



# Driving Business Value Across the Enterprise

**Gary Wong** P.Eng., MBA, CMA

Manager, Corporate Applications  
Greater Vancouver Regional District  
[gwong@gvrd.bc.ca](mailto:gwong@gvrd.bc.ca)

# Agenda

---

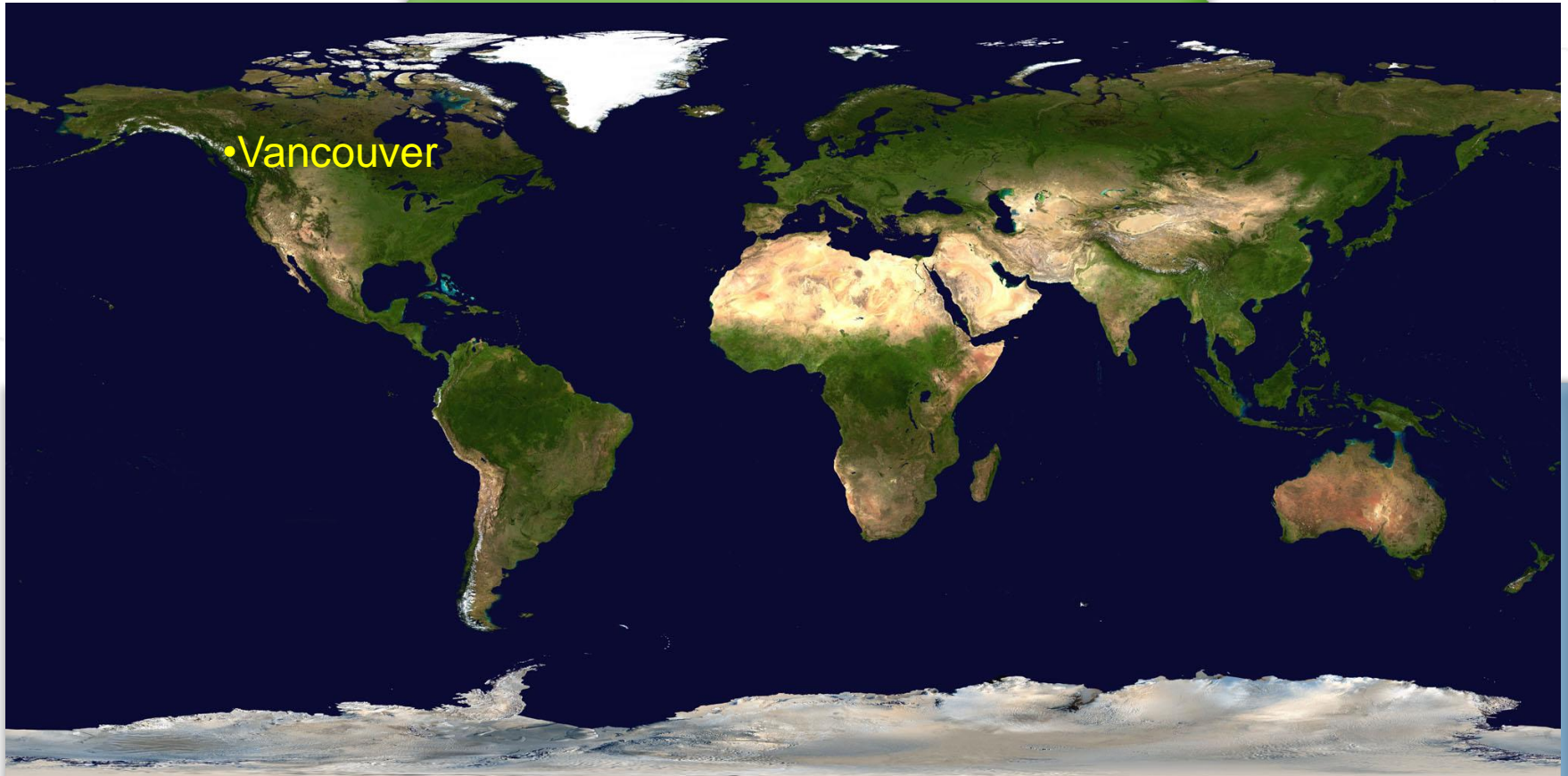
1. Background
2. Business Challenges
3. Solutions and Benefits
4. Future Plans
5. Take-Aways
6. Q & A

VALUE NOW, VALUE OVER TIME



# Background

- Greater Vancouver Regional District (GVRD)



• Building a sustainable region

• 3600 affordable housing units

**VALUE NOW, VALUE OVER TIME**



# Business Challenges

---

1. Disparate Systems and Data
2. Obsolete Systems
3. Ever Changing Environments
4. Accessible Information and Self Service

VALUE NOW, VALUE OVER TIME



# Disparate Systems and Data

## Challenge

- Multiple User Interfaces
- Disparate Technologies
- Users required to learn different systems
- Data Redundancy
- Costly Support
- Enterprise Integration Issues

