



# SAP Integration For an Accounting Mass Balance Using Sigmafine

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# Agenda

- Introduction
- Background
- The Plan
- The Solution
- Current Status
- The Learnings
- Questions

# Introduction

- Bryan Sower
  - PI Technology Steward
  - Working with PI since 1998
- Dow Corning Profile
  - 2009 Sales: \$5.09 Billion
  - Employees: Approximately 10,000 globally
  - Manufacture of silicon based chemicals
  - Significant software
    - OSIsoft PI tools including RLINK(Since 1995, 20+ PI servers)
    - SAP ECC 6.0 – single instance globally
    - Sample Manager LIMS
    - Web based Radio Frequency (RF) interface to PI and SAP
    - Various Control Systems (one of everything)

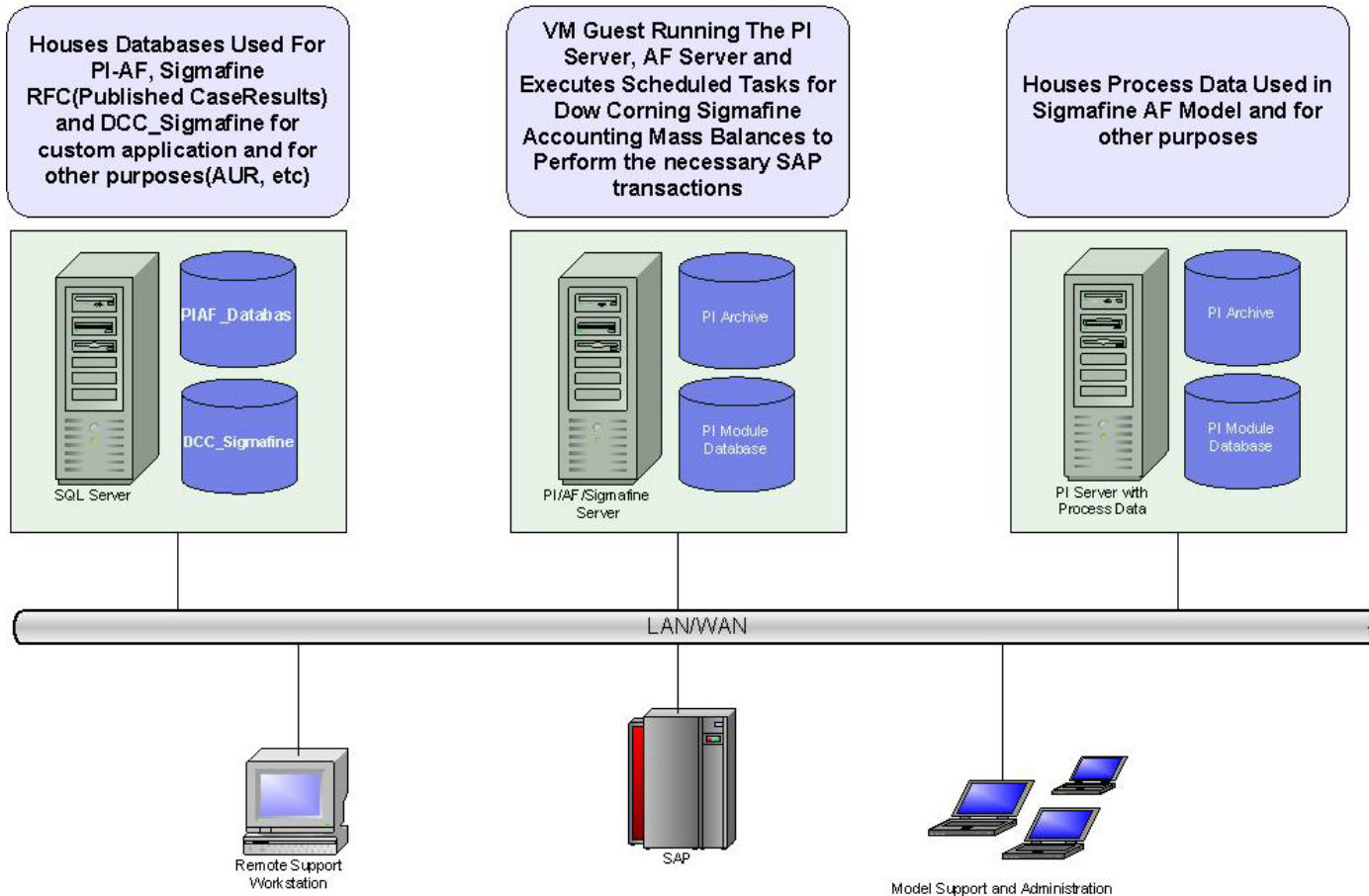
# Background

- Several different solutions and components developed at different sites and by different organizations to perform accounting mass balance over the last 12 years.
  - Excel solution
  - Edict/ACE solution
  - Custom applications to perform SAP integration to extract information needed from SAP and to execute SAP transactions
- Some solutions were difficult to support and maintain
- Difficult for new users to learn
- Low degree of flexibility
- Execute a fairly high volume of transactions which insure that inventory levels are timely and accurate.
- Need a more comprehensive solution that is easily supportable and would grow with our needs

# The Plan

- Pilot Sigmafine at two key sites with different legacy solutions
- Take a new more comprehensive approach to accounting mass balances for the company
- Establish documented standards for how we model and execute an accounting mass balance
- Design the solution to be SOx compliant and easy for auditors to understand
- Make it easy to support, maintain and troubleshoot
- Take the best features from the legacy solutions and incorporate those where possible.
- The solution must be able to run unattended and recover from errors and SAP outages with variable case durations.
- Develop a natural workgroup of Sigmafine users that can coach and support each other

# The Solution - Architecture



# The Solution – Model Development

- First step training – Combined three day on site training course with 2 day coaching session
- Build database with from template database with predefined element templates and example elements
- Standardize element naming to simplify modeling and troubleshooting
- Utilize standardized Excel workbooks with the add-ins for AF and Sigmafine to facilitate element definition
- Create custom data references if necessary

# The Solution – AF Database

The screenshot displays the AF Explorer interface. On the left, a tree view shows a hierarchy of elements under 'Material Balance' and 'DCC\_Flow\_SAP'. The selected element is 'IL\_GL\_nd\_BPRO\_1914375\_pr\_STC\_TCS'. On the right, a table displays the attributes and values for this element.

