Building the Case for Asset Framework at International Paper

Presented by Rick Smith

INTERNATIONAL PAPER

Agenda

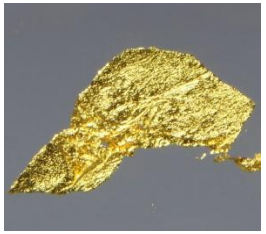
- About International Paper
- Building the Case
  1. Single Version of the Truth
  2. Downtime Tracking
  3. Tracking (Energy) Consumption
- Future Plans

International Paper

- World's Largest Pulp and Paper Company
  - Founded 1898 (117 Years Ago)
  - 58,000 Employees
  - $23.6 Billion Net Sales (2014)
- OSIsoft Installed Base
  - 35 Facilities (70 PI Servers)
    - US, Brazil, France, India, Poland, Russia
  - 1.5+ Million PI Tags

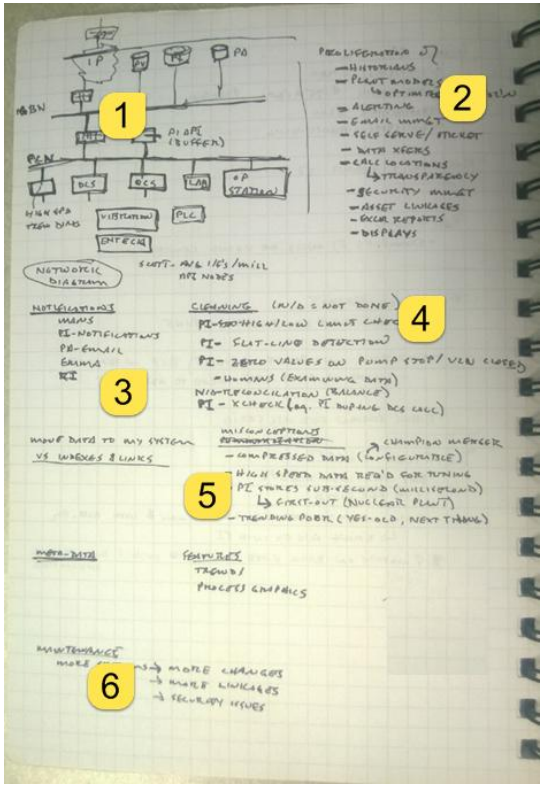
Why Do I Need a Business Case?

- Infrastructure IS NOT a Shiny Rock
- Incumbent Solutions In Place
- Point Solutions are Everywhere
- Point-to-Point Data Exchange is Everywhere
- The Manufacturing Village is Larger Than Before
- There is Money Involved…Time is Money…
- People Like What they Have… Change is BAD!!