## Solution

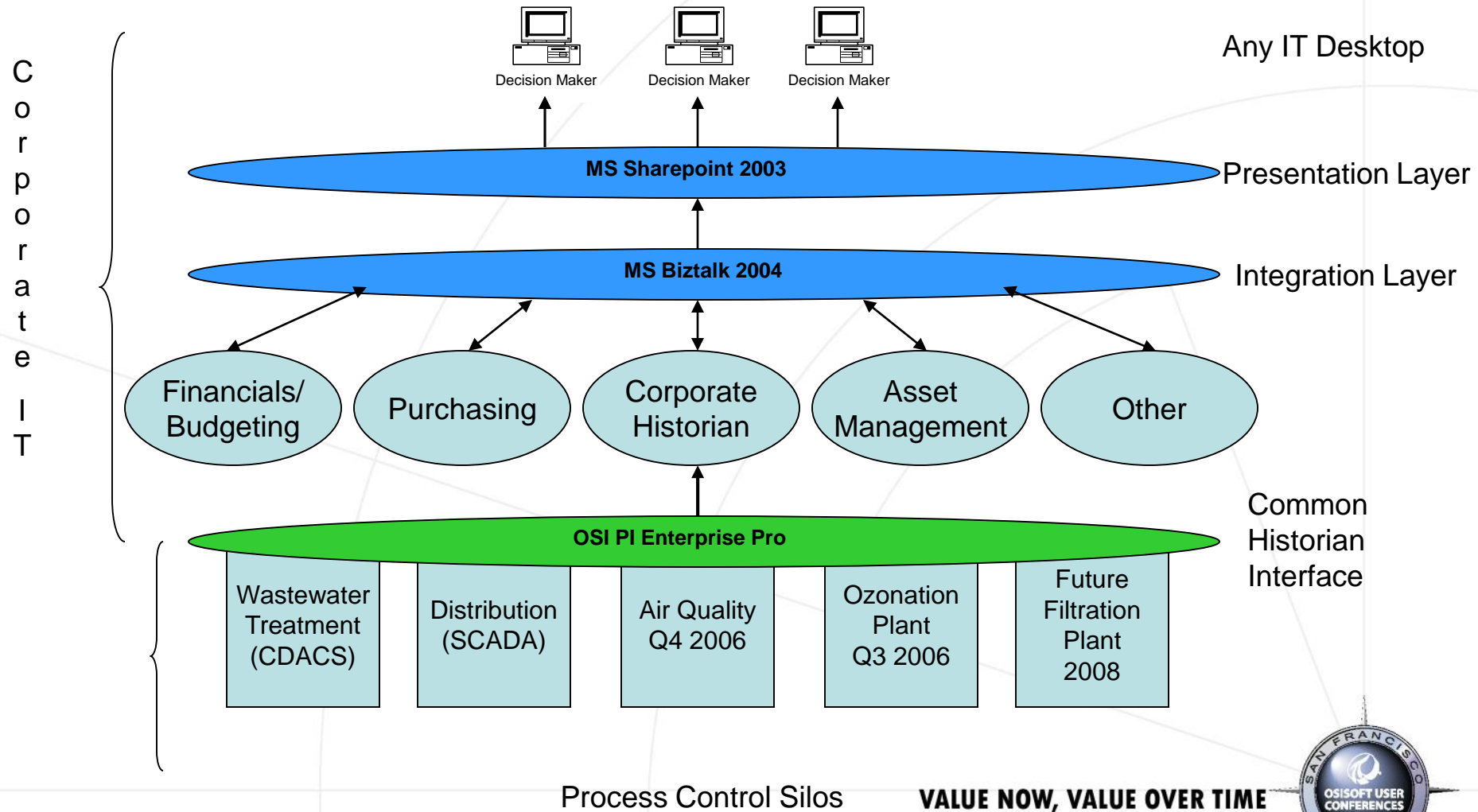
- One Corporate 250,000 tag OSI PI Enterprise Pro V3.4 server for all control system data
- Common User Interface using ProcessBook, DataLink, and RTWebParts
- Common web portal using Sharepoint across the organization
- MS Biztalk and PI SDK for data and application integration

VALUE NOW, VALUE OVER TIME





# Production Architecture



Process Control Silos

**VALUE NOW, VALUE OVER TIME**



# Benefits

---

- Do not need to standardize control systems or other disparate systems
- Cost savings in the hundreds of thousands
- People know where and how to find information
- Learn one system using familiar tools

VALUE NOW, VALUE OVER TIME



# Obsolete Systems

## Challenge

- Eight unreliable, proprietary Historians across four Wastewater Treatment Plants (WWTPs)
- Imminent failure of an obsolete and cumbersome billing system that generates \$165 million / yr in revenue from Water sales and Wastewater treatment
- Two month delay before Finance received preliminary billing information
- \$100,000+ / yr support and maintenance