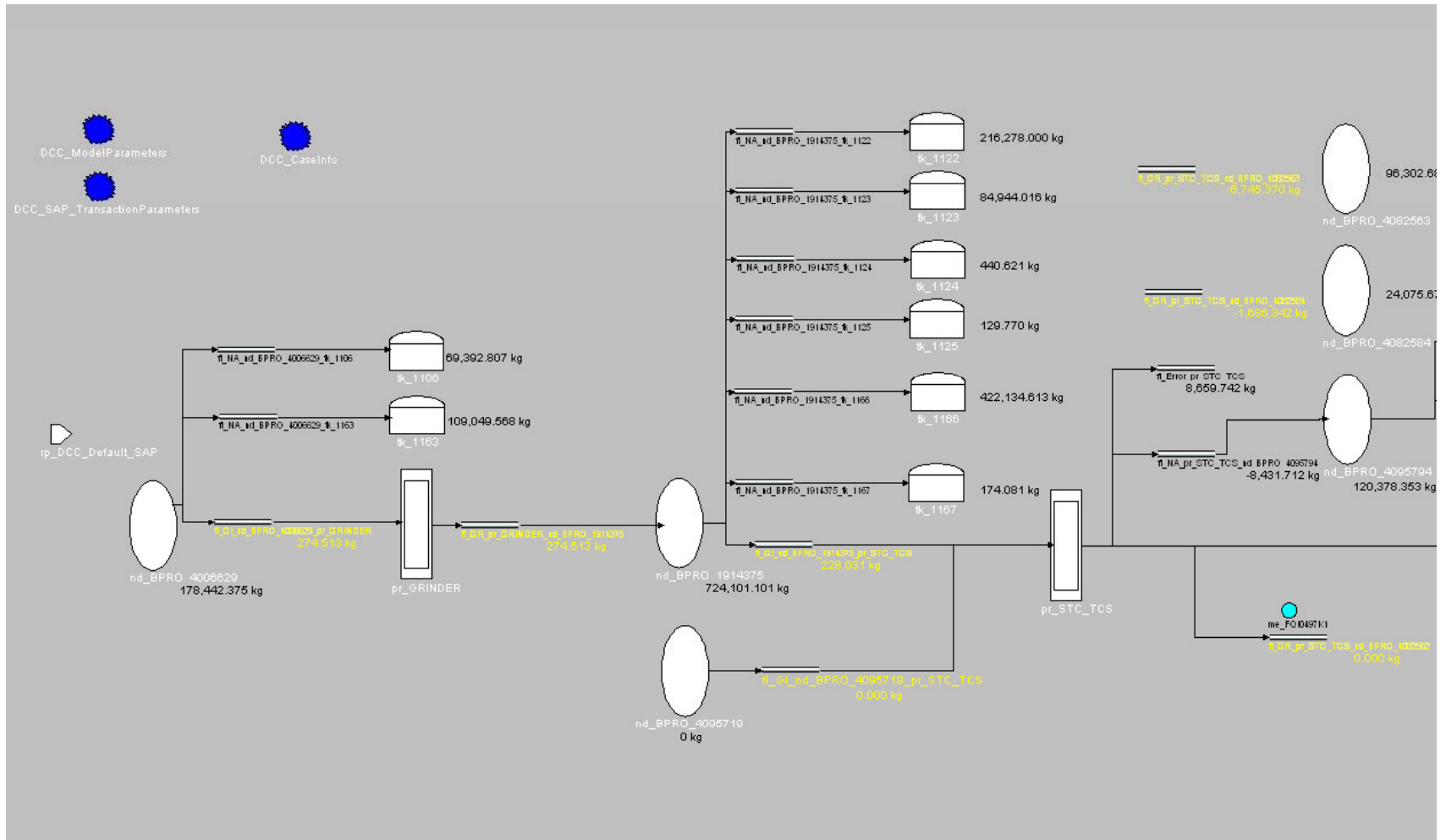
Name	Value	Value Type	Data Referenc...	Settings
a_Audit_ElementChangeDate	3/19/2009 3:36:05 PM	Date	<None>	
a_Audit_ElementChangedBy		String	<None>	
a_Audit_ElementChangeReason		String	<None>	
a_Audit_TemplateChangeDate	3/19/2009 3:36:05 PM	Date	<None>	
a_Audit_TemplateChangedBy		String	<None>	
a_Audit_TemplateChangeReason		String	<None>	
Comments		String	<None>	
DCC_InServiceFlag	1	Integer	<None>	
OSI_ObjectStatus	IS	String	Table Lookup	SELECT Obj
r_ReconciledInferredStatus	??	String	<None>	
r_ReconciledInfluence	0	Double	<None>	
r_ReconciledMass	228.03130744 kg	Double	<None>	
r_ReconciledMassFlowRate	38.0069774889578 kg/h	Double	UDOM	CalcType=45
r_ReconciledMassTolerance	14966.86447324 kg	Double	<None>	
r_ReconciledSolvability	S	String	<None>	
z_CaselD	3	Long	Formula	A...IDCC_Ca
