EXCHANGE NETWORK RETURN ON INVESTMENT MODEL USER'S GUIDE

JUNE 28, 2006

Prepared by: enfoTech & Consulting, Inc

11 Princess Road, Unit A
Lawrenceville, New Jersey 08648

Environmental Information
eXchange
Network

Acknowledgements

The ROI Model Project team is comprised of participants from four states, ECOS, and an independent contractor. The following table lists the Project Members:

Primary Project Team

State and ECOS Members	Organization
Michael Beaulac	Michigan DEQ
Molly O'Neill	ECOS
Kurt Rakouskas	ECOS

Independent Contractor	Organization
Tony Jeng (Lead Consultant)	enfoTech & Consulting, Inc.
Brian Cerra	enfoTech & Consulting, Inc.
Douglas Timms	enfoTech & Consulting, Inc.

Supporting States

Primary State Contact	Organization
Michael Beaulac	Michigan DEQ (State Lead)
Deborah Sherrod	Michigan DEQ (AQS)
Jeffrey Jones	Michigan DEQ (DMR)
Ruth Borgelt	Michigan DEQ (TRI)
Robert Jackson	Michigan DEQ (TRI)
Kristen Philip	Michigan DEQ (SDWIS)
Sherry Driber	New Jersey DEP (State Lead)
Mike Matsko	New Jersey DEP (Node)
Charles Pietarinen	New Jersey DEP (AQS)
Angela Witcher	New Jersey DEP (AQS)
Harry Chen	New Jersey DEP (AQS)
Theresa Pagodin	New Jersey DEP (RCRA)
Michael Gerchman	New Jersey DEP (RCRA)
Jim Bridgewater	New Jersey DEP (RCRA/SDWIS)
Phil Royer	New Jersey DEP (SDWIS)
Linda Sharkey	New Jersey DEP (SDWIS)
Russell Polo	New Jersey DEP (SDWIS)
Nancy Imler	Pennsylvania DEP (State Lead)
Kirit Dalal	Pennsylvania DEP (AQS)
Jeff Miller	Pennsylvania DEP (AQS)
Bob Bauer	Pennsylvania DEP (DMR)
Troy Conrad	Pennsylvania DEP (DMR)
John Murtha	Pennsylvania DEP (DMR)
Rama Kapu	Pennsylvania DEP (SDWIS)
Ed Karmilovich	Pennsylvania DEP (RCRA)
Tim Lehman	Pennsylvania DEP (SDWIS)

Primary State Contact	Organization
Bill Sedlak	Pennsylvania DEP (SDWIS)
Jen Gumert	Pennsylvania DEP (IT)
Dudley Hackett	Pennsylvania DEP (IT)
Debbie Stewart	Washington ECY (State Lead)
Miles Neale	Washington ECY (Node)
Phyllis Baas	Washington ECY (AQS)
Kathy Sundberg	Washington ECY (AQS)
Ed Bentley	Washington ECY (RCRA)
Dan Kruger	Washington ECY (RCRA)
Jean Rushing	Washington ECY (RCRA)
Idell Hanson	Washington ECY (TRI)
Joanne Phillipson	Washington ECY (TRI)

Version Control Summary				
Version	Date	Description	Lead/Affiliation	Change
1.0	June 16, 2006	ROI Model User's Guide	Tony Jeng, Brian Cerra & Douglas Timms	-

Table of Contents

1   Introduction

1.1   Background

The business of managing and protecting the natural environment has become highly information intensive. Data on air, water, and waste are routinely exchanged among regulated facilities, states, tribes and the U.S. Environmental Protection Agency (EPA). Today, most environmental data are stored in electronic data management systems. These systems are often incompatible or structured differently from one another, even within the same regulatory agency. This proliferation of heterogeneous data systems has resulted in complex and often burdensome approaches to exchanging environmental data, especially for environmental reporting by the permitted community and follow-up data exchanges between the state and EPA. Business processes historically utilized manual data entry, email, or batch file processing to move data from facilities to state and federal regulatory agencies.