## Solution

- Replaced unreliable Historians with PI redundant pair buffer nodes at each of four WWTPs sending data back to single Corporate OSI PI Server
- Corporate Historian Reporting and Information Systems (Codename CHRIS) - Based upon PI Enterprise, PI SDK, .Net, and MS Office, re-wrote the entire billing application

VALUE NOW, VALUE OVER TIME





# Benefits

---

- Removing / converting 8 obsolete, proprietary Historian licenses for immediate savings \$285,000 on licensing
- 100+GB of data in Sybase to 6GB in OSI PI
- Finance receives near real time billing information for forecasting
- More accurate and faster billing
- Support and maintenance costs projected to be reduced by 70%
- QA/QC on data with audit trail
- Reliable, supportable, cost effective, and intuitive applications that meet today's and future business needs

**VALUE NOW, VALUE OVER TIME**



# CHRIS QA/QC Screen

Corporate Historian Reporting Information System

Water Wastewater Rainfall Admin

Reza Arbabi Help Close Session

## Sewer Billing

Plant: Annacis Plant

Start Date: 2003/12/01

End Date: 2003/12/10

[Execute the Report](#)

### QA/QC on Sewer Billing Data

Filter City of White Rock-A City of Burnaby-B

Tag: SBI1FQ-100 Brunette Interceptor Totalizer

From 12/1/2003 to 12/10/2003 Change Comment Option: Show All Municipality: City of Burnaby

Valid	Timestamp	Value	Suggested	Changed
<input checked="" type="checkbox"/>	12/1/2003 12:00:00 AM	75,385,450.00	N/A	
<input checked="" type="checkbox"/>	12/1/2003 1:00:00 AM	3,095,489.00	N/A	
<input checked="" type="checkbox"/>	12/1/2003 2:00:00 AM	5,743,165.00	N/A	
<input checked="" type="checkbox"/>	12/1/2003 3:00:00 AM	8,145,181.00	N/A	
<input checked="" type="checkbox"/>	12/1/2003 4:00:00 AM	10,385,650.00	N/A	
<input checked="" type="checkbox"/>	12/1/2003 5:00:00 AM	12,596,890.00	N/A	
<input checked="" type="checkbox"/>	12/1/2003 6:00:00 AM	14,601,520.00	N/A	
<input checked="" type="checkbox"/>	12/1/2003 7:00:00 AM	16,758,640.00	N/A	
<input checked="" type="checkbox"/>	12/1/2003 8:00:00 AM	19,271,870.00	N/A	
<input checked="" type="checkbox"/>	12/1/2003 9:00:00 AM	22,383,510.00	N/A	
<input checked="" type="checkbox"/>	12/1/2003 10:00:00 AM	25,607,840.00	N/A	
<input checked="" type="checkbox"/>	12/1/2003 11:00:00 AM	29,226,510.00	N/A	
<input checked="" type="checkbox"/>	12/1/2003 12:00:00 PM	32,627,410.00	N/A	
<input checked="" type="checkbox"/>	12/1/2003 1:00:00 PM	36,079,790.00	N/A	
<input checked="" type="checkbox"/>	12/1/2003 2:00:00 PM	39,335,320.00	N/A	
<input checked="" type="checkbox"/>	12/1/2003 3:00:00 PM	42,464,020.00	N/A	
<input checked="" type="checkbox"/>	12/1/2003 4:00:00 PM	45,488,140.00	N/A	
<input checked="" type="checkbox"/>	12/1/2003 5:00:00 PM	48,639,760.00	N/A	
<input checked="" type="checkbox"/>	12/1/2003 6:00:00 PM	51,649,680.00	N/A	
<input checked="" type="checkbox"/>	12/1/2003 7:00:00 PM	54,798,800.00	N/A	
<input checked="" type="checkbox"/>	12/1/2003 8:00:00 PM	58,222,000.00	N/A	
<input checked="" type="checkbox"/>	12/1/2003 9:00:00 PM	61,545,960.00	N/A	
<input checked="" type="checkbox"/>	12/1/2003 10:00:00 PM	64,824,400.00	N/A	
<input checked="" type="checkbox"/>	12/1/2003 11:00:00 PM	68,543,380.00	N/A	
<input checked="" type="checkbox"/>	12/2/2003 12:00:00 AM	71,410,280.00	N/A	
<input checked="" type="checkbox"/>	12/2/2003 1:00:00 AM	3,111,363.00	N/A	
<input checked="" type="checkbox"/>	12/2/2003 2:00:00 AM	5,794,955.00	N/A	
<input checked="" type="checkbox"/>	12/2/2003 3:00:00 AM	8,170,547.00	N/A	
<input checked="" type="checkbox"/>	12/2/2003 4:00:00 AM	10,294,490.00	N/A	
<input checked="" type="checkbox"/>	12/2/2003 5:00:00 AM	12,151,560.00	N/A	

Graph will presented here

QA/QC Ready.