Red-Eye Flight from OSISoft 2014 UC…

1. Typical Network
2. Proliferation
3. Notifications
4. Data Cleaning
5. Misconceptions
6. More…More… More



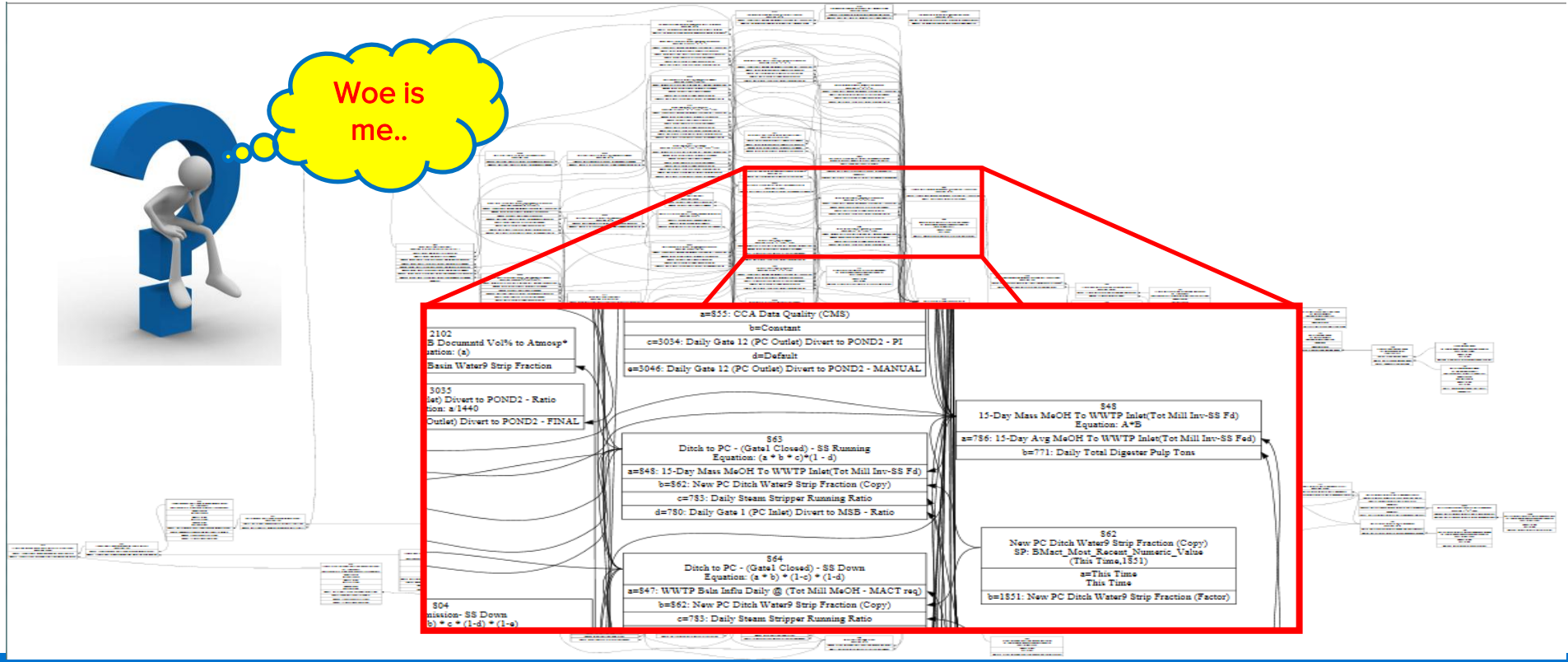
Building the Business Case

1. Single Version of the Truth
2. Downtime Tracking
3. Tracking (Energy) Consumption

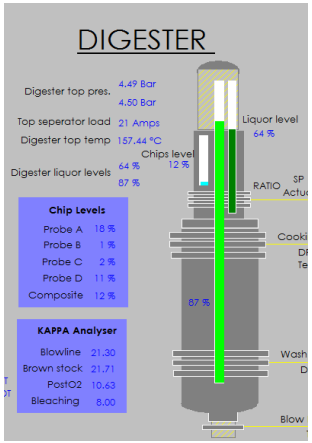
Case #1: Single Version of the Truth

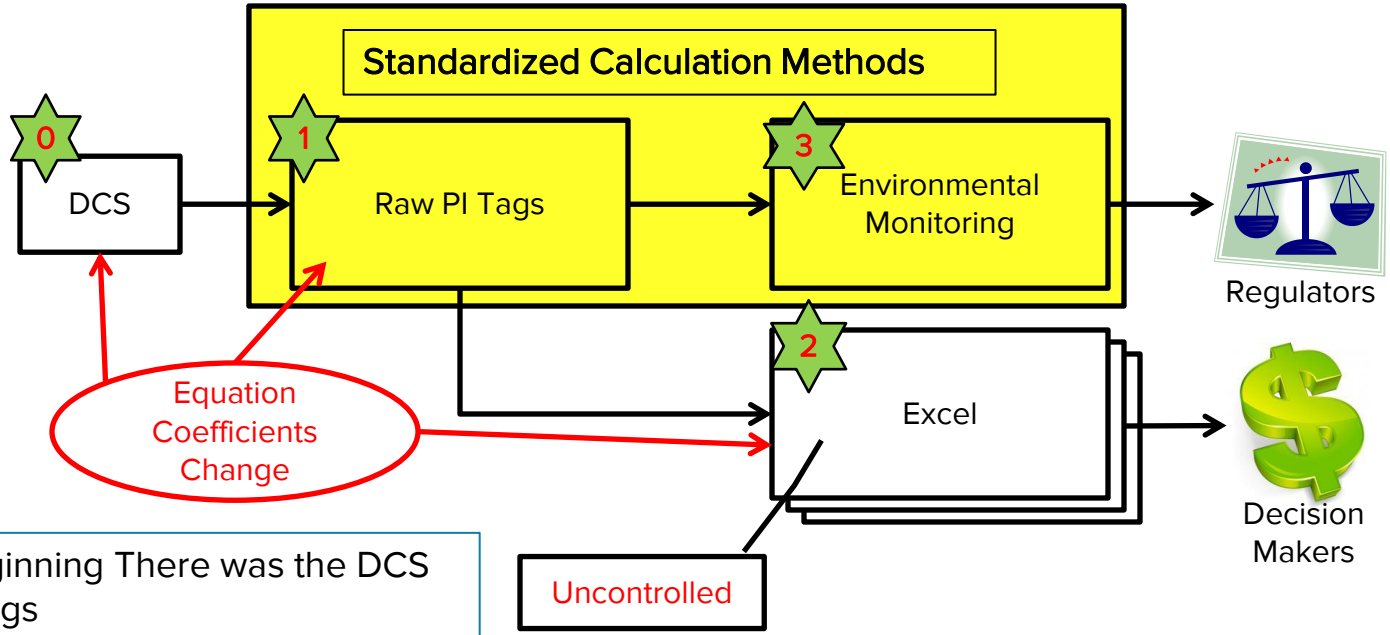
- Question: How Much We Make?
- The Answer Depends on Who You Ask…
  - What Base-Line Time Period Selected?
  - What PI Tags Were Used?
  - What Calculations Were Used?
  - How Was Data Filtered?

