance) across all of DHEC's Environmental Bureaus (Air Quality, Environmental Health, Land and Waste Management, Water, Ocean and Coastal Resource Management),

- Led detailed requirement analysis and workflow design for multiple functional areas including Application Processing, Permitting, Permit Limits, Schedules of Compliance, Discharge Monitoring Reporting, and reporting.
- Worked closely with DHEC to develop user stories and design functionality for the above functional areas, including data modeling, user interface design, and business rule definition.
- Designed approach for workflow and task processing.
- Using Agile/Scrum approach, led functional development team to successfully develop, test and deliver functionality for pre-production application releases. Currently directing activities to implement the system for 40+ environmental programs.

ATTAINS Exchange Network Data Flow

Montana Department of Environmental Quality
Project Manager : 2016

Bill served as project manager and lead analyst for a project to develop data exchange software for the transmittal of surface water quality standards attainment data from Montana's database to EPA's new ATTAINS data system via the Exchange Network. Bill analyzed the Montana source database, mapped data element to the new EPA XML schema, and oversaw the development, testing and implementation of data flow components in Montana's environment. During this project, Bill participated on the EPA ATTAINS integrated

project team (IPT) to help define the data exchange standard. As the result of this project, Montana was the first state to successfully flow data to EPA's new ATTAINS system using the new format.

MiWaters System

Michigan Department of Environmental Quality - Water Resources Division (WRD)
Team Lead : 2013 - Current

Bill is a business analyst and team lead responsible for developing key functional components for the MiWaters nVIRO system which consolidates and replaces over 25 existing systems used by WRD, bringing consistency to permitting and compliance processes, and significantly enhancing WRD's capabilities through advanced technologies (e.g., GIS), enhanced public access to information, and improved data integrity.

- Led detail requirement analysis and workflow design for multiple functional areas including Application Processing, Permitting, Permit Limits, Schedules of Compliance, Discharge Monitoring Reporting, and ICIS/NPDES reporting.
- Worked closely with DEQ to develop user stories and design functionality for the above functional areas, including data modeling, user interface design, and business rule definition.
- Designed MiWaters approach for workflow and task processing.
- Using Agile/Scrum approach, led functional development team to successfully develop, test and deliver functionality for nine pre-production application releases.

Water Quality Assessment Reporting and Documenting (WARD) System Phase 3

Montana Department of Environmental Quality
Project Manager : 2013-2014

Bill acted as the lead analyst and project manager to enhance WARD, DEQ's water assessment system, combining the functionality of the EPA-provided Assessment Database (ADB) system into the existing WARD application. Bill analyzed requirements, confirmed the design, and coordinated the development, testing and implementation of the system enhancements. In addition to extending the WARD application, Bill oversaw the development and implementation of the ATTAINS data flow components from WARD to the EPA ATTAINS system via DEQ's OpenNode2 Exchange Network node. Bill also coordinated the design, development, and implementation of custom software to extract data from DEQ's GIS systems, transform it into the format required by USGS for loading into the National Hydrography Dataset (NHD) via the Exchange Network NHDEvent data exchange. The enhanced WARD system and data flows were implemented in Fall, 2013.

OpenNode2 ICIS-NPDES Data Exchange Project

Environmental Council of States (ECOS)

Project Manager : 2012 - 2013

Bill served as the project manager and lead analyst on a project to design, develop and release open source software for the ECOS OpenNode2 Exchange Network node to transmit data from environmental agencies to EPA's ICIS-NPDES system. The ICIS-NPDES data exchange is complex, containing 49 unique payload types and over 900 business rules. Bill analyzed requirements, conceptualized and documented the design, oversaw development of the OpenNode2 plugin software, and led a data exchange pilot with the Washington Department of Ecology (Ecology). Bill conceived a design that leverages the XML processing report returned from EPA as a means of automatically keeping the agency NPDES database and the EPA ICIS-NPDES system in sync without the need for the state to manually set insert, update, and delete flags in the submission data. The ICIS-NPDES plugin is now used as more than a dozen state agencies to submit data to ICIS-NPDES.

ICIS-NPDES Data Flow Implementation Project

Vermont Department of Environmental Conservation (DEC)
Project Manager : 2012 - 2013

Bill served as the project manager and lead analyst on a project to design, develop and implement the ICIS-NPDES data flow from DEC's Waste Water Inventory (WWI) system to US EPA. Bill facilitated requirements and design sessions with DEC subject matter experts to map the WWI elements to the ICIS-NPDES XML schema. Bill worked with DEC technical staff to add new data elements and business rules to WWI so that the data met ICIS-NPDES data validation requirements. Bill developed the data exchange components and assisted in the deployment of OpenNode2 to the DEC technical environment, facilitated testing, debugging and assisted DEC flow stewards in troubleshooting and correct of the ICIS-NPDES flow components once placed into production. The exchange was implemented in December 2012 with Bill performing in a support role into Summer, 2013.

Water Quality Analysis Reporter (WQAR) System Design

Arkansas Department of Environmental Quality
Lead Analyst : 2011-2013

Bill served as the lead analyst for a project to gather requirements and develop a design for the Arkansas DEQ Water Quality Analysis Reporter (WQAR) application. WQAR is used to calculate whether surface waters meet water quality standards and designated uses. Bill met with subject matter experts for a three-day analysis workshop. The workshop involved rapid interface prototyping and data modeling to quickly and efficiently develop a design framework. Bill then synthesized and documented the requirements from the meeting and developed a comprehensive system design document. Bill then lead the effort to develop, test and implement the WQAR application. WQAR was implemented in July, 2013.