z_Material	Ground Silicon	String	Table Lookup	SELECT Mat
z_SAP_AllowReversal	True	Boolean	<None>	
z_SAP_BatchManaged	False	Boolean	Table Lookup	SELECT Batc
z_SAP_BatchNo	--	String	Table Lookup	SELECT Batc
z_SAP_CostCenter		String	<None>	
z_SAP_CreateMovement	True	Boolean	Table Lookup	SELECT SAP
z_SAP_MaterialDescription	SILICDN-GROUND.KG.KG-BULK	String	Table Lookup	SELECT (Mat
z_SAP_MaterialNo	1914375	String	<None>	
z_SAP_MovementType	261	Integer	<None>	
z_SAP_Plant	0136	String	<None>	
z_SAP_ProcessOrder	--	String	Table Lookup	SELECT Proc
z_SAP_ProcessOrderMaterialNo	--	String	Table Lookup	SELECT Mat
z_SAP_ResourceNetwork	STC_TCS	String	<None>	
z_SAP_SLOC	BPRO	String	<None>	
z_SAP_SpecialStock		String	<None>	
z_SAP_Threshold	0	Integer	<None>	
z_SAP_ToMaterialNo		String	<None>	
z_SAP_ToPlant	0136	String	<None>	
z_SAP_ToSLOC		String	<None>	
z_SAP_INDM	KG	String	<None>	