Getting to the Answer Can be Complex



Digester Production Calculations



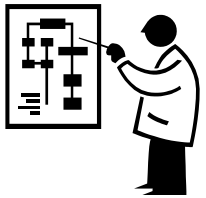


0. In the Beginning There was the DCS
1. Raw PI Tags
2. Excel Calcs From Raw Inputs
3. Daily Env. Calcs Added

Kamyr Digester Production (ADUBTPD)

Air-Dried Unbleached Tons per Day =
Chip Meter Speed (rpms) * Bulk Density (lb/ft^3) *
Chip Meter Volume (ft^3) * Chip Meter Fill Factor * Yield *
[1440 min/day] / [2000 lb/US Ton]

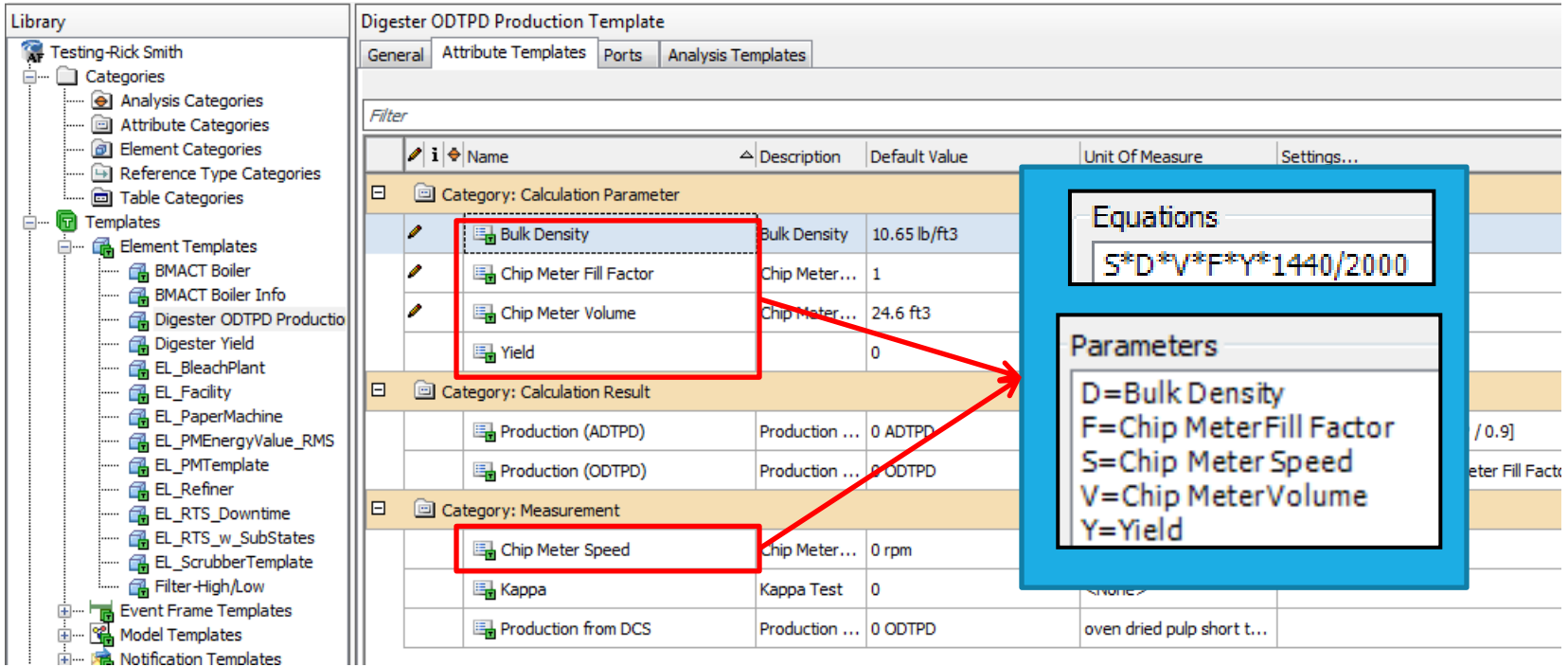
Where Yield = [A + B*(Kappa) + C * (Kappa)^2]