Adopt-a-Beach™ Web Portal

Alliance for the Great Lakes
Project Manager : 2011

Bill served as project manager and lead analyst for a project to develop a public web portal of beach cleanup events in the Great Lakes region. The Adopt-a-Beach™ portal makes it easy for the public to find event and sign up as well as create and host new cleanup events. The system also tracks the amount and type of litter collected and extensive beach sanitary survey data, as well as administrative screens to manage users, cleanup teams, and cleanup campaigns. The portal also contains data interfaces with the Alliance's fundraising and member management system, Raiser's Edge and Convio. Bill managed all phases of the project from requirements gathering to design, development, testing and implementation for an on-time release in July 2011. Upon release. The system greatly improved the Alliance's public presence, accelerating the pace of enrollment of new volunteers and supporters. The system utilizes Microsoft technologies including MVC3, NHibernate, and SQL Server and heavily utilizes AJAX for a clean, responsive user interface.

Great Lakes Restoration Initiative Accountability System Implementation

U.S EPA Region 5
Project Manager : 2010 - 2012

Bill managed a project to implement a customized version of the Michigan DEQ BeachGuard system in the U.S EPA Region 5 Great Lakes National Program Office (GLNPO). The system provides a means for EPA to collect routine sanitary survey data electronically from dozens of grant recipients. In addition to providing secure, online data entry functions, the system was also enhanced to include an automated "aggregation service" that connects with any number of external data providers to automatically import surveys collected by other agencies via a custom web services client. Bill crafted the design of the service and oversaw the development, testing, and implementation of the enhancements, including the customization of four agency-run source systems to provide the survey data in XML via a RESTful service architecture.

Node 2.0, ICIS-NPDES and EIS Data Flow Implementation Project

Minnesota Pollution Control Agency
Project Manager *:* 2010 - 2012

Bill served as the project manager and lead analyst to develop and implement several Exchange Network data flows for the Minnesota Pollution Control Agency (MPCA). Tasks included upgrading MPCA to Exchange Network Node to version 2.0, upgrading the existing data exchange components from EPA's legacy NPDES Permit Compliance System (PCS) data flow to the EPA's modernized ICIS-NPDES system, developing and implementing a custom Emissions Inventory System (EIS) data flow, designing and implementing a new flow from the EPA Assessment Database (ADB) to the EPA ATTAINS database, and analyzing MPCA's readiness for implementing the EPA RCRA v5.2 data flow. In undertaking these projects, Bill

extensively analyzed MPCA data models, developed data transformation mappings, and assisted in developing and testing routines to transform MPCA data into formats accepted by EPA.

Michigan Wellogic Rewrite

Michigan DEQ
Lead Analyst : 2009 – 2012

Bill acted as the lead analyst for a project to redevelop Michigan DEQ's Water Well management system. Wellogic provides a public-facing web interface for collecting water well data from contractors and health departments. Bill analyzed the existing system, performed detailed requirements gathering, developed a prototype and design specification architected the data migration procedures, and assisted with system testing and training. This project required that Bill adhere to a strict project management methodology employed by the State of Michigan for documentation, requirements traceability, test cases, and other requirements.
Building on the success of this project, DEQ initiated a second enhancement project with Windsor to add functionality to handle licensure of water well drilling contractors. The enhanced system includes online annual renewal processing and integration with DEQ's accounting system for invoicing. Bill took on the role of project manager and lead analyst for this project, directing all aspects of project management, system design, overseeing development, data migration, testing, and implementation.

BeachGuard EPA Reporting and Support

Michigan DEQ
Project Manager *:* 2004 - 2012

Bill has worked with MDEQ to perform maintenance, enhancements and support to the BeachGuard application. Bill has developed user guides, managed requirements gathering, system enhancement development, and implementation. Additionally, Bill assisted in preparing and transmitting required EPA reporting under BEACH Act grant reporting requirements each year from 2004 – 2009.

OpenNode2 Support Coordinator

Environmental Council of States (ECOS)
Project Manager : 2009 - Present

Windsor developed OpenNode2, the predominant software used by states, tribes, and private industry on the Exchange Network. OpenNode2 is owned and maintained by ECOS through a support contract with Windsor. Since the beginning of a support agreement in 2009, Bill has served as the project manager to maintain the OpenNode2 software, develop and maintain data flow modules (plugins), and to provide ongoing support to implementers across the

country. In this capacity, Bill has become intimately familiar with the node software, specific implementation challenges, and interoperability issues that may arise.

SPDES Systems Assessment

New York Department of Environmental Conservation
Analyst : 2009

Bill was an analyst for a project to assess information systems and business processes for NY DEC's NPDES wastewater permitting program, SPDES. Bill met with administrative and technical staff, inspectors, attorneys and program administrators to analyze and document workflows. All information systems were inventoried and functions analyzed. Bill assisted in developing a comprehensive assessment of current processes and systems. Next, Bill assisted in developing an implementation plan, laying out a strategy for the agency to improve efficiency and data quality through a series of discrete, specific projects.

Pollution Prevention Results (P2R) Flow Development and Deployment Project

Colorado Department of Public Health and Environment
Project Manager *:* 2008

Bill headed a project to develop and implement a Pollution Prevention Results (P2R) data exchange for Colorado DPHE and the Pollution Prevention Resource Center (PPRC). Bill developed an Exchange Network-compliant XML schema and Flow Configuration Document (FCD) and prepared and submitted the exchange package to the Network for approval. Bill also led the effort to install and configure Exchange Network nodes as well as to develop, test, and deploy the P2R exchange components in both organizations' environments and provided node administrative training to technical staff. In addition, Bill installed and configured the WQX, TRI, SDWIS and FRS Exchanges on the Colorado DPHE node. Both Exchange Network nodes were operational in September, 2008.