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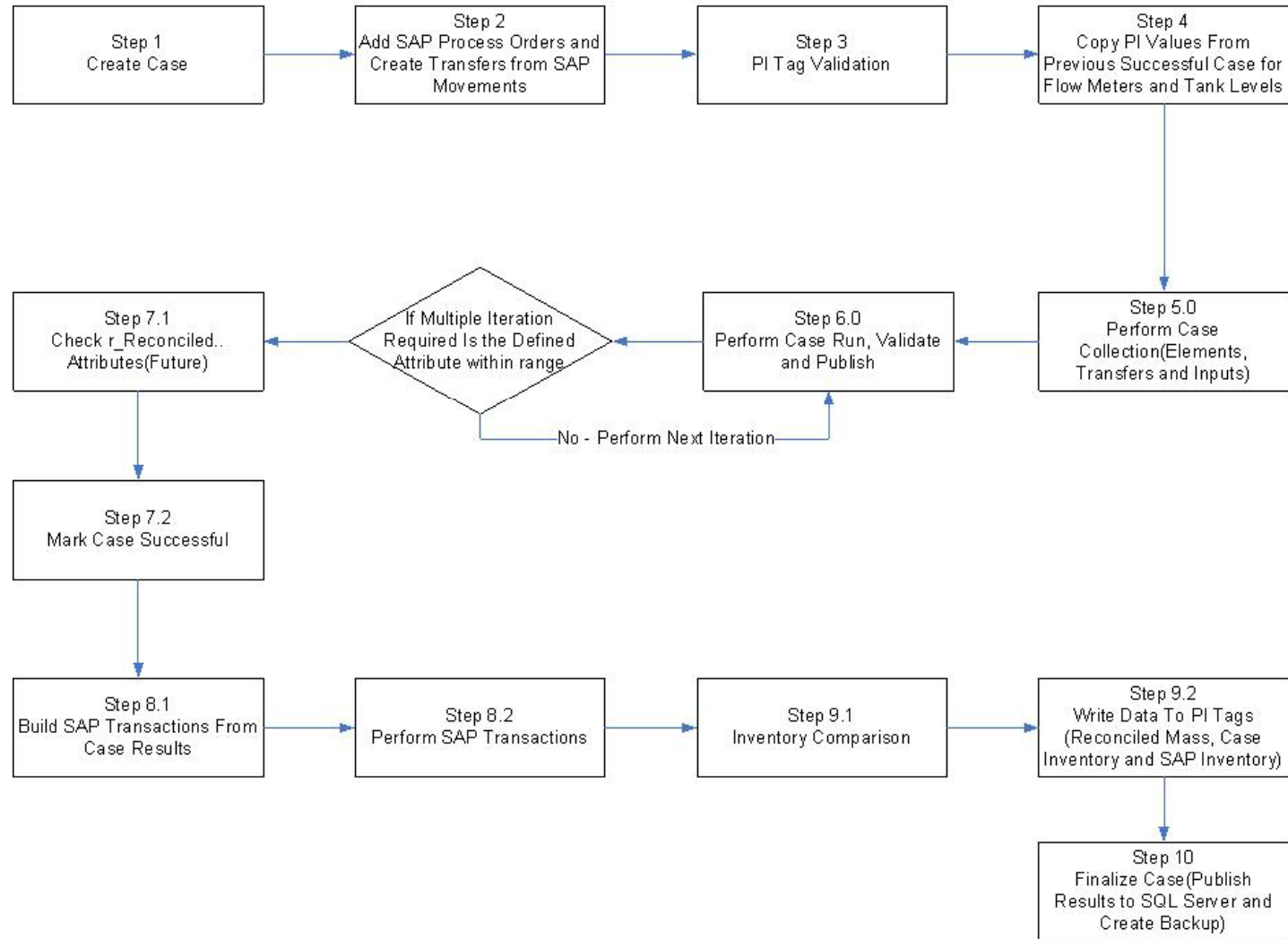
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# The Solution – A Model