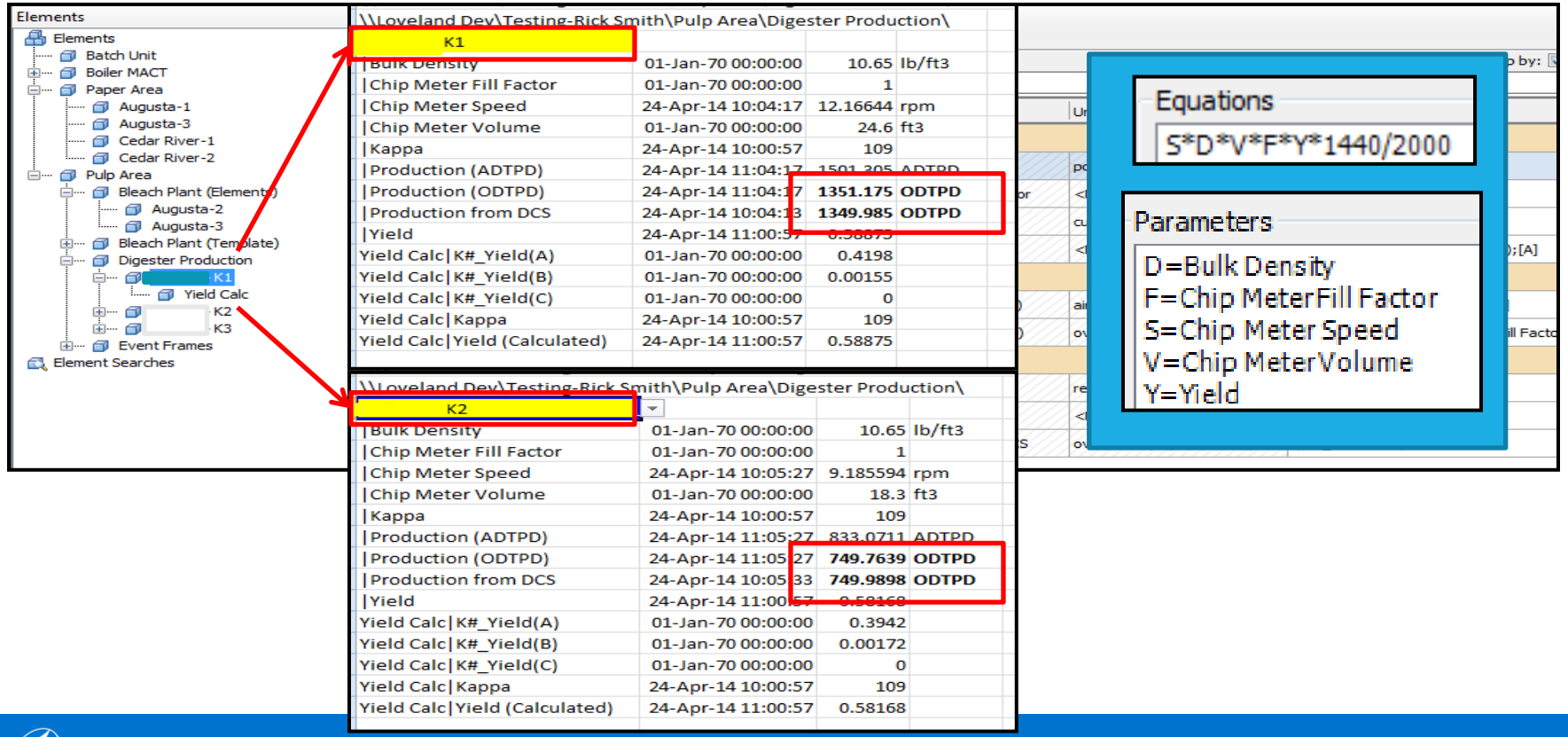
PI PE -> '03SIC103.PV' * 10.65 * 24.6 * 1.0 * (0.4198 + 0.00155 * 'K1Kappa.PV' + 0.0 * 'K1Kappa.PV' * 'K1Kappa.PV') * 1440 / 2000

Yield Coefficients and “Constants” Change

Build the Calculation Template…



Standard Calculations Via AF

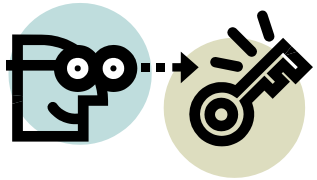


Asset Framework (AF) Calculation Conversion Benefits

- Standard Calculation Methodology
  - Controlled By the AF Template
  - Therefore, One Version of the Truth
- AF Becomes the One Stop Shop for…
  - Enterprise Alias for Calculated Results
  - Time Stamped Coefficient Changes
  - DCS/PI Calculation Comparison

Case #2: Downtime Tracking

- Overall Equipment Efficiency (OEE) =
  Availability * Speed Efficiency * Quality
  - Availability: Downtime/Slowback System (RTS)
  - Speed Efficiency: Maximum Sustainable Rate
  - Quality: A1 Tons Acceptance



- Reliability Tracking System (RTS)
  - Windows Service Reads PI Data and Writes State Information to PI
    - 0=Normal; 1=Slow; 2=Down
    - Event System Triggers Off State Tag
  - Excel Report for Each Unit Operation
  - ~300 Unit Operations Monitored

Report Output

Top 15 Reasons Sorted by Equivalent Downtime

YEAR-TO-DATE

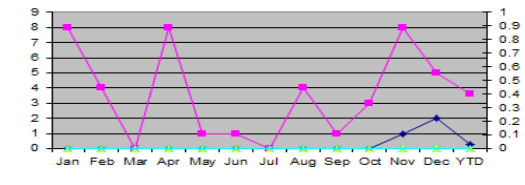
REASON LEVEL 1	REASON LEVEL 2	REASON LEVEL 3	# of Incidents	Equiv. DT (%)
Internal Equipment	#1 Lime Kiln	Other	11	0.9%
Internal Equipment	#1 Lime Kiln	ID Fan	1	0.9%
Internal Equipment	#1 Lime Kiln	Precoat Filter	21	0.9%
Internal Equipment	#1 Lime Kiln	Scrubber	4	0.7%
External Upstream	#2 Recovery Boiler	GL Inventory Low	1	0.6%
Internal Process	#1 Lime Kiln	Cool Down	1	0.2%
Internal Equipment	#1 Caustic			
External Utilities	Other			
Internal Process	#1 Lime Ki			
Internal Process	#1 Lime Ki			
Internal Process	#1 Lime Ki			
Internal Process	#1 Lime Ki			
Total *				