BEACH Act Reporting

Ohio Department of Health
: 2008 - 2010

Bill prepared XML data submissions for ODH to meet EPA BEACH Act reporting requirements for both 2008 and 2009 data. Bill consolidated data from various spreadsheets, coordinated data QA activities, and transformed beach monitoring and notification data into the XML formats required by EPA. After gaining approval and sign-off from ODH, Bill submitted the data to EPA and verified it had be received and processed successfully.

BeachGuard Implementation and Maintenance Project

Illinois Department of Health
: 2007 - Present

Bill coordinated the sale of a Michigan BeachGuard license to Illinois DPH, held requirements gathering web conferences, developed system customization documentation, and oversaw the customization and implementation of the BeachGuard system for Illinois DPH. Bill also prepared and transmitted annual BEACH Act reports in 2007, 2008, and 2009. The Illinois DPH BeachGuard system is located here. Since its deployment in 2007, Bill has assisted DPH with maintenance, support and enhancement activities.

BeachGuard Implementation Project

Indiana Department of Environmental Management
Technical Lead *:* 2008

Bill coordinated the sale of a Michigan BeachGuard license to Indiana DEM. Bill provided technical guidance to Indiana DEM staff, who then customized and implemented the system. Bill also provided technical training to beach program staff to help them prepare and submit data under BEACH Act reporting requirements. The Indiana DEM BeachGuard system is located here.

NPDES Permit Management System Redevelopment

Wyoming Department of Environmental Quality
Project Advisor *:* 2007-2008

As a project advisor, Bill provided oversight and guidance to a team of analysts and developers on a project to redevelop DEQ's NPDES Permit Management system, WYPDES, into a modern ASP.NET web application. The system contains modules for all aspects of permit management, including facilities, contacts, permits, effluent limits, DMRs, inspections, violation tracking and enforcement actions. The WYPDES system also generates customized documents and will send batch data to ICIS-NPDES using data exchange procedures and DEQ's Exchange Network Node.

ICIS-NPDES DMR Data Entry/XML Submission Utility

Early in the project, Bill conducted requirements gathering sessions with DEQ staff, documented finding and assisted in requirements review sessions. Bill then developed a prototype user interface design and system data model to serve as an aid in subsequent design sessions. During this period, Bill provided business area expertise to the project's lead analyst as the final design was documented and finalized. Bill continued to be actively engaged through development and deployment in an advisory role.

Arkansas Department of Environmental Quality
Project Manager*:* 2008

Bill served as project manager and lead analyst for the Arkansas ICIS-NPDES DMR Data Entry and XML Submission Utility. Bill met with Arkansas business and technical experts to perform requirements and design for upgrading DEQ's existing DMR data entry application. The existing application generated PCS-compliant Measurement Violation batch files as flat text. The application was enhanced to generate XML files compliant with the ICIS-NPDES DMR v1.5 schema. Additionally, the application was upgraded to include a built-in Exchange Network Node Client capable of submitting XML files to EPA, checking the status of submissions, and downloading processing results. The application was successfully implemented and began submitting DMR batch files to EPA in June, 2008.

WQX and Beach Notification Flow Deployment

Georgia Department of Natural Resources
Lead Analyst *:* 2008

Bill was the lead analyst for the analysis, design, development and deployment of the Water Quality Exchange (WQX) and Beach Notification data flows for the Georgia DNR Java Exchange Network Node. Bill configured and executed the successful submission of both flows, allowing DNR to meet their BEACH Act reporting requirements. Bill also prepared documentation and provided training to program and technical staff on node and flow maintenance activities.

PCS DMR Utility Redevelopment Project

Arkansas Department of Environmental Quality
Team Lead : 2007

Bill led a joint requirements gathering/design effort for the redevelopment of a data entry tool for NPDES DMR (Discharge Monitoring Report) data for Arkansas' Water Division. The utility provides the capability for Arkansas staff to enter DMR data from PCS-generated paper DMR forms. The utility then creates PCS-compliant Measurement Violation (MV) batch files and formats the files for direct submission to EPA using appropriate IBM mainframe Job Control Language (JCL) header and footer syntax. Bill developed a data model, system prototype and user interface design specification and assisted Windsor development staff to create and release the final system. Arkansas now uses this tool exclusively for performing all required DMR data reporting to EPA.
The PCS DMR Utility utilizes a Microsoft .NET 2.0 desktop interface and a Microsoft SQL Server 2000 database.

ICIS-NPDES Readiness Assessment

Wyoming Department of Environmental Quality
Lead Analyst *:* 2006

Bill served as a lead analyst in a project to assess the data element compatibility between Wyoming's NPDES data management system and the ICIS-NPDES Required Data Element

(RIDE) list. Bill performed a comprehensive analysis of DEQ databases and held information gathering meetings to gain an understanding of DEQs data management practices. Bill then performed a gap analysis to determine which of the 300+ ICIS-NPDES data elements mapped to existing DEQ data elements. In addition to assessing EPA data requirements, the project identified many potential improvements DEQs own data management practices. Findings were documented and presented to DEQ Water Quality Division management. Following the assessment, Bill helped to create an implementation plan for DEQ, providing a high-level project plan for implementing the needed changes to track EPA-required data elements and building an automated data flow to ICIS-NPDES.