In the late 1990's, state environmental agencies and the EPA formed the Information Management Workgroup (IMWG) to collaborate on improving the management of environmental data. Recognizing that existing methods of exchanging data had become inefficient, burdensome and costly, the IMWG initiated plans for a new data exchange model. The result was the National Environmental Information Exchange Network (now known simply as the Exchange Network — a secure Internet- and standards-based approach for exchanging environmental data. Using universally applicable technologies such as eXtensible Markup Language (XML), Nodes and Web services, the states, EPA and regulated facilities are using the Exchange Network to increase access to environmental data and make the exchange of data more efficient.

1.2   Data Flows Examined in ROI Analysis

In the context of this ROI project, a data flow is defined as a collection of one or more exchanges of information between either environmental agencies or with the regulated community, to support the information management requirements of a particular segment of an environmental regulation.

Based on the limited scope of this ROI project, the team selected five data flows. The selected data flow needed to be one which is affected by the implementation of an Exchange Network project and which multiple states have, are currently implementing, or are at least planning to implement, in order to collect sufficient ROI data relevant for an Exchange Network ROI analysis.

Based on these criteria, the data flows examined were:

- **Air Quality System (AQS)** – This data flow focuses on the State's primary data collection and data exchange of ambient air quality data as required by the Clean Air Act. This includes the collection of ambient air quality data at the State level and its exchange to the U.S. EPA's national AQS system. AQS is a national database that contains ambient air pollution data and meteorological data collected by the EPA, state, local and tribal air pollution control agencies from thousands of monitoring stations.
- **Resource Conservation and Recovery Act (RCRA)** – RCRAInfo is the national database containing hazardous waste data collected from delegated States. This data flow focuses on the collection of Waste Handler, Permitting, Compliance Monitoring & Enforcement (CME), Corrective Action, and Waste Activity information at the state level and its exchange to the EPA's Office of Solid Waste (OSW), which regulates all solid and hazardous waste under the RCRA.
- **Safe Drinking Water Information System (SDWIS)** – This data flow focuses on the State's primary data collection and data exchange activities to support their management of the Safe

Drinking Water Act. This includes the collection of various safe drinking water analytical reports from laboratories and water systems, the collection of operating reports from water systems, and the exchange of sampling, compliance, and enforcement information from the state to the U.S. EPA's national SDWIS system,

- **Toxics Release Inventory (TRI)** – This data flow involves the collection of annual TRI reports from regulated facilities by states and the EPA, and the recent business process change introduced by the Exchange Network allowing facilities to submit data electronically to the EPA. Once sent to EPA, it is then sent automatically to states thus relieving facilities of the burden of duplicate submissions and the states the trouble of additional data entry and/or processing of diskette submissions.

- **Electronic Discharge Monitoring Report (eDMR)** – This data flow focuses on the State's primary data collection and data exchange activities to support their management of the National Pollution Discharge Elimination System (NPDES) program. This program regulates point sources that discharge pollutants into waters of the United States. The data flow includes the collection of Discharge Monitoring Reports (DMRs) from regulated facilities at the State level and the exchange of this information, along with permitting, compliance, and enforcement information to the EPA's national Permit Compliance System (PCS).

The first four data flows were selected for the following reasons:

(1) The EPA planned to model its internal ROI from implementing many of these same data flows;

(2) many of these data flows are already in production in several of the participating state agencies; and

(3) many states and tribes are prioritizing these flows for implementation over the next few years.

The fifth flow, eDMR, was chosen to ensure that the ROI model could be extended to capture eGovernment (industry to state) related activities that are directly tied to the Exchange Network.

2   The ROI Model

The ROI Model is to be used specifically for the five data flows mentioned above (AQS, RCRA, SDWIS, TRI, and eDMR). Because each flow had its own unique factors that affected the operational cost a generic model was not developed. However, the methodology used to develop each model can be applied to any other data flow. These steps include:

1. **Determine all the factors affecting the Operational Cost**: Any step in the business process that will add to the overall data flow operational cost.
2. **Determine the boundary of the analysis**: Determine which factors will be included in the analysis.
3. **Quantify each cost factor for both before and after project implementation**: Determine what input parameters are needed to quantify the cost factor than assign values and determine an equation to calculate the cost. Each cost factor should be assessed for both the pre and post implementation operational scenarios.
4. **Determine the Project implementation and Maintenance costs**: These values will be used to calculate the ROI values.
5. **Calculate the ROI values**: Using the same formulas as each data flow in the model the ROI values can be calculated.