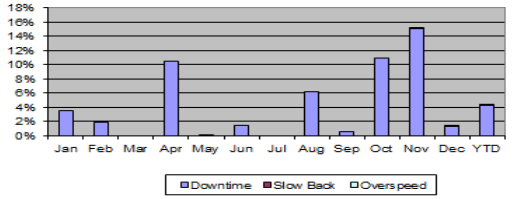
INTERNATIONAL PAPER

RTS Monthly Report Downtime Summary

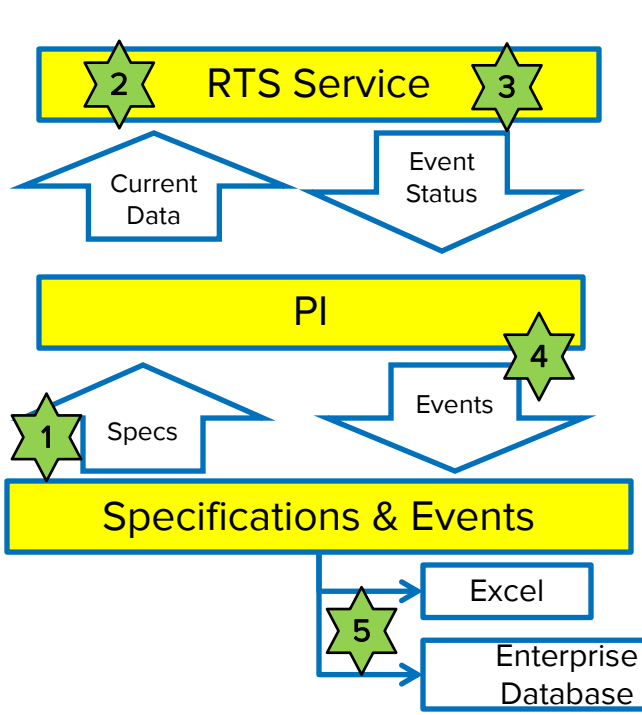
Date	12/31/10
Mill	Mill-X
Equipment	#1 Lime Kiln

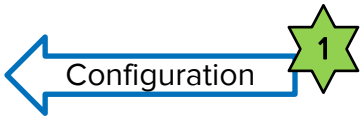
EQUIVALENT DOWNTIME	For Month No. of Events	For Month Duration (Hr)	For Month Equival. DT (%)	Year-To-Date No. of Events	Year-To-Date Duration (Hr)	Year-To-Date Equival. DT (%)
Slowback Mode	2	1.1	0.1%	3	3.2	0.0%
Downtime Mode	5	10.5	1.4%	43	1041.2	4.3%
Total			1.4%			4.3%
Overspeed Mode	0	0.0	0.0%	0	0.0	0.0%
Availability (100 - Downtime %)		733.5	98.6%		7718.9	95.7%
Avg. Time Between DT Events		148.8	hr		203.7	hr
Average Downtime Event Time		0.0	hr		0.1	hr



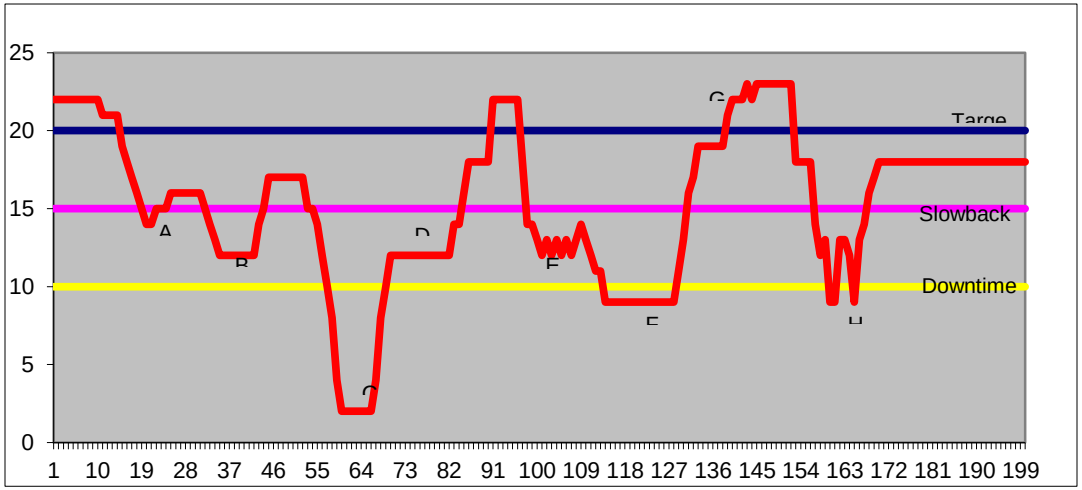


Downtime Data Flow (2002-Present)