PCS-IDEF Data Exchange Project

Minnesota Pollution Control Agency
Project Lead *:* 2006

Bill led a project to map NPDES Discharge Monitoring Report (DMR) data from an integrated permit management system into EPA's Interim Data Exchange XML Format (IDEF). Bill designed, built and implemented software to automatically submit the XML data to EPA's Central Data Exchange (CDX) node on a regular interval. To accomplish this task, Bill met with business experts to understand the project requirements, studied the agencies' Oracle database model and developed the design specification and application architecture. Bill developed the PL\SQL data transformation routines, assisted in developing the data mapping and submission management user interface, prepared documentation, trained staff, and implemented the solution. MPCA states that the PCS-IDEF solution has substantially reduced the burden of performing EPA data reporting, bringing significant cost savings and freeing up valuable resources.
The project utilizes PL\SQL procedures on Oracle 10g, Microsoft .NET 2.0 remoting, XML, Windows Forms, and Windows Services technology.

PCS-IDEF Data Exchange Project

Washington Department of Ecology
Project Lead : 2005 - 2006

Bill served as the project lead for automating the transmission of NPDES permit data and Discharge Monitoring Report (DMR) measurement result data into the federal Permit Compliance System (PCS) mainframe from Washington's permit management system. This project involved complex data mapping from the agencies' system to a series of staging tables. Data is translated from the staging area into the EPA's Interim Data Exchange XML Format (IDEF). Transmission of data to EPA was automated using a custom Exchange Network Node client application. The system includes a desktop IDEF Submission Management Utility which is used to control the breadth, quantity and frequency of data exchange to EPA's CDX

node. The Washington system was built using Oracle 10g database and the Microsoft .NET 1.1 for data exchange and administration components.

Data Warehouse Project

Clackamas County, Water Environment Services
Lead Analyst *:* 2004 - Present

Bill served as the lead analyst for Clackamas County, Oregon's data integration project which sought to integrate data from multiple data sources into one central data warehouse. Bill met with business users and gained an understanding of information needs and current systems. From this analysis, Bill developed a long term vision for the data warehouse and a near-term project plan for the initial data integration effort of monitoring data. Bill architected a data model, crafted extraction, transformation, and load (ETL) routines which integrate data from four source systems including the agencies' treatment plant monitoring system, Industrial SQL (InSQL). Bill also developed the detailed technical architecture and user interface design. Under Bill's direction, a two subsequent projects incorporated financial data from the county PeopleSoft Financials system and customer data from the agency utility billing system. The data warehouse provides Clackamas County staff the ability to compare and evaluate environmental sampling, financial, and sewer system loading data from several data sources in an easy to use, customizable query interface.
The data warehouse utilizes traditional data warehouse dimensional modeling techniques and targets the SQL Server 2000 platform using Microsoft Analysis Services 8.0. The user interface is a Microsoft .NET 2.0 Windows application.

Toxic Release Inventory (TRI) XML Schema and Flow Configuration Project

Environmental Council of States (ECOS) / US Environmental Protection Agency (EPA)
Business Analyst and XML Architect *:* 2004 – 2005

Bill played a central role in developing the next generation of tools for exchanging TRI data between private, state and federal entities. During this project, Bill analyzed business processes, existing forms and data formats, environmental data standards and conducted information gathering sessions with state and federal stakeholders. Following the analysis, Bill developed an XML schema and several supporting documents. The schema was granted candidate recommendation status by the schema sanctioning authority, the Exchange Network Technical Resources Group (EN TRG).
In addition to schema development, Bill authored a TRI Flow Configuration Document describing specific details of performing a TRI data exchange using Web services technologies. Bill also facilitated the implementation of a TRI data exchange pilot between two states and the US EPA. The pilot TRI data flow using XML and Web Services was successfully completed in January 2005.

Resource Conservation and Recovery Act (RCRA) XML Converter Project

Environmental Council of States (ECOS) / US Environmental Protection Agency (EPA)
XML Transformation Specialist : 2004

Bill served on a joint EPA/ECOS project which developed a component for the EPA RCRA program that converts XML files to a legacy flat file format. This project involved performing extensive mapping of data between relational, flat file, and XML data formats. Bill authored, tested and refined data mapping routines using Visual Studio.NET 2003 and C#. In addition, Bill collaborated with other team members on building SQL extraction routines and developing XSLT transformations. The converter was successfully implemented into EPA's production system in October of 2004.

Exchange Network and XML

Environmental Council of States (ECOS)
Technical Advisor *:* 2003 - Present

Since 2003, Bill has been an active member of the Exchange Network (Network) governance in a technical advisory capacity. During this time, Bill has prepared numerous formal guidance documents for the Network, presented at several national meetings as an expert on XML schema and data exchange design, and participated in maintenance and development of Network technologies and standards including the Node 2.0 specification. In addition, Bill continues to provide advice to a variety of Network exchange development workgroups on topics of exchange design, conformance with network standards for schema, and documentation.

State-to-EPA PCS DMR Data Exchange

Michigan Department of Information Technology
Design Analyst/Implementation Specialist *:* 2003 - 2004

Bill served as an analyst for the State of Michigan's State-to-EPA data exchange project which automated data exchange between Michigan's wastewater reporting system and the US EPA Permit Compliance System (PCS) through the EPA Central Data Exchange (CDX) web services portal.
Bill's role included analyzing the state's wastewater database and revising data structures to facilitate consistent extraction and formatting of data for transmission to the EPA PCS mainframe, coordinating with federal staff and contractors to negotiate data exchange processes, and building XSLT conversion utilities to format data for submission. In addition, he installed and tested the data exchange components and administered the production system through the upload of backlogged data in the state system.