2.1   Getting Started

When the ROI Model is opened for the first time the only worksheet displayed will be the "Model Intro" Sheet. This sheet requests basic information pertaining to the project to be analyzed using the model. These topics include the following:

- Model User Information
- Data flow name
- Statutory or Other Requirements
- Business Significance
- Internal Improvements

- Impact on the Public
- Project Participants
- Project Background
- Current Technology
- Funding

To advance to the Model Input section, select the data flow to be analyzed in the drop down menu at the bottom of the spreadsheet as shown below:
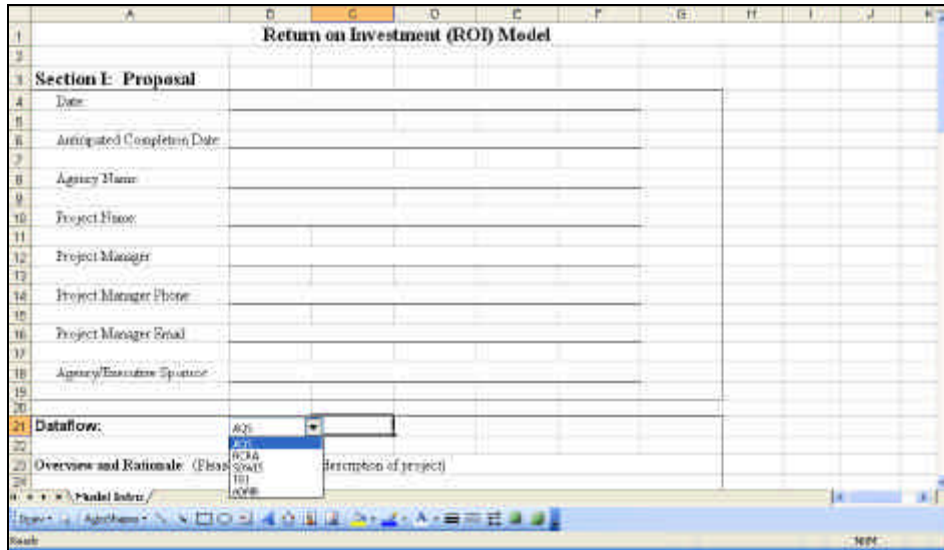
Once a selection is made, two new tabs will appear in the bottom of the screen:
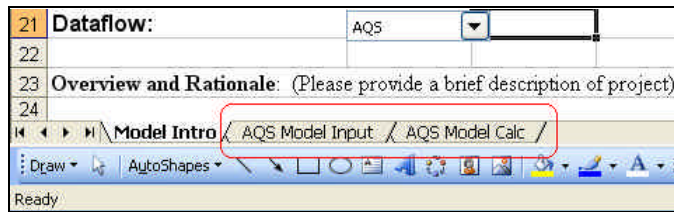
The first tab, "Model Input" is the main data entry worksheet. Based on the data entered in the "Model Input" sheet, ROI values will be generated in the "Model Calc" tab.

2.2   "Model Input" Worksheet

The "Model Input" worksheet is used as a data entry form for the user to enter all necessary information to calculate ROI values for a particular data flow. In this worksheet, all cells that are presented in red text are cells in which the user is <u>required</u> to provide an input. These cells have all been pre-populated with default values based on the four-state business process analysis performed earlier this past year. The user will need to decide whether to use the default values provided, or to edit these values with data specific to their state's operational scenario in which the user is analyzing. All cells that are presented in blue text are values that are calculated based on the data provided in the cells with red text. The user is encouraged not to edit these blue cells as their values are used for the calculation of the ROI values. The "Model Input" worksheet can be broken down into six sections for any of the data flows that can be analyzed using the model as seen in the diagram below:

Key Questions ①

	NPDES Permittees	1200
Key values for ROI Analysis	Project development duration (Years)	1

Operational Scenario ②

Business Scenario Questions:	Choose facility DMR submission method	Paper
	Choose DMR types:	Both
	Choose DMR tracking method:	State database and PCS

Default Values ③

Facility to State Cost Factors:

(A4) Data entry cost (by state)

	Pre - EN	Post - EN
Hourly rate of state staff ($/hour)	28.5	0
Number of Permittees	1200	1200
Frequency of submissions	12	12
# of DMRs/year (Data entered)	14400	14400
Time spent to enter each DMR (hours/DMR)	0.29	0.00
Time spent to enter each monthly DMR	0.87	0.00
Accuracy of data entry (% entered correctly)	100%	100%
SUBTOTAL COST ($/year)	$474,240.00	$0.00