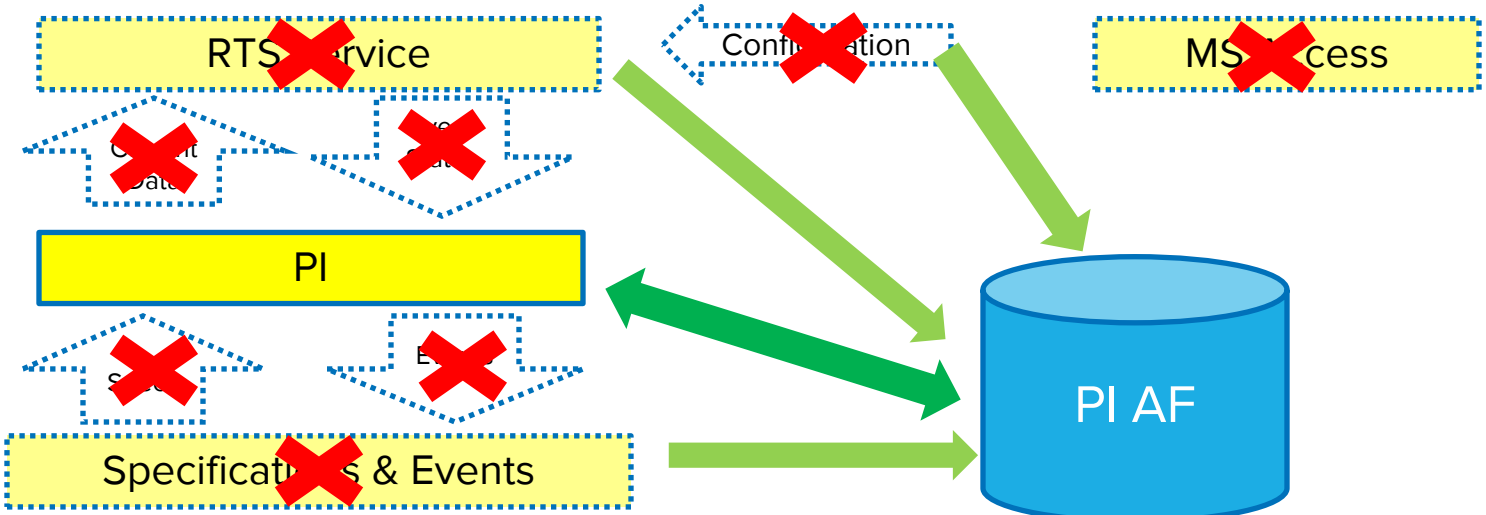




MS Access



Future Downtime Data Flow



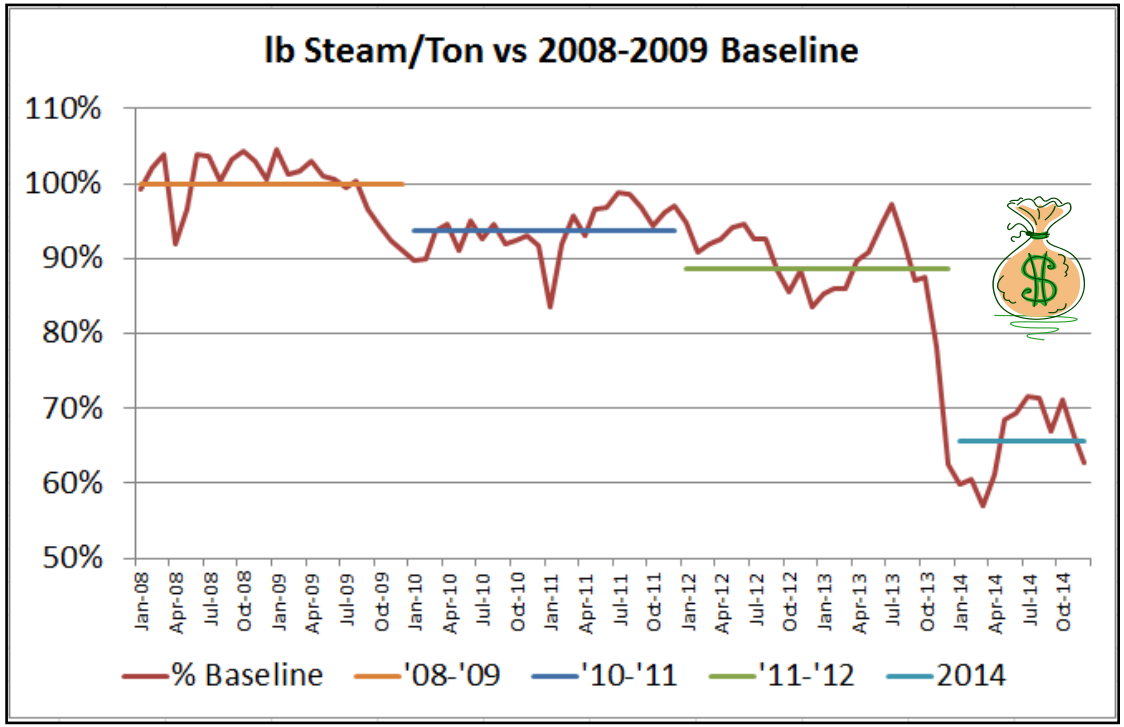
Event name	Start time	End time	Duration	Target.Average	Value.Average
EF_RTS_RTS-Test1_SS_2014-09-12 06:50:00	12-Sep-14 06:50:00			40.00	45.67
EF_RTS_RTS-Test1_SS_2014-09-16 06:20:00	16-Sep-14 06:20:00	16-Sep-14 06:31:00	0 0:11:00	40.00	27.75
EF_RTS_RTS-Test1_SS_2014-09-16 06:50:00	16-Sep-14 06:50:00	16-Sep-14 11:22:00	0 4:32:00	40.00	8.11
EF_RTS_RTS-Test1_SS_2014-09-16 18:32:00	16-Sep-14 18:32:00	16-Sep-14 23:07:00	0 4:35:00	40.00	9.42
EF_RTS_RTS-Test1_SS_2014-09-16 23:11:00	16-Sep-14 23:11:00	16-Sep-14 23:32:00	0 0:21:00	40.00	26.70

Converting Downtime to Event Frames…

- Simplify Environment
  - Eliminate Distributed Access Databases
  - Eliminate Windows System Service
  - Remove Specification/Event System Requirement
- Configuration with Standard PI Tools
- Will Work at All IP Manufacturing Facilities
- Simplifies Reporting Requirements

Case #3: Tracking (Energy) Consumption

- Huge Cost Driver
- Time Consuming to Monitor
- When to Invest?
- Where to Invest?