# The Solution – Processing Steps



# The Solution – SAP Integration

- Reuse and upgrade custom RFCs and .Net application from legacy application for retrieving process order information, movements and inventory quantities.
  - Criteria for queries dynamically built from the element attributes
  - Utilize SAP Resource Network to assist in identifying the correct process order to use
  - Table look-up data references to find the correct Process Order for a given case
  - Movement data used to build transfers
  - Inventory data used after transactions from the case are processed to compare with inventory levels in SAP to highlight any possible issues.
- SAP transactions processed in real time with custom RFC and ..Net application for immediate feedback

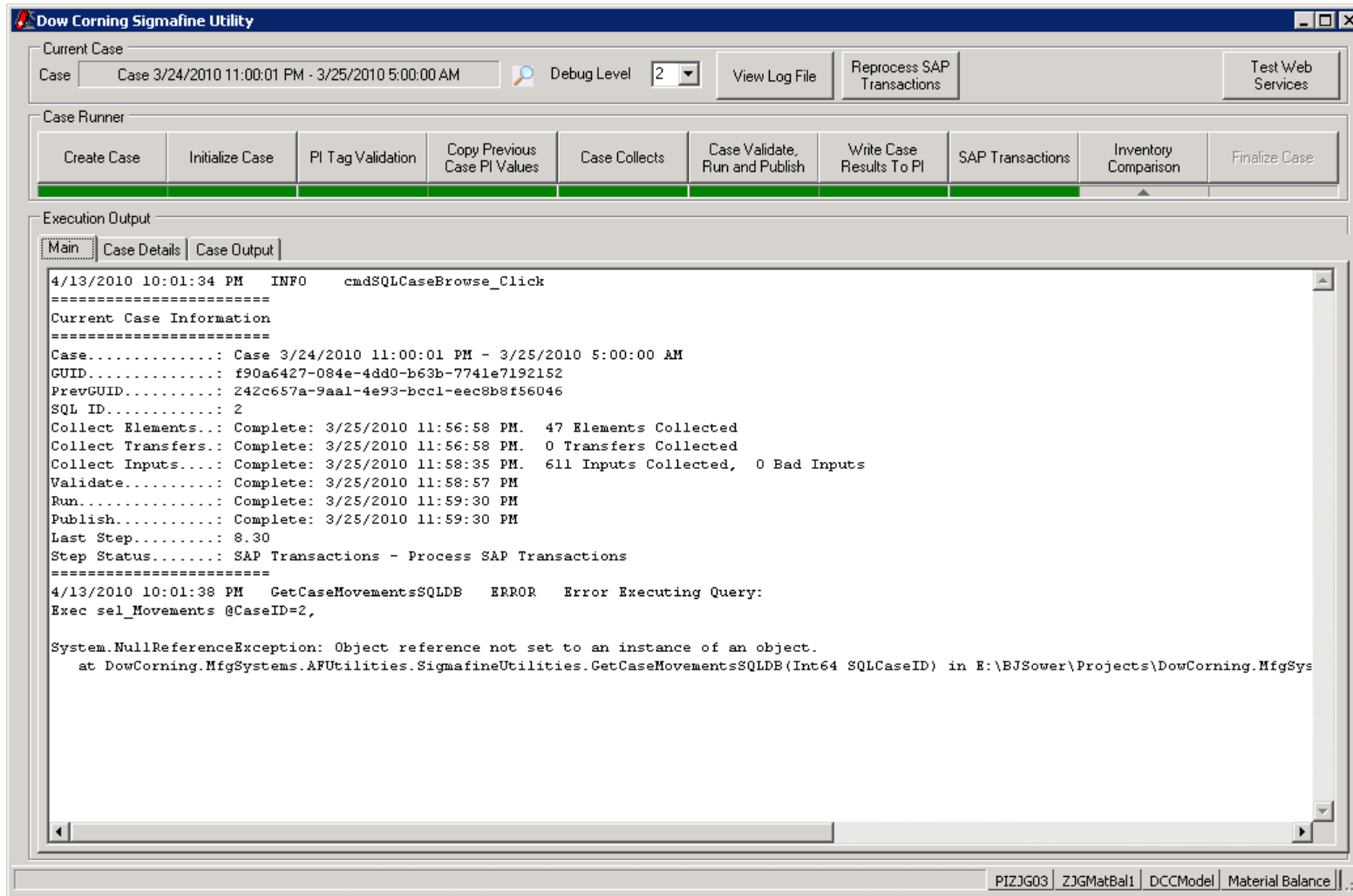
# The Solution – PI Data

- Copying of data from previous successful case for tank levels and totalizers
  - Eliminate issues with compression from case to case
- Perform tag and data validation
  - The PI data is a critical part of the case processing and the validation by Sigmafine was not comprehensive enough