Michigan Beach Monitoring System

Michigan Department of Information Technology
Project Manager/Lead Developer *:* 2001 – 2004

Bill played a central role in the development of the Michigan Beach Monitoring System, which now serves as a national model. Charged with fulfilling the Department's legislative mandate to collect and post beach monitoring and closure data online, Bill led the Michigan Beach Monitoring project from inception to implementation.
Bill performed all the requirements gathering, analysis, modeling, design, development and implementation of the system. The system was developed to allow authorized health department officials to log on, enter and maintain test result data and beach closure information. In addition, he performed data extraction and formatting of beach monitoring data into an XML file for submission to the EPA as required by the EPA BEACH Act grant reporting criteria.

Ted Morris

Technical Architect

Employment History

Consultant, Windsor Solutions, Inc. 2008-present

Architect and Principal Engineer, Xiotech Corporation
2006-2008

Software Architect and Project Lead, j2 Global Communications, Inc.
2002-2006

Senior Software Engineer and Project Lead, Expertcity, Inc.
2001-2002

Senior Software Engineer and Project Lead, Sylantro Systems, Inc.
2000-2001

Architect and Principal Engineer, eFax.com
1993-2000

Software Engineer, Interactive Support Group, Inc.
1992-1993

Engineer, Ford Motor Company
1990-1992

Education

M.S., Mechanical Engineering – Stanford University, Stanford, CA
1990

B.S., Mechanical Engineering – Stanford University, Stanford, CA
1989

Stanford Overseas Program – Berlin and Munich, Germany

About Ted

Ted is a technical architect at Windsor Solutions with over 25 years of professional software development and management experience spanning a wide range of technologies, platforms, and enterprises. During the past few years, Ted has acted as the principal engineer and architect of Windsor's nVIRO solution, as well as OpenNode2, which provides simultaneous support for the latest EPA Exchange Node Specifications, including v1.1, v2.0, and v2.1. Since Windsor's Node was chosen by ECOS as the open-source Exchange Network Node in 2009, Ted has had primary responsibility for assisting Windsor's clients in deploying and upgrading their organizations to OpenNode2. Ted has also been instrumental in providing guidance to EPA and ECOS regarding enhancements to the Exchange Network Node Specifications.

Ted is also active in many of Windsor's custom, distributed services and solutions that integrate server-side technologies with client-side desktop and web-based applications. Many of these solutions provide sophisticated and intuitive querying, editing, and visualization of extremely large environmental datasets.

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Key Projects

FX Data Exchange *Technical Architect*	*Northwest Indian Fisheries Commission* *2019-Present*
North Dakota CERIS Application (nVIRO *Technical Architect*	*North Dakota DEQ* *2019-Present*
Alabama AEPACS Application (nVIRO) *Technical Architect*	*Alabama DEM* *2019-Present*
Kansas KEIMS Application (nVIRO) *Technical Architect*	*Kansas DHE* *2018-Present*
nCIDENT Complaints Application (nVIRO) *Technical Architect*	*Oregon DEQ* *2018-Present*
Regulator ePortal Application (nVIRO) *Technical Architect*	*Indiana IDEM* *2018-Present*
ePermitting Application (nVIRO) *Technical Architect*	*South Carolina DHEC* *2016-Present*
WyWaste Application (nVIRO) *Technical Architect*	*Wyoming DEQ* *2015-Present*
CEDEN WQX Flow and Web Services *Technical Architect*	*California State Water Resources Control Board* *2015-2016*
Nearshore Data Exchange *Technical Architect*	*Northwest Indian Fisheries Commission* *2013-Present*
MiWaters Application (nVIRO) *Technical Architect*	*Michigan DEQ* *2013-Present*
Surface Water Monitoring System *Technical Architect*	*Wyoming Department of Environmental Quality* *2011-2012*
GIS Water Quality Spatial Viewer Technical Architect	*Seldovia Village Tribe, Northwest Indian Fisheries Commission* *2010-Present*
OpenNode2 Exchange Network Projects *Technical Architect*	*Various Clients* *2009-Present*

Detailed Project Descriptions

Agencywide ePermitting and Compliance nVIRO Applications

Multiple State Agencies and Divisions (see full list above)

Technical Architect and Lead Services Developer *:* 2016-Present

Ted has worked closely with South Carolina DHEC over the past year to design, architect, develop and deploy into a Production environment the ePermitting application solution, which is a customized version of Windsor's nVIRO product-line. The ePermitting application is used within DHEC's Environmental Bureaus (Air Quality, Environmental Health, Land and Waste Management, Water, Ocean and Coastal Resource Management) to manage data across sites, permits, corrective actions, financial assurances and many other entities.

Ted designed and developed the entire backend service tier for the ePermitting application, including all REST service APIs, business logic, and workflows & scheduled tasks executing within the service layer. In addition, Ted fully integrated the the ePermitting services with the nSpect and nForm backend service layers to allow the ePermitting application to function seamlessly with these product-lines.

WyWaste nVIRO Application

Wyoming DEQ - Solid and Hazardous Waste Division (SHWD)
Technical Architect and Lead Services Developer *:* 2015-Present

Ted has worked closely with Wyoming DEQ over the past two years to design, architect, develop, and deploy the WyWaste application solution into a Production environment. WyWaste is a customized version of Windsor's nVIRO product-line that is used by the Wyoming DEQ's Solid and Hazardous Waste Division (SHWD) to manage data across sites, permits, corrective actions, and financial assurances for the Hazardous Waste, Solid Waste, and Voluntary Remediation Programs.