# CHRIS Admin Screen

Corporate Historian Reporting Information System

Water Wastewater Rainfall Admin Reza Arbabi Help Close Session

**Navigation**  
Select a function from the list.

**Functions**

- Tag Pool
- Configuration Tags
- Municipality
- Plant/System/Source
- Non Revenue/Wastewater
- Sewer System Admin.**
- Audit Trail

**Sewer System Administration**

Municipality Sewers Plant Tributary

**Municipality**

Refresh

- City of Burnaby
- City of Coquitlam
- City of Langley
- City of New Westminster
- City of Port Coquitlam
- City of Port Moody
- City of Richmond
- City of Surrey**
- City of Vancouver
- City of White Rock
- Corporation of Delta
- District of Maple Ridge
- District of Pitt Meadows
- Township of Langley

**Rainfall Tag**

Save Refresh

Rainfall Tag: SDT34YQN

**Municipality Catchment/Temporary Value**

Save Refresh

Catchment/Temporary Value: 3.09

**Sewer Tags**

Save Refresh Excel

Tag Name	+/-	Balance
SNE9FQ-200	+	<input checked="" type="checkbox"/>
SNS2FQ-200	+	<input checked="" type="checkbox"/>
SWF1FQ-100	-	<input checked="" type="checkbox"/>
SBYNFQ-100	-	<input checked="" type="checkbox"/>
SNS2FQ-100	+	<input checked="" type="checkbox"/>
SSS3FQ-100	+	<input checked="" type="checkbox"/>
SNE9FQ-101	-	<input checked="" type="checkbox"/>
SKTZFQ-100	-	<input checked="" type="checkbox"/>
SLGPFQ-200	-	<input checked="" type="checkbox"/>
SLGPFQ-101	+	<input checked="" type="checkbox"/>
*		<input type="checkbox"/>

Sewer Admin Section.

VALUE NOW, VALUE OVER TIME



# Utilities Consumption Report

Microsoft Excel - AI Daily Utility.xls

File Edit View Insert Format Tools Data Window PI Help

Type a question for help

Arial 10 B I U

Reply with Changes... End Review...

Q11 {=PI(CalcDat("A-JSI-80-004D.pv", \$A\$5, \$A\$4, "1 Days", "average", 1, 0, "gvprdhst01"))}