Add to all other facility to state cost factors

State to EPA Cost Factors:

(5) Submission to EPA

	Pre - EN	Post - EN
Hourly rate of state staff ($/hour)	28.5	37.5
Average time spent preparing submissions (hours/month)	0	0
Number of DMRs entered	14400	0
Time to enter each DMR into PCS	0.29	0
Time spent to fix submission problems (hours/year)	N/A	60
SUBTOTAL COST ($/year)	$118,560.00	$2,250.00

Add to all other state to EPA cost factors

④

	Pre - EN	Post - EN
Total cost from Facility to State ($/year)	$585,420	$29,640

	Pre - EN	Post - EN
Total cost from Facility to State ($/year)	$118,560	$2,250

Implementation Cost ⑤

Facility to State	
SUBTOTAL COST	$270,850.00
State to EPA	
TOTAL NODE COST	$240,000
Total # of flows implemented on the Node within first 3 years (estimate)	10
Shared Node Cost	$24,000
Implementation	$212,000
SUBTOTAL COST	$236,000.00
TOTAL IMPLEMENTATION COST	**$506,850.00**

Financial Model ⑥

	% Participation by facilities (a projected goal)	% Project spending (% of total implementation Cost)
Year 0	0% (Development)	50%
Year 1	0% (Development)	50%
Year 2	25% (Production Year)	
Year 3	37%	
Year 4	50%	
Year 5	60%	
Year 6	70%	

These six sections include

- Key Questions
- Operation Scenario Questions
- Cost Factor Default Values
- Total Operational Costs (both pre and post implementation)
- Implementation Costs
- Financial Model Values

Each of these sections is described below:

① **Key questions**

When the user first opens the "Model Input" worksheet, all values have been pre-populated based on

information gathered during visits to other states when developing the model. These values are to be considered rough estimates to be used for screening purposes. If a user would like a more accurate estimate, then actual values can be plugged in for each input parameter for the business process being examined.

The first step in entering data is to answer a few "key" questions which will be used as a basis for scaling the default values for each of the Cost Factors. Typically these key factors relate to the amount of data being processed. The values provided for these key questions are then linked to the appropriate cost factors, and will either positively or negatively affect the cost factor's value.

② Operational Scenario

As part of the Business Process Analysis, experience shows that each cost factor can be interpreted differently depending on a state's unique business process for managing a particular program. For example, some states will accept electronic submissions of data from the regulated facilities, while other states may rely on paper submissions. For each data flow there were certain operational scenarios that greatly affect how the cost factors are quantified.

To answer the Operation Scenario questions select the most appropriate response from the list in the appropriate drop down box for each operational scenario.

③ Determination of Cost Factor Values

Default cost factor values are provided in the model. These were derived from the data provided from four states participating in the project to use the model in their agencies.

The user should supply all known data that is specific to their particular state when analyzing each cost factor. Remember, the default values are to be seen as approximations and considered for use if no other better data is available. If actual data is available from either the model user and/or program area staff involved in the analysis, then it should be used in place of the default values. Each cost factor corresponds to a step in the business process diagram shown in the beginning of the worksheet.

Be sure to note the units of each input parameter when entering actual data, as the subtotals for each cost factor are calculated based on these units. Some input parameters allow the unit to be selected from a drop-down list. Any parameter with a unit choice will have a box surrounding the unit as seen below:

④ Sub-flow division

The ROI model has divided each data flow into two primary sub-flows or data flow segments: (1) Facility/Lab-to-State data flow and (2) State-to-EPA or Exchange Partner (who would request data from the state for a non-regulatory purpose) data flow. This allows users to independently analyze each section of the flow. The different data flow segments can be distinguished by the different colors applied to each segment. The basic color code theme is as follows:

- Green: Represents the facility or lab to state flow
- Orange: Represents the state to EPA flow
- Light Blue: Represents the state to Exchange Partner flow

⑤ Implementation and Maintenance Costs

All data flows in the ROI model will include the cost to implement a State-to-EPA submission of data. This implementation cost will account for the cost incurred by the state to implement 1) an Exchange Network Node and 2) the particular data flow using the Node. There is also an associated implementation cost for the facility/lab-to-state sub-flow for the eDMR and SDWIS data flows. This implementation accounts for a data collection server (and associated accoutrements) to collect data electronically from the facilities or labs and to store it electronically in the state database.