Ted designed and developed the entire backend service tier for WyWaste, including all REST service APIs, business logic, and workflows & scheduled tasks executing within the service layer. In addition, Ted fully integrated the WyWaste services with the nSpect and nForm backend service layers to allow WyWaste to function seamlessly with these product-lines.

MiWaters nVIRO Application

Michigan Department of Environmental Quality - Water Resources Division (WRD)
Technical Architect and Lead Services Developer *:* 2013-Present

Ted has worked closely with Michigan DEQ-WRD over the past four years to design, architect, develop and deploy into a Production environment the MiWaters application solution, which includes an integrated set of custom applications published to a high-availability, cloud-hosted environment. MiWaters includes complete integration with Windsor's nForm, nSpect, and nSite product suites. The solution includes both public-facing and internal web sites, consolidates and replaces over 25 existing systems used by WRD, brings consistency WRD's to permitting and compliance processes and workflows, and significantly enhances WRD's capabilities through the use of the latest web and service development frameworks and advanced technologies (e.g., GIS).

Ted is the primary technical architect of the nVIRO application suite. He designed and developed the entire backend service tier for nVIRO, including all REST service APIs, business logic, and workflows, client service and backend integrations (e.g., payment services, document management systems, authentication providers, etc.) & scheduled tasks executing within the service layer. In addition, Ted fully integrated the nVIRO services with the nSpect, nForm, nSIte, and nVisage backend service layers to allow nVIRO to function seamlessly with these product suites. Ted has also been instrumental in instituting robust devops processes and workflows into the nVIRO development and deployment lifecycles.

ICIS-Air v5.0 OpenNode2 Plugin Implementation

ECOS
Technical Architect and Lead Developer : 2013-Present

Ted is architecting, developing, testing, and deploying a new version of the ICIS-Air v5.0 OpenNode2 plugin. The plugin will be used by multiple states to submit ICIS-Air datasets to EPA via the OpenNode2 application.

Nearshore Data Exchange (NSX) Exchange Network Solution

Northwest Indian Fisheries Commission (NWFIC) and Washington Department of Fish and Wildlife (WDFW)
Technical Architect and Lead Developer : 2013-Present

Ted is architecting, developing, and testing the Nearshore Data Exchange (NSX) and OpenNode2 flows to the Northwest Indian Fisheries Commission (NWFIC) and Washington Department of Fish and Wildlife (WDFW). The NSX data exchange includes a sophisticated data querying and editing client and several components that allow easy sharing and publishing of NSX data between clients and the OpenNode2 central data repository hosted by NWIFC.

OpenNode2 Deployment and Flow Development

Oregon DEQ
Technical Architect and Lead Developer : 2013-Present

Ted architected, developed, tested, and successfully deployed OpenNode2 to the Oregon DEQ environment. In addition, Ted helped mentor the implementation of production Exchange Network flows as part of the deployment, including ICIS-NPDES, EIS, FACID, PNWWQX, UIC, and WQX. Ted continues to provide ongoing support to Oregon DEQ for OpenNode2 and its flows.

RCRA Phase 2 Implementation

Kansas DHE
Technical Architect and Lead Developer *:* 2012 – Present

Ted acts as the technical architect and provides design support for the KDHE RCRA Phase 2 project which utilizes Windsor's nSpect and nForce products in a cloud-hosted environment for use by KDHE. The design integrates compliance and enforcement functions for both hazardous and solid waste facilities (provided by the nForce application) with a tablet-based

mobile inspections application (provided by the nSpect application). It allows efficient transfer of inspection, compliance and enforcement data for hazardous waste facilities electronically to RCRAInfo, and also allows inspection, compliance and enforcement actions for both solid and hazardous waste facilities to be managed in a similar manner. The solution is completely hosted in Windsor's cloud environment and provides seamless database connections to/from the KDHE internal database backend.

Surface Water Monitoring (SWM) System

Wyoming DEQ
Technical Architect and Lead Developer *:* 2012

Ted architected, developed, tested, and successfully deployed Windsor's SWM 2.0 system to the Wyoming DEQ development and production environments. The SWM web application, web services, and database backend allow complete editing, viewing, querying and data export and migration capabilities for WY DEQ's SWM datasets. The application solutions also interoperate with OpenNode2 and the Exchange Network to provide submissions of WQX datasets to EPA.

OpenNode2 Deployment and Flow Development

Hawaii DOH
Technical Architect and Lead Developer : 2011-Present

Ted architected, developed, tested, and successfully deployed OpenNode2 to the Hawaii DOH environment. In addition, Ted helped mentor the implementation of production Exchange Network flows as part of the deployment, including AQS, BEACHES, FACID, HERE, ICIS-NPDES, RCRA, SDWIS, TRI, and WQX. Ted continues to provide ongoing support to HIDOH for OpenNode2.

OpenNode2, WQX GIS Spatial Viewer, WQX Desktop Client, and WQX Data Flow Deployment

Oneida Tribe of Wisconsin, Washoe Tribe of Nevada and California
Technical Architect and Lead Developer : 2011-Present

Ted is architecting, developing, and deploying OpenNode2, the WQX GIS Spatial Viewer, the WQX Desktop Client, and multiple WQX data flow services for use by the Oneida Tribe. These applications and services will enable Oneida to centrally publish WQX datasets and perform sophisticated querying, editing and visualization of the WQX datasets in both web-based and desktop-client environments.