Annacis Utilities Report - Electrical

	CoGen Total	BCHydro Total	Plant Total	BCH 002	BCH 004	Total	Power	Peak Demand	Ave. Demand	Demand	CoGen	Nat	Nat	Dig 5	Dig 6	Dig 7	Dig 8			
	kW	kW	kW	KVA	KVA	KVA	Factor	KVA	KVA	\$	RTH's	m3	\$							
20060217	2,176	\$1,456	3,638	\$2,433	5,814	\$3,889	1892	1835	3,727	0.98	5,465	3,727	\$17,631	68	54	\$20	15,379	8	17,828	12,87
20060218	2,154	\$1,441	3,384	\$2,263	5,538	\$3,704	1751	1719	3,470	0.98	5,465	3,469	\$16,411	72	0	\$0	15,562	8	17,127	12,99
20060219	2,086	\$1,395	3,647	\$2,439	5,733	\$3,835	2121	1617	3,738	0.98	5,465	3,738	\$17,681	66	0	\$0	15,079	6	15,791	13,16
20060220	2,163	\$1,447	3,230	\$2,161	5,394	\$3,608	2201	1185	3,385	0.95	5,465	3,386	\$16,013	72	0	\$0	15,750	4	18,221	12,96
20060221	2,174	\$1,454	3,211	\$2,148	5,385	\$3,602	2278	1071	3,348	0.96	5,465	3,348	\$15,838	72	169	\$62	13,067	0	18,104	12,94
20060222	2,375	\$1,589	3,301	\$2,208	5,676	\$3,797	2150	1271	3,421	0.95	5,465	3,420	\$16,181	72	85	\$32	14,922	0	16,867	12,92
20060223	2,203	\$1,474	3,522	\$2,356	5,725	\$3,829	2279	1332	3,611	0.98	5,465	3,611	\$17,080	72	254	\$94	14,576	1	15,421	12,83
20060224	1,828	\$1,223	3,930	\$2,628	5,757	\$3,851	1930	2081	4,011	0.98	5,465	4,011	\$18,972	70	396	\$147	14,069	2	14,942	12,63
20060225	1,980	\$1,325	3,741	\$2,502	5,721	\$3,827	1615	2215	3,830	0.98	5,465	3,830	\$18,117	70	30	\$11	14,937	7	15,872	12,90
20060226	2,265	\$1,515	3,457	\$2,313	5,722	\$3,827	1488	2073	3,561	0.97	5,465	3,561	\$16,844	72	0	\$0	15,426	2	15,978	12,68
20060227	2,785	\$1,863	2,846	\$1,904	5,631	\$3,767	1588	1352	2,940	0.97	5,465	2,940	\$13,906	85	85	\$31	15,180	3	15,993	12,72
20060228	2,779	\$1,859	2,910	\$1,880	5,589	\$3,738	1559	1315	2,874	0.98	5,461	2,874	\$13,594	88	0	\$0	15,487	4	16,290	12,85
20060301	3,049	\$2,039	2,611	\$1,746	5,660	\$3,786	1398	1305	2,703	0.97	3,373	2,703	\$12,786	96	0	\$0	17,348	0	18,036	12,87
20060302	2,557	\$1,711	2,354	\$1,574	4,911	\$3,285	1109	1354	2,493	0.94	3,439	2,493	\$11,791	89	0	\$0	20,210	75	21,816	15,43
20060303	2,003	\$1,340	2,798	\$1,871	4,801	\$3,211	1102	1855	2,957	0.95	3,439	2,956	\$13,986	72	0	\$0	18,742	407	20,132	17,28
20060304	2,000	\$1,338	2,801	\$1,873	4,801	\$3,211	1130	1836	2,966	0.94	3,439	2,967	\$14,030	72	0	\$0	16,897	221	17,920	15,68
20060305	2,156	\$1,442	3,020	\$2,020	5,176	\$3,462	1524	1702	3,226	0.94	3,502	3,226	\$15,261	72	0	\$0	14,972	0	16,673	13,80
20060306	2,165	\$1,448	3,017	\$2,018	5,182	\$3,466	1716	1514	3,230	0.93	3,501	3,230	\$15,279	72	0	\$0	15,003	0	16,664	14,06
20060307	2,094	\$1,400	3,102	\$2,075	5,195	\$3,475	1454	1835	3,290	0.94	3,501	3,289	\$15,560	72	0	\$0	15,065	1	15,799	14,27
20060308	2,044	\$1,367	3,263	\$2,182	5,306	\$3,549	1560	1844	3,403	0.96	3,915	3,403	\$16,098	72	0	\$0	17,307	0	17,969	16,15
20060309	2,004	\$1,340	3,238	\$2,166	5,242	\$3,506	1395	2006	3,401	0.95	3,999	3,401	\$16,085	72	0	\$0	18,854	0	19,894	17,73
20060310	2,042	\$1,366	3,319	\$2,220	5,360	\$3,585	1347	2123	3,469	0.96	3,999	3,470	\$16,410	72	0	\$0	16,646	0	17,400	15,47
20060311	2,249	\$1,504	3,358	\$2,246	5,607	\$3,750	1409	2066	3,475	0.97	3,999	3,475	\$16,438	72	0	\$0	14,374	1	14,859	13,49
20060312	2,302	\$1,540	3,351	\$2,241	5,653	\$3,781	1505	1938	3,443	0.97	4,036	3,443	\$16,284	72	0	\$0	15,542	2	16,142	14,53
20060313	2,273	\$1,521	3,135	\$2,097	5,409	\$3,618	1616	1662	3,278	0.96	4,036	3,278	\$15,507	72	0	\$0	16,374	0	17,023	15,29
20060314	2,083	\$1,394	3,134	\$2,096	5,217	\$3,490	1589	1682	3,271	0.96	4,036	3,271	\$15,473	72	0	\$0	15,862	0	16,477	14,76
20060315	2,028	\$1,356	3,040	\$2,034	5,068	\$3,390	1441	1723	3,164	0.96	4,036	3,163	\$14,966	71	28	\$10	16,351	1	16,980	15,21
20060316	1,974	\$1,320	3,035	\$2,030	5,009	\$3,350	1367	1835	3,202	0.95	4,036	3,202	\$15,144	72	0	\$0	18,057	0	18,894	16,79
20060317	1,973	\$1,320	3,023	\$2,022	4,996	\$3,342	1336	1851	3,187	0.95	4,036	3,187	\$15,076	72	0	\$0	17,813	1	18,269	16,43
20060318	1,979	\$1,323	2,827	\$1,891	4,806	\$3,214	1208	1758	2,965	0.95	4,036	2,965	\$14,027	72	0	\$0	16,739	0	17,150	15,47
20060319	2,063	\$1,380	2,848	\$1,905	4,911	\$3,285	1298	1688	2,986	0.95	4,036	2,986	\$14,125	72	0	\$0	15,160	0	15,343	13,85
Ave	2,194	\$1,467	3,161	\$2,114	5,355	\$3,582	1,593	1,698	3,291	0.96	4,476	3,291	74	36	\$13	16,026	24	17,093	14,21	
Min	1,828	\$1,223	2,354	\$1,574	4,801	\$3,211	1,102	1,071	2,493	0.93	3,373	2,493	66	0	\$0	13,067	0	14,859	12,6	
Max	3,049	\$2,039	3,930	\$2,628	5,814	\$3,889	2,275	2,215	4,011	0.98	5,465	4,011	96	396	\$147	20,210	75	21,816	17,7	
Total	\$45,488		\$65,542		\$111,030							1,102	\$408	496,805	755	529,868	443.1			
CoGen Total																				
BCHydro Total																				
Plant Total																				
BCH 002																				
BCH 004																				
Total																				
Power																				
Peak Demand																				
Ave. Demand																				
Demand																				
CoGen																				
Nat																				
Nat																				
Dig 5																				
Dig 6																				
Dig 7																				
Dig 8																				
DEVIATION	NA	NA	10%	10%	10%	10%	na	na	10%	na	na	na	na	na	na	na	na	na	na	
HIGH FLAG	4,100																			
Recoveries	/kW	/Costs	/Chemical	/DEMAND	/Electrical															