The “Your.Name.Here” Spreadsheet

- For Each of 60 Paper Machines
- Summarize PI Data for 20-40 PI Tags
    - Retrieve 1-Month of Data
    - Allocate/Aggregate Data for “Missing” PI Tags
    - Remove “Bad Data” (Sheet Break, Downtime, etc.)
  – Copy/Paste Values into Enterprise Spreadsheet
- Update Chart Ranges (Enterprise Spreadsheet)
- This Exercise Takes 2+Days/Month

Can We Reduce the Effort?

- OSISoft Paper Machine Demonstration
  - Jim Black (Industry Principal-OSISoft)
  - Gopal Gopalkrishnan (Solutions Architect-OSISoft)
- AF Elements
  - Steam, Electricity and Sheet Break Status
- Asset Analytics (For Each Element)
  - Value Adjusted For Sheet Break (Event-Triggered)
  - Data Quality Check (Daily Event Frame)

Monthly Summary

Date Range

Monthly Averages

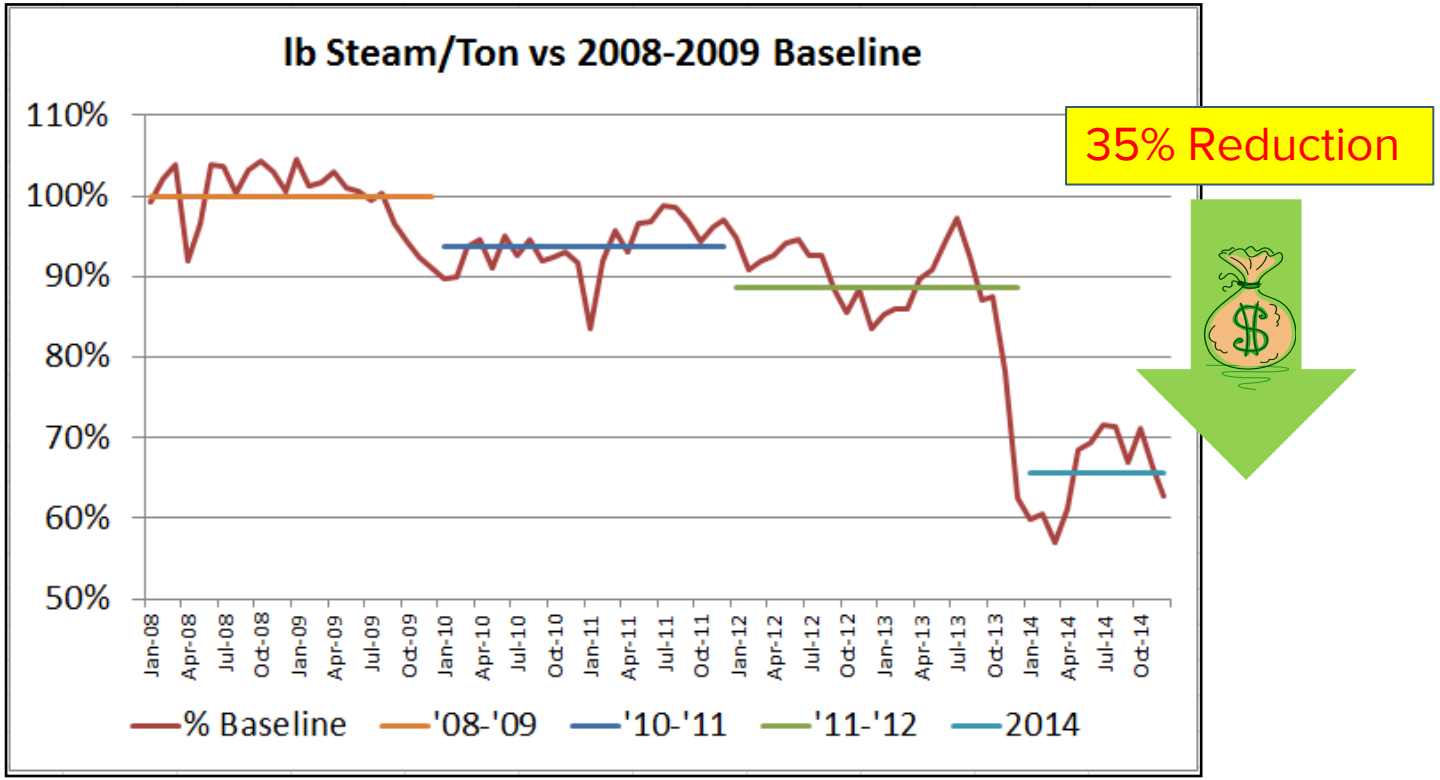
	Start time	End time	ProductionRate	Tons	Electricity_KwhPerTon	Steam_HP_LbsPerTon	Electricity	Steam_HP
PM1_01/2013	01-Jan-13 00:00:00	01-Feb-13 00:00:00	52.99943161	39431.57813	78.89457703	1424.099365	3110937.75	56154.48438
PM1_02/2013	01-Feb-13 00:00:00	01-Mar-13 00:00:00	65.14954376	43780.49219	72.2878418	1326.632324	3164797.25	58080.61719
PM1_03/2013	01-Mar-13 00:00:00	01-Apr-13 00:00:00	63.43252182	47130.36328	67.87601471	1332.900024	3199021.25	62820.0625
PM1_04/2013	01-Apr-13 00:00:00	01-May-13 00:00:00	60.65192032	43669.38281	71.24710846	1341.715454	3111317.25	58591.88672
PM1_01/2014	01-Jan-14 00:00:00	01-Feb-14 00:00:00	45.7202034	34015.83203	82.536026	1544.678101	2807531.5	52543.51172
PM1_02/2014	01-Feb-14 00:00:00	01-Mar-14 00:00:00	67.36373901	45268.43359	75.16860199	1325.387329	3402765	59998.21094
PM1_03/2014	01-Mar-14 00:00:00	01-Apr-14 00:00:00	57.92578125	43038.85547	76.41738892	1475.846313	3288917	63518.73438