JMX Exchange Network Solution

Northwest Indian Fisheries Commission (NWFIC) and Washington Department of Fish and Wildlife (WDFW)
Technical Architect and Lead Developer *:* 2011-Present

Ted architected, developed, tested, and successfully deployed the Juvenile Migration Data Exchange (JMX) and OpenNode2 flows to the Northwest Indian Fisheries Commission (NWFIC) and Washington Department of Fish and Wildlife (WDFW). Ted also developed and deployed

custom desktop client software that enables sophisticated publishing, querying and editing of JMX flow data that is shared between the NWIFC (and its member tribes) and WDFW. Ted continues to provide ongoing support to NWFIC and WDFW for the JMX Exchange Network Solution.

Exchange Network Node Specification Enhancements and Steering Committee

ECOS
Technical Architect and Lead Developer *:* 2010-Present

Ted provides critical input and advice during ECOS and EPA discussions related to enhancing and improving the Exchange Network Node Specifications, including the recent v2.1 modifications and upcoming REST-based interface enhancements.

WQX GIS Spatial Viewer

NWIFC, USET, Seldovia Village Tribe, Oneida Tribe, Washoe Tribe
Technical Architect *:* 2010 - Present

Ted architected, developed, tested, and deployed an integrated WQX GIS Spatial Viewer to multiple Indian tribes across the country. The WQX GIS Spatial Viewer is an ASP.NET web application and set of web services that provide sophisticated querying and visualization of WQX datasets.

Release of OpenNode2 as Open Source EN Node Solution

ECOS
Technical Architect : 2009 - Present

Ted helped prepare, document, and release v1.0 of OpenNode2 Exchange Network Node solution to the open source community. OpenNode2 was selected by ECOS to be the open source Exchange Network Node solution for network partners. Two months later, Ted helped release v1.1 of OpenNode2 with multiple enhancements as part of a continuous improvement effort of the software. Ted provides ongoing support for OpenNode2 open source solution to Exchange Network partners, and architected and developed several additional Exchange Flow plug-ins released as part of OpenNode2.

e-SMR Application Development

California EPA
Technical Architect and Lead Developer : 2011-2012

Ted is architecting, developing, and deploying new eDMR OpenNode2 query, solicit, and download services which support Cal/EPA's e-SMR application.

OpenNode2 Deployment and Flow Development

AK DEC
Technical Architect and Lead Developer : 2011

Ted architected, developed, tested, and successfully deployed OpenNode2 to the Alaska DES. In addition, Ted implemented several production Exchange Network flows as part of the

onsite deployment, including EIS, FACID, ICI-NPDES, PNW, SDWIS, TRI and WQX. Ted continues to provide ongoing support to AK DEC for OpenNode2.

OpenNode2 Deployment and Flow Development

MN PCA
Technical Architect: 2010-2011

Ted architected, developed, tested, and successfully deployed OpenNode2 to the Minnesota Pollution Control Agency. In addition, Ted implemented several production Exchange Network flows as part of the onsite deployment, including ICIS-NPDES, OWIR and WQX. Ted continues to provide ongoing support to MN PCA for OpenNode2.

Oil and Gas Data Viewer

Wyoming DEQ
Technical Architect : 2010-2011

Ted is architecting, developing, testing, and deploying Windsor's Oil and Gas Data Viewer and Exchange flow for WY DEQ. The Oil and Gas Data Viewer is a SharePoint ASP.NET web application and set of web services that provide sophisticated querying and visualization of Oil and Gas emissions datasets.

OpenNode2 Deployment and Flow Development

USET

Technical Architect: 2010

Ted architected, developed, tested, and successfully deployed OpenNode2 to the United South and Eastern Tribes Incorporated. In addition, Ted implementing the WQX production Exchange Network flow as part of the deployment. Ted also developed and deployed custom client software that enables easy import and export of WQX flow data between the USET and its member tribes.

Mike Abramczyk

Systems Analyst

Employment History

Systems Analyst, Windsor Solutions, Inc.
2013-present

Staff Scientist, Data Management, Cardno ENTRIX
2012-2013

Business Analyst, Target Corporation
2010-2011

Education

B.A. Mathematics and Economics – Northwestern University, Evanston, IL
2010

About Mike

Mike is a Systems and Business Analyst with ten years of experience in IT analysis and system design. He has extensive experience in database design using Microsoft SQL Server, piloting innovative database management strategies and design paradigms that have proven key to managing Windsor's nVIRO environmental permit management and compliance tracking product. Mike has a wide breadth of environmental program knowledge, spanning Water, Air, and Land and Waste Management program areas, as he was recently engaged in an analysis effort to document business processes for each area. He has helped design and build Windsor's eDMR solution for Wastewater Limit tracking, and is currently engaged in design efforts to integrate nVIRO with RCRAInfo. Mike has additional experience in project planning, budgeting and scheduling, resource management, and team facilitation. Mike's background in environmental data management and information systems coupled with his formal training in mathematics and economics give him a unique analytical perspective.

Key Projects

Alabama Environmental Permitting and Compliance System *Systems Analyst*	*Alabama Department of Environmental Management* *2019-Present*
Indiana Construction Stormwater Regulatory ePortal *Systems Analyst*	*Indiana Department of Environmental Management* *2018-Present*

South Carolina nVIRO ePermitting System *Systems Analyst*	*South Carolina Dept of Health and Environmental Control* *2016-Present*
MiWaters nVIRO *Systems Analyst*	*Michigan Department of Environmental Quality* *2013-Present*

Detailed Project Descriptions

Alabama Environmental Permitting and Compliance System (AEPACS)

Alabama Department of Environmental Management (ADEM)
Systems Analyst: 2019 - Current

Mike serves as a systems analyst working to implement Windsor's nVIRO system for the Alabama Department of Environmental Management (ADEM). Mike has worked with ADEM staff to identify, design, and implement system enhancements, including Content Management System integration and expanded support for electronic submission certification. Mike also serves to support the business teams by advising on system best practices and maintaining business configuration data. Additionally, Mike is responsible for coordinating system deployments locally and to ADEM's environment.