Ready Calculate NUM

start Drafts - Micros... OSI UC - Message Microsoft Power... AIWWTP Home ... Microsoft Excel - ... 4:15 PM

• Daily analysis for power generation / consumption



VALUE NOW, VALUE OVER TIME



# Ever Changing Environments

## Challenge

- SCADA system to be replaced by 2007/2008 – Data continuity for water distribution and wastewater collection
- Water Operations Optimization – simulations, forecasting, and predictive modeling requiring operational and process data
- New Water Filtration Plant online in 2008 – Up to 40,000 new tags
- MS Office System 2007 pilot – portal and desktop evolving

## Solution

- OSI PI Enterprise Corporate Server will be able to collect from new control systems
- All control system data resides in OSI PI Enterprise Server and is available for existing and future modeling and forecasting requirements
- CHRIS application built upon PI SDK is written in .Net 2.0, C#, and SQL 2005

VALUE NOW, VALUE OVER TIME





# Benefits

---

- Scalable systems that are future proof
- Common interface through CHRIS, RtWebParts, DataLink, or ProcessBook
- Keeping an agile environment
- As new control systems are implemented, users continue receiving information they need to make better business decisions

VALUE NOW, VALUE OVER TIME



# Accessibility and Self Service

---

## Challenge

- How do we increase ROI further?
- Training and support increases as user demand increases
- Are the right people getting the right information at the right time?

## Solution

- Results oriented, no fanfare
- Training: OSI on-site sessions, train the trainers model, and computer based training
- RtWebParts in production with SVG viewer on all 1200+ desktops
- DataLink and ProcessBook on request

VALUE NOW, VALUE OVER TIME



# Benefits

---

- OSI PI is saving tax dollars, protecting the environment, and increasing safety
- Improved quality of life in the region
- Storm Sewer Overflow Predictor
- Iona Island Overflow Predictor
- Dam Monitoring System
- Self service – people are receiving the information required to make decisions

VALUE NOW, VALUE OVER TIME



# Storm Sewer Overflow Predictor

---

## Before PI:

- Data not available
- Could only view data on one SCADA console
- Data and trends could not be analyzed (eg. No Excel support)
- On the North Shore of Vancouver, overflowing storm sewers caused flooding in residential basements. The GVRD would receive calls after the overflow event – too late!

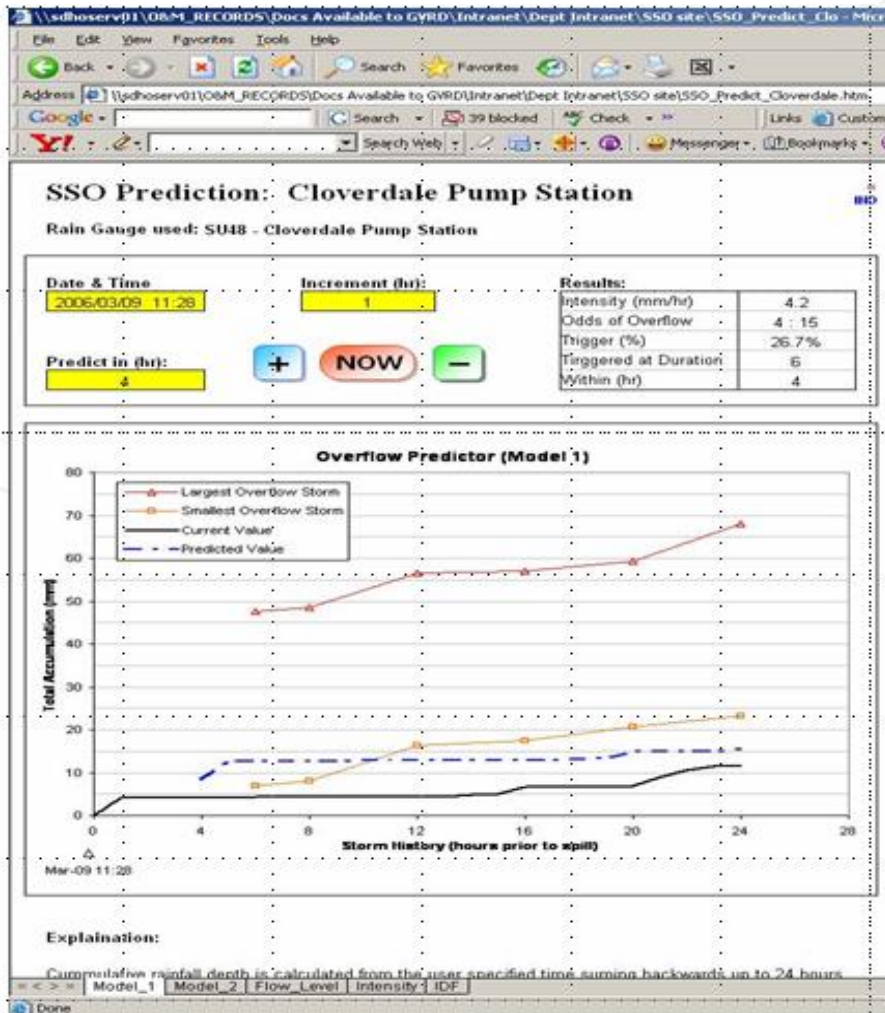
## With PI:

- We now get data quickly, easily, and in real time
- Allows us to be very creative and efficient with what we can do with the data
- This is how the Storm Sewer Overflow (SSO) predictor was born
- Through DataLink, current flow data in Excel is compared to historical data to predict the probability of an overflow. The Spreadsheet is then stored as html files and made available on the Intranet. Now, no more overflows.

VALUE NOW, VALUE OVER TIME



# SSO Predictor



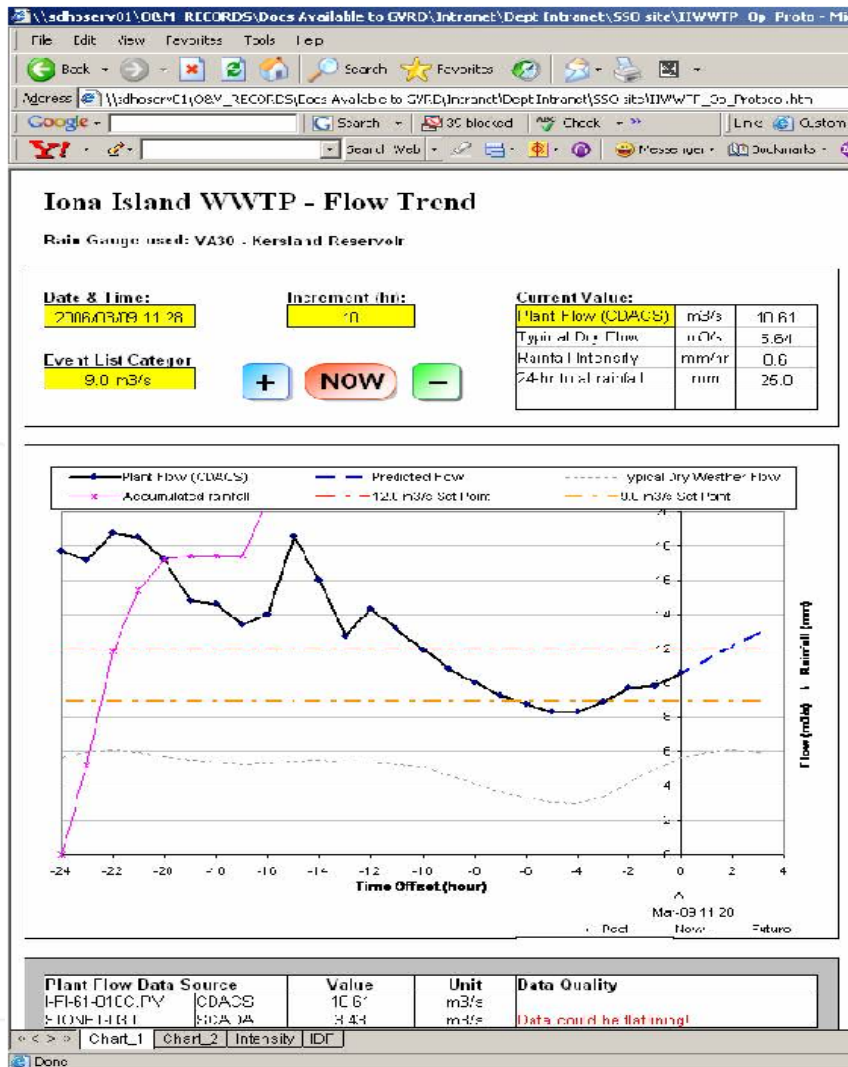
- If the website shows a high probability of overflow, GVRD crews can be sent out to open valves to prevent the overflow and flooded basements (\$\$\$)!
- Marilyn Towill – “I’ve been monitoring the SSO Predictor and it gave me some comfort through the rainy holiday season knowing that no overflow was expected.”

VALUE NOW, VALUE OVER TIME





# Wastewater Overflow Predictor



- If the wet well will exceed its safety limit, operators can drive pumps harder to keep the wet well at safe levels. This prevents raw sewage overflows, damage to the environment, and costs to the GVRD in fines.