	Start time	End time	ProductionRate	Tons	Electricity_KwhPerTon	Steam_HP_LbsPerTon	Electricity	Steam_HP
PM2_01/2013	01-Jan-13 00:00:00	01-Feb-13 00:00:00	39.713871	29547.12109	225.8252258	2240.65332	6672485.5	66204.85156
PM2_02/2013	01-Feb-13 00:00:00	01-Mar-13 00:00:00	46.81391907	31458.95313	214.6317444	2141.956787	6752090	67383.71875
PM2_03/2013	01-Mar-13 00:00:00	01-Apr-13 00:00:00	46.71214676	34707.125	211.1295166	2120.703613	7327698.5	73603.52344
PM2_04/2013	01-Apr-13 00:00:00	01-May-13 00:00:00	46.98371887	33828.27734	209.9403076	2136.415771	7101919	72271.26563
PM2_01/2014	01-Jan-14 00:00:00	01-Feb-14 00:00:00	37.06420517	27575.76953	246.0911713	2492.465332	6786153.5	68731.64844
PM2_02/2014	01-Feb-14 00:00:00	01-Mar-14 00:00:00	44.85942459	30145.53125	218.7319183	2245.138916	6593790	67680.90625
PM2_03/2014	01-Mar-14 00:00:00	01-Apr-14 00:00:00	45.86004639	34074.01563	214.614624	2179.784424	7312782	74274.00781
PM2_04/2014	01-Apr-14 00:00:00		35.81909561	23842.70313	208.6723785	2263.317139	4975320	53963.67188

1. 15-Second Refresh
2. Data Cleaned and Summarized

Monthly Totals

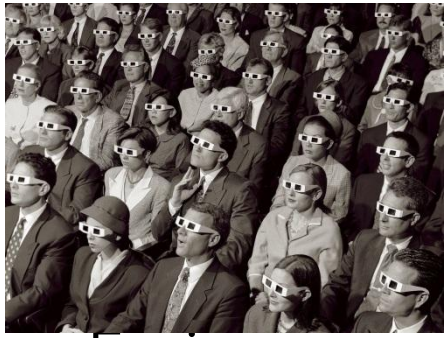
In the End, All the Effort IS Worth It



Benefits of Converting to Event Frames

- Reduce Monthly Task to < 4 Hours (est.)
  - Data Transfer Time Reduced by > 98%
  - Eliminate Data Cleaning Step
  - Eliminate per Ton Calculation Step
- Simplify Reporting
  - Single Version of the Truth

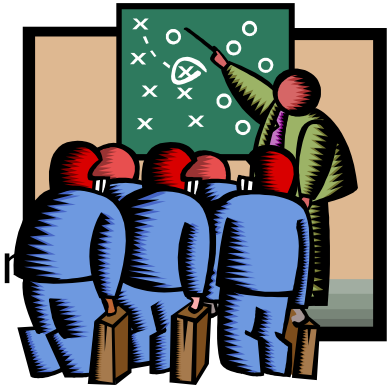
Summarizing the Cases



1. Single Version of the Truth
   a. Reduce Risk/Liability
   b. Alias Name Makes Finding the Right Values Easier
2. Downtime Tracking
   a. Simplify the Environment
   b. Works at All IP Locations
3. Tracking (Energy) Consumption
   a. Simplify the Methodology
   b. Better Results with Reduced Time/Effort

Next Steps…

- Switch PI Servers to Domain Security (Complete)
- AF Projects (Proposed)
  - Notifications
    - Replace Home Grown Solution
  - Event Frames
    - Replace Home Grown Downtime Solution
    - Daily/Monthly/Grade Analysis
  - Identify and Configure Standard Plant Model
  - … More to Come…



Hot Off the Press…

- Winder Cycle Time Analysis
- Batch Digester Analysis

Rick Smith

Richard.SmithJr@ipaper.com

Manufacturing Process Information Consultant

International Paper

Questions

Please wait for the microphone before asking your questions

State your
name & company

THANK YOU

“We are all salesmen…”