For the State-to-EPA or State to Exchange Partner data flow segments, the implementation cost is for a Node-to-Node data flow. This cost takes into account the cost of the Node, its associated hardware, and the cost to implement the data flow.

For each data flow segment there is an associated implementation cost. It is also assumed that for each major implementation there may be more than one unique data flow sharing the implementation cost. For example, a state may have implemented multiple flows within a year or so utilizing the same node or application server. For this reason the user must estimate how many data flows will be sharing the hardware and software described in the implementation section by the end of three years after completing the ROI analysis. This should include any unique flow that uses the hardware and software, including any internal data flows, federal submissions and external data exchanges.

The flow implementation costs are divided or shared among the total number of existing or planned flows to prevent one data flow from unfairly bearing the total shared implementation costs.

⑥ Financial Model

It is important to note that implementing an Exchange Network project does not happen immediately, especially when integrating eGovernment types of activities. The project length may stretch over multiple years. For data flows that rely on information from data suppliers such as laboratories or regulated facilities, participation rates will not reach 100% immediately after the application is in production. These participants will require time to transition to a new way of doing business. This time lag may greatly affect the project pay-back period because the impacted program manager may not recognize the full potential of the project until a larger percentage of data suppliers are participating in the new process. For example, in the eDMR and SDWIS flows, the operational cost of moving data from labs or facilities to the state depends on the number of labs or facilities making electronic versus paper submissions. The more facilities and labs that participate in the electronic flow, the greater positive impact (i.e., better return on development cost invested) this project will have. The Financial Model embedded in the ROI Model asks the user to estimate these factors to account for their influence.

The two questions in the Financial Model are:
1. Percent of total project cost spent per year.
2. Percent participation (only for the eDMR and SDWIS data flows). This is the annual percentage of data suppliers that has shifted to a reporting method that is compatible with the implementation of Exchange Network technologies.

In the last section of the "Model Input" worksheet for the eDMR and SDWIS data flows, the user is asked to estimate the participation percentage for the first five years after the data flow is put into

production. These estimates will impact the summary table in the first section of the "Model Calc" worksheet. For all data flows the user must supply the estimated project spending breakdown during the years the data flow is in development. These values should be expressed as a percentage of the total implementation cost spent each year.

In the ROI Model, the timeline of events is defined as follows:

- **Year 0**: Represents the (pre-implementation) operational scenario at the exact point in time before the Exchange Network project began.
- **Year 1**: Represents the (pre-implementation) first year after work on the project began.
- **Year 1 plus the Project implementation time**: This is the year that the project moved into the production phase. This year and all that follow are considered to be operating "Post – implementation."

2.3 "Model Calc" Worksheet

Once all the data has been entered, the user can view the results of the calculations in the "Model Calc" worksheet by clicking the "Model Calc" tab at the bottom of the screen. As seen in the diagram below, these results take the total operational costs for each data flow segment both before and after project implementation to determine an annual savings or loss. Then by taking the implementation costs and applying the financial model, all ROI Values can be calculated.

⑦ ROI Calculations

The ROI calculations are different for flows that depend on participation rates (eDMR and SDWIS) than those flows that do not (AQS, RCRA and TRI). For flows that depend on participation by facilities the business process (and thus, the operational cost) will be different for those facilities that are participating

and those that are not. This requires the model calculations to take into account 2 different business processes for the post implementation data flow. To account for this, the model uses the percent participation rate as a scaling factor for the total operational cost to more accurately reflect each business process. For flows that do not depend on participation rates the calculations are much simpler because the post implementation business process will be constant. In the TRI data flow for example, EPA is now the primary recipient, or "clearinghouse," of electronically submitted TRI reports, which are then forwarded the state. The data flow does not depend on the method facilities choose to submit data.