- Up to \$1,000,000 per violation

VALUE NOW, VALUE OVER TIME



# Dam Monitoring

- GVRD dams are monitored for safe levels of flows and pressures
- Alarming is a challenge since alarm limits are not set points but instead are equations based on a lake level
- Currently the control system cannot handle equations for alarm limits without custom programming



VALUE NOW, VALUE OVER TIME



# What's The Dam Solution?

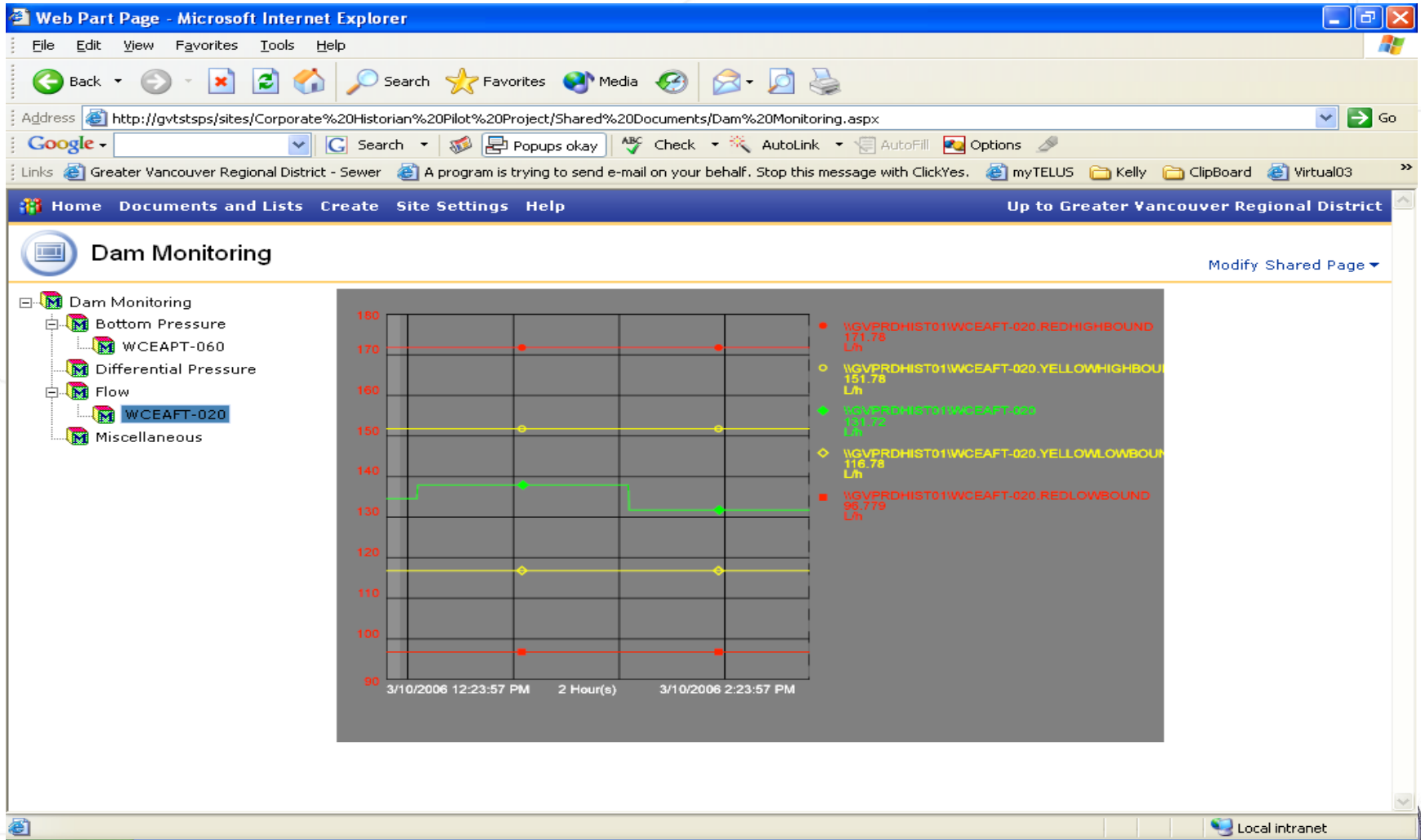
---

- Calculated tags used for alarm limits
- Allows alarm limit history to be stored and trended along side monitored tags
- Tags are monitored by an e-mail program. E-mails are sent when alarm limits are breached.
- RtTreeView and RtTrend used in SharePoint for displaying alarm data

VALUE NOW, VALUE OVER TIME



# RtWebParts Monitoring





# Future Plans

---

- Continue Roadmap from 2004
- Ozonation Plant Information
- Air Quality Monitoring Information
- Water Filtration Plant Information
- More KPIs and reporting through Sharepoint / RtWebParts

VALUE NOW, VALUE OVER TIME





# Take-Aways

---

**Roadmap** – vision backed by facts and expertise

**Value** – cost effective solutions that meet business needs

**Momentum** – continue to build upon your successes

VALUE NOW, VALUE OVER TIME



# Q & A

---

“Keep the momentum going!”

Tom Heath  
VP, Operations and Maintenance  
GVRD

**VALUE NOW, VALUE OVER TIME**