Indiana Construction Stormwater Regulatory ePortal

Indiana Department of Environmental Management (IDEM)
Systems Analyst: 2018 - Current

Mike is a systems analyst responsible for migrating IDEM's Construction Stormwater division to Windsor's nVIRO product. During the initial implementation phase, Mike designed functional enhancements, notably security integration with IDEM's Microsoft Azure Active Directory and Azure B2C installations. Work performed has been extended to support SSO implementations for other nVIRO installations. Mike also analyzed and designed data migration routines between IDEM's source Tempo360 installation and nVIRO. After the initial implementation, Mike has coordinated periodic system upgrades and provided continued system support, serving as the primary contact between IDEM staff and Windsor.

South Carolina ePermitting System

South Carolina Department of Health and Environmental Control (DHEC)
Systems Analyst: 2016 - Current

Mike is a systems and data migration analyst responsible for replacing a legacy system supporting 42 distinct program areas from bureaus including Wastewater, Air, and Land and Waste Management. The target system builds on the existing nVIRO solution, which supports EPA-mandated permit tracking, mobile inspections, enforcement, DMR submission, and spatial analysis. The ePermitting effort expanded nVIRO include additional program-specific

features, and enhance existing workflow and data management functionality. Mike served as a lead analyst in the Gap Analysis effort to survey the 42 program areas, resulting in a summary dossier containing detailed program descriptions and integration effort ratings for each program. He is now engaged in system development, focusing on integration with DHEC's financial system, SIPS, and enhancing compliance and enforcement functionality in ePermitting.

WyWaste System

Wyoming Department of Environmental Quality – Solid and Hazardous Waste Division
Database Analyst and System Advisor: 2016 - Current

Mike served as the data conversion analyst and database development advisor for the WyWaste System, which replaced a legacy Solid and Hazardous Waste tracking application. This effort saw the enhancement of the nVIRO system to include functionality for Solid and Hazardous Waste programs, such as Financial Assurance tracking, and ability to handle data from the national Hazardous Waste tracking system RCRAInfo. One of the major challenges of the project was to establish common code bases for the MiWaters system for the application, services, and database code, rebranded as nVIRO. This effort was successful and nVIRO clients will continue to enjoy the benefits of a shared code base for future implementations.

MiWaters System

Michigan Department of Environmental Quality - Water Resources Division (WRD)
Data Lead: 2013 - Current

Mike is the lead database administrator and integration expert the MiWaters electronic permitting solution. The system supports EPA-mandated permit tracking, mobile inspections, enforcement, DMR submission, and spatial analysis, and has brought together 20 + individual water program applications and a NPDES permitting application into a single integrated system. Mike is responsible is responsible for designing and constructing data integration procedures between the central MiWaters system and supporting modules, such as nForm and nSpect, along with leading the data conversion effort from legacy systems.

ADEM nSpect Implementation

Alabama Department of Environmental Control
Lead Analyst: 2016

Mike is the lead analyst for Alabama's implementation of nSpect, Windsor's mobile inspection platform. He has designed database integration procedures and has led all technical communication with the client team. Additionally, Mike oversaw nSpect's subsequent rollout to the entirety of ALDEM's construction inspection division.

Port Gamble Exchange Network Spatial Viewer

Port Gamble S'Klallam Tribe
Lead Systems Analyst: 2016

Mike served as the lead systems analyst on a project to reconfigure and implement Windsor's spatial reporting application for the Port Gamble S'Klallam Tribe. This implementation involved expanding the scope of the existing Spatial Viewer application from handling only water quality sampling data to other media types, most notably fish collection and field observation data. Mike oversaw and coordinated the design, development, implementation, and training phases of the project, and was key in developing database integration procedures. The Port Gamble installation will become the baseline for all future Spatial Viewer implementations.

PARIS Report Creation Tool Analysis

Washington Department of Ecology
Systems Analyst : 2013

As part of the Washington Department of Ecology's redevelopment of their Permit and Enforcement tracking system, Mike has been researching and assessing tools to enable business users to more easily create reports. The analysis will result in a presentation and demonstration detailing the strengths and weaknesses of various Commercial Off the Shelf solutions.

Deepwater Horizon Natural Resource Damage Assessment

Cardno ENTRIX
Staff Scientist, Data Management : 2012-2013

Mike joined Cardno ENTRIX as part of the staff engaged to assist with the Natural Resource Damage Assessment (NRDA) relating to the Deepwater Horizon incident. He was involved with data processing, QA, and documentation. Additionally, Mike was the task and technical manager for a team of 8 database developers.

Inventory Replenishment Systems

Target Corporation
Business Analyst : 2010-2012

Mike worked as an Inventory and Merchandise Analyst with Target Corporation. He developed two significant processes used to optimally allocate inventory through the 1700 store chain by partnering with vendor contacts and conducting a supply chain and purchase pattern analysis. These processes led to a $25 million reduction in on-hand inventories, while

keeping sales rates of the key items constant. Additionally, Mike worked with his partners on the Merchandising team to optimize product assortments using sales history data.