  - Needed the ability to decide what to do on an element by element basis how to handle validation failures
- Validation Rules
  - Rule 0 – Valid tag
  - Rule 1 – Good data at start/end of case
  - Rule 2 – Value is not older than maximum age(Snapshot .vs Current Time)
  - Rule 3 – Percent of good data for case time range is greater than minimum percent good(Float and Int Tags Only)
- Validation Options
  - Ignore - Continue on with the case execution
  - OutOfService - Mark element OS and continue
  - DoNotCalculate - Halt execution

# The Solution – Automation

- 3 applications were created that automated the integration with SAP and the execution of a case.
  - Interactive application for users to manually create a new case and execute the processing steps or to troubleshoot a case that was run on a schedule
  - Background application executed at a set interval for automated case execution
  - Background application executed at a set interval to reprocess any failed SAP transactions.
- All applications were built on a single .Net class to insure consistent processing and code reusability

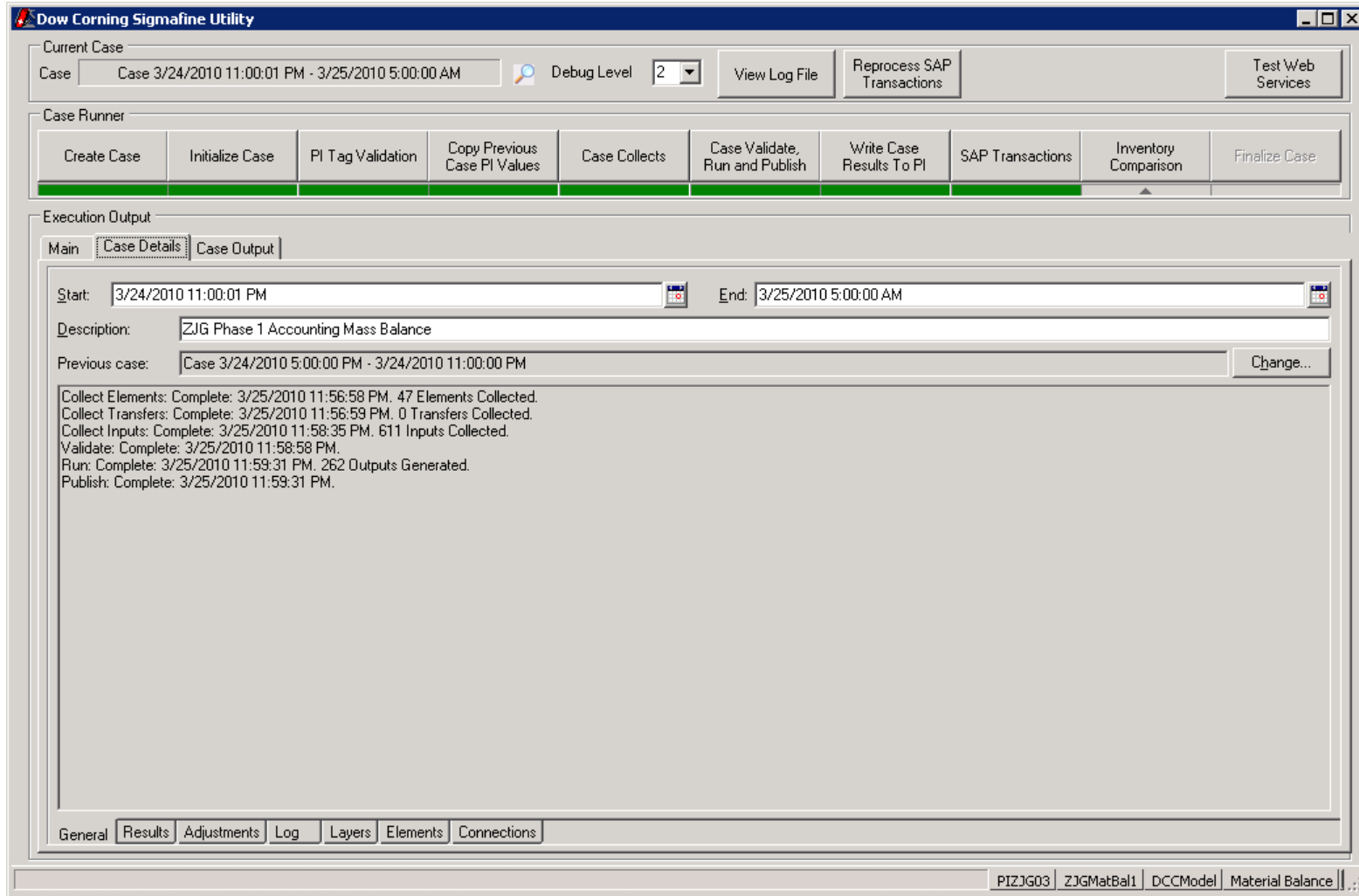
# The Solution – Interactive Application