2.3.1 For data flows that are affected by the participation rate of data suppliers (eDMR and SDWIS):

Based on the responses in the Model Input section, three important values are generated in the Model Calculation Worksheet:

① Annual Operational Cost **before** Exchange Network implementation

② Implementation Cost (Project Investment)

③ Annual Operational Cost **after** Exchange Network implementation

The Financial Model incorporates these values and generates the following chart (this is an example using the eDMR data flow):

	A	B	C	D	E	F	G	H	I
6	Costs Over Time (By Year and Timeline)	0	1	2	3	4	5	6	7
7	**Before EN Project**								
8	Facility to state dataflow Operational Cost	$1,460,314	$1,460,314	$1,460,314					
9	State to CDX dataflow Operational Cost	$2,880	$2,880	$2,880					
10	State to Exchange Partner dataflow Operational Cost	$44,800	$44,800	$44,800					
11	**TOTAL Annual Dataflow Cost Before EN Project**	$1,507,994	$1,507,994	$1,507,994					
12									
13	**EN Project Capital Investment**								
14	% of total project cost spent/year	0%	75%	25%					
15	Project Investment	$0	$317,325	$105,775					
16									
17	**After EN Project**								
18	**Facility to State dataflow Operational Cost**								
19	Facility Participation Rate (%)				20%	30%	45%	55%	%
20	Annual Operational Cost to support non-participation facilities				$1,168,251	$1,022,220	$803,173	$657,141	$511,110
21	Annual Operational Cost to support participating facilities				$5,130	$7,695	$11,543	$14,108	$16,673
22	Annual EN System Maintenance Cost				$28,510	$28,510	$28,510	$28,510	$28,510
23	**Total Annual Cost for Facility to state Dataflow**				$1,201,891	$1,058,425	$843,225	$699,759	$556,292
24									
25	**State to CDX Dataflow Operational Cost**								
26	Operational Cost				$0	$0	$0	$0	$0
27	Annual EN System Maintenance Cost				$13,800	$13,800	$13,800	$13,800	$13,800
28	**Total Annual Cost for State to CDX Dataflow**				$13,800	$13,800	$13,800	$13,800	$13,800
29									
30	**State to Exchange Partner Dataflow Operational Cost**								
31	Annual Operational Cost				$0	$0	$0	$0	$0
32	**Total Annual Cost for State to Exchange Partner Dataflow**				$0	$0	$0	$0	$0
33	**TOTAL Annual Dataflow Cost After EN Project**				$1,215,691	$1,072,225	$857,025	$713,559	$570,092

As displayed in the chart above, as the amount of participating facilities increases, the "TOTAL Annual Data flow Cost <u>After</u> EN Project" data flow production decreases (approaches the "Annual Post-Project Cost" as one approaches 100% participation). The Model uses the data in this chart to calculate the

following values for use in the Payback Period and ROI calculations:

- **Annual Operational Savings**: This is the net difference between the Total Annual Data flow Cost Before Implementation and After Implementation.

- **Cumulative Project Capital Investment**: This is the running total of the cost to implement the Exchange Network Project. It is equal to the total spent in all previous years plus the amount spent in the current year.

- **Cumulative Balance of Combined Investment and Savings**: This value is used to calculate the Payback Period and the ROI. To determine this value the program uses the following equation:

    If Year "n" is less than the first production year (Year 3 above):

    $(\text{Cumulative Balance})_{\text{Year n}} = (\text{Cumulative Project Capital Investment})_{\text{Year n}}$

    If Year "n" is greater than or equal to the first production year (Year 3 above):

    $(\text{Cumulative Balance})_{\text{Year n}} = (\text{Cumulative Balance})_{\text{Year n-1}} + (\text{Annual Operational Savings})_{\text{Year n}}$

This is summarized over a seven-year period in the table below:

	A	B	C	D	E	F	G	H	I
36	ROI Analysis	0	1	2	3	4	5	6	7
37	Annual operational savings (Excluding EN Project Capital Investment)	$0	$0	$0	$292,303	$435,769	$650,969	$794,435	$937,902
38	Cumulative Project Capital Investment	$0	-$317,325	-$423,100	-$423,100	-$423,100	-$423,100	-$423,100	-$423,100
39	Cumulative Balance of Combined Investment and Savings	$0	-$317,325	-$423,100	-$130,797	$304,972	$955,941	$1,750,376	$2,688,278