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# The Solution – Interactive Application



# The Solution – Interactive Application

Current Case  
Case Case 3/24/2010 11:00:01 PM - 3/25/2010 5:00:00 AM Debug Level 2 View Log File Reprocess SAP Transactions Test Web Services

Case Runner  
Create Case Initialize Case PI Tag Validation Copy Previous Case PI Values Case Collects Case Validate, Run and Publish Write Case Results To PI SAP Transactions Inventory Comparison Finalize Case

Execution Output  
Main Case Details Case Output

No.	Process Order	Material No.	Batch ID	Planned Start	Planned End	SAP Plant	Resource Network
1	000104640123	01914375		2/25/2010 0:00	3/13/2010 0:00	0136	GRINDER
2	000104640121	04082563		2/25/2010 0:00	3/10/2010 0:00	0136	STC_TCS

Process Orders PIZJG03 ZJGMatBal1 DCCModel Material Balance

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# Current Status

- Sigmafine installed at 4 sites with a 5<sup>th</sup> to start modeling in May
- Complexity of models vary from about 3000 elements in a single model to less than 100.
- 2 sites are validation models and data in parallel with legacy applications
- 2 sites developing models to replace legacy applications
- 1 new site with no legacy application to move to production in June/July timeframe
- 1 new site to begin training at the end of May, model development in June and move to production in August.

# The Learnings

- Terminology
  - Make sure that everyone, especially the engineers, is clear that this is an accounting mass balance and not what they normally think of as a mass balance.
- Training
  - It works best to have onsite training for a week where the standard course is compressed to 3 days and the remaining 2 days are for coaching
  - Have some members of the natural work group attend the training to provide input and continuity from implementation to implementation
- Model Development
  - Spend the time up front to create your template AF database with element templates and example elements. Remember this is an accounting mass balance so get rid of those attributes that do not apply and keep things as simple as possible
  - Have Sigmafine back to for additional coaching sessions if needed
  - Element definition and configuration goes pretty quickly, but defining the relationship of the elements in ProcessBook can be time consuming and tedious.
  - Don't be afraid to create your own data references if necessary, they can be pretty easy.

# The Learnings

- SAP Integration
  - This is the where the most custom development will occur. Try to leverage standard RFC and BAPI's provide by SAP if possible
  - Utilization of the Resource Network in SAP to assist in mapping of process orders to elements can be very useful
- Automation
  - One of the biggest benefits we see is the ability to execute the accounting mass balance at a set frequency and notification of any issues that were encountered. It gives much better visibility of issues

# Questions

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