These values described above with example data can also be shown graphically (see below) to illustrate the payback period of the Exchange Network Implementation Project:
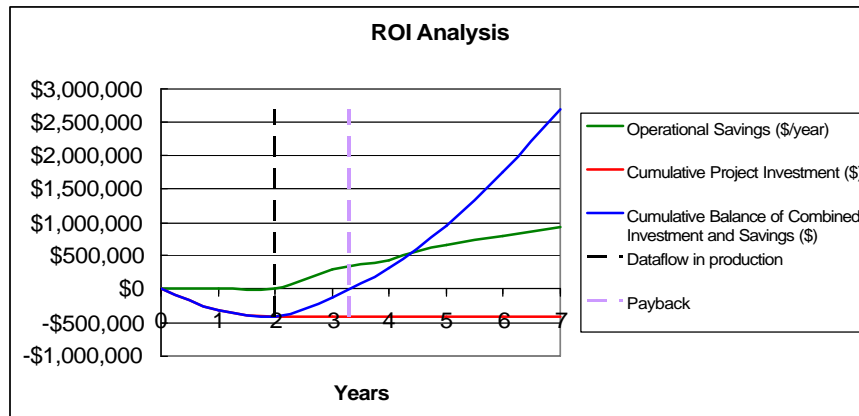
The ROI Model uses linear extrapolation to estimate where the "Cumulative Balance of Combined

Investment and Savings" curve (blue curve in above graph) crosses the x-axis. This is the point where the project begins to turn a profit, also known as the Payback Period.

	A	B
69	Table 1	
70	**Payback Period (years after project completion, data flow is in production)**	
71	A1 Project development duration	2
72	B1 Year with first positive balance	4
73	C1 Cumulative balance of the previous year ($)	-130,797
74	D1 Cumulative balance of this year ($)	304,972
75	**Payback Period (years): C1/(D1 - C1) + (B1-A1-1) =**	**1.30**

The Payback Period is defined as the time it takes for the investment to break even and begin to show a profit. As can be seen in the graph above, this happens just after Year 3. Because the first two years were spent implementing the data flow (and is not yet in production), the actual Payback period is 1.3 years.

The ROI calculation also takes into account the participation level of the facilities. Because the Annual Project Benefit is affected by the percentage of participating facilities, a ROI value is calculated for each year after production by the following equation:

$$ROI = \frac{(\text{Total Annual Project Benefit})}{\text{Initial Investment}} \, x\, 100$$

Where:

Total Annual Project Benefit = (TOTAL Annual Data flow Cost Before EN Project) – (TOTAL Annual Data flow Cost After EN Project)

The ROI is presented in a table that utilizes the data from above:

	A	B	C	D	E	F	G	H	I
77	Table 2								
78	**ROI Financial Worksheet**	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
79	A2 TOTAL Annual Dataflow Cost Before EN Project ($/year)	$1,507,994	$1,507,994	$1,507,994	$1,507,994	$1,507,994	$1,507,994	$1,507,994	$1,507,994
80	B2 TOTAL Annual Dataflow Cost After EN Project ($/year)	$0	$0	$0	$1,215,691	$1,072,225	$857,025	$713,559	$570,092
81	C2 Total Annual Project Benefit ($/year)	$0	$0	$0	$292,303	$435,769	$650,969	$794,435	$937,902
82	D2 Initial Investment	$0	$423,100	$423,100	$423,100	$423,100	$423,100	$423,100	$423,100
83	**Return On Investment (ROI) %: C2/D2 x100 =**	**0.00%**	**0.00%**	**0.00%**	**69.09%**	**102.99%**	**153.86%**	**187.77%**	**221.67%**

Notice again that as the participation level increases, the ROI also increases.

2.3.2 For data flows unaffected by the participation rate of data suppliers (AQS, RCRA and TRI):

For data flows with a constant post implementation operational cost, the ROI calculations are much simpler. The only values needed are the following:

     a.   Annual operational cost before implementation
     b.   Annual operational cost after implementation
     c.   Annual maintenance cost
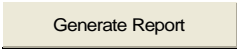   d.   Implementation cost

ROI Calculations (using the above values):

$$ROI = \frac{a - b - c}{d}$$

$$Payback\ Period = \frac{1}{ROI}$$

2.4 Report Generation

From the "Model Calc" worksheet the user can generate a Summary ROI Report by clicking the

Generate Report

button near cell H1. This will create a new "Report" worksheet that consolidates all of the results into a one page printer friendly report.