



# Data Validation Module Supporting Real-time Decision-Making Process

Processes America Advisor

Presented by **Alfredo Garza Ibarra**



# Agenda

- **About CEMEX**
- **OSIsoft History at CEMEX**
- **Cement Production Model**
- **Problems and Challenges to overcome**
- **Production Data Validation (DVM)**
- **Conclusions**

# About CEMEX

**CEMEX** is a growing global building-solutions company that produces, distributes, and markets **Cement, Ready-Mix Concrete, Aggregates**, and related building materials throughout the Americas, Europe, Africa, the Middle East, and Asia, in more than 50 countries, and maintains trade relationships in approximately 102 nations.



## A global industry leader

- Annual sales of US\$14.98 billion
- One of the leading cement manufacturers in the world
- World's leading supplier of ready-mix concrete, and one of the world's largest suppliers of aggregates
- One of the world's top traders of cement and clinker
- Close to 44,000 employees worldwide

# OSIsoft History at CEMEX

1995



First  
PI System  
Installed

1995-2004



Expanding  
PI System  
Installs

2005 - 2006



Enterprise  
Agreement

2007 - 2008



Worldwide  
PIMS Project

2009 - 2010



PI Infrastructure  
as Enterprise  
Platform

2011 - 2013

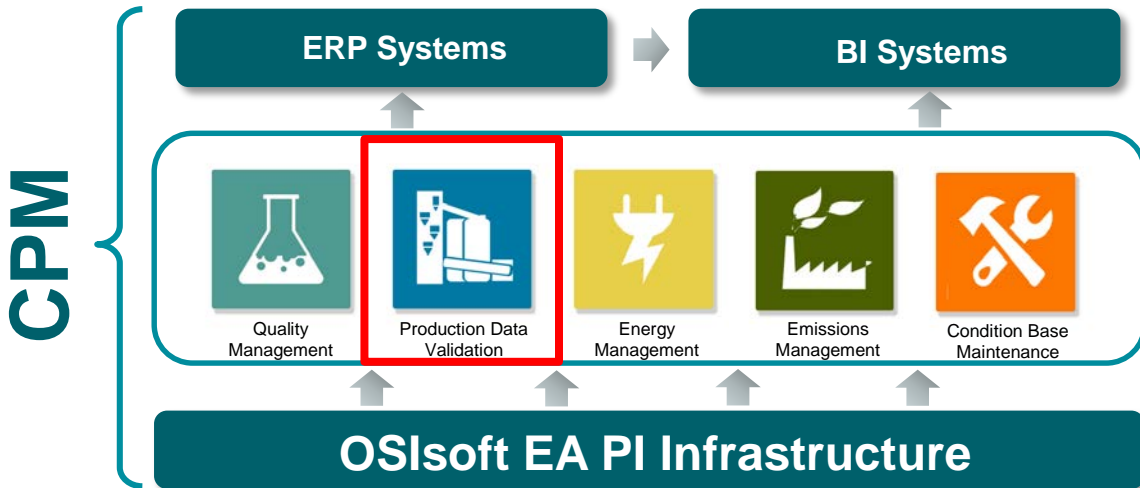


Cement  
Production  
Management

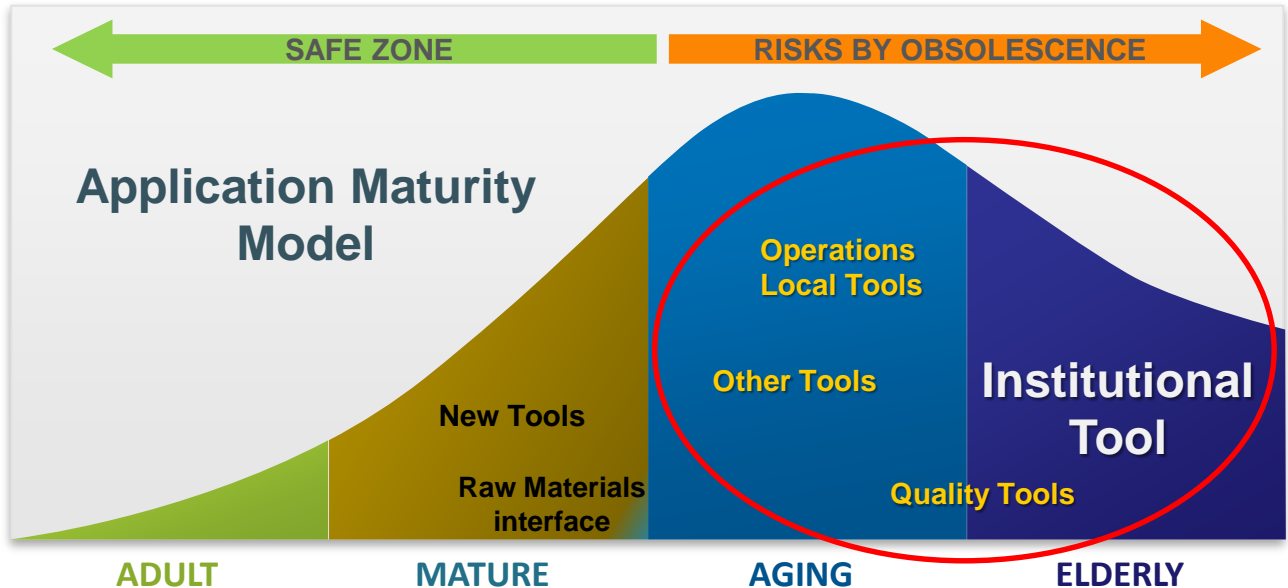


Agreement – Access to Industry Principals, Center of Excellence, Software, etc.

# Cement Production Model



# The problem to overcome

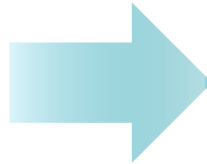


# The Challenge

@ Cement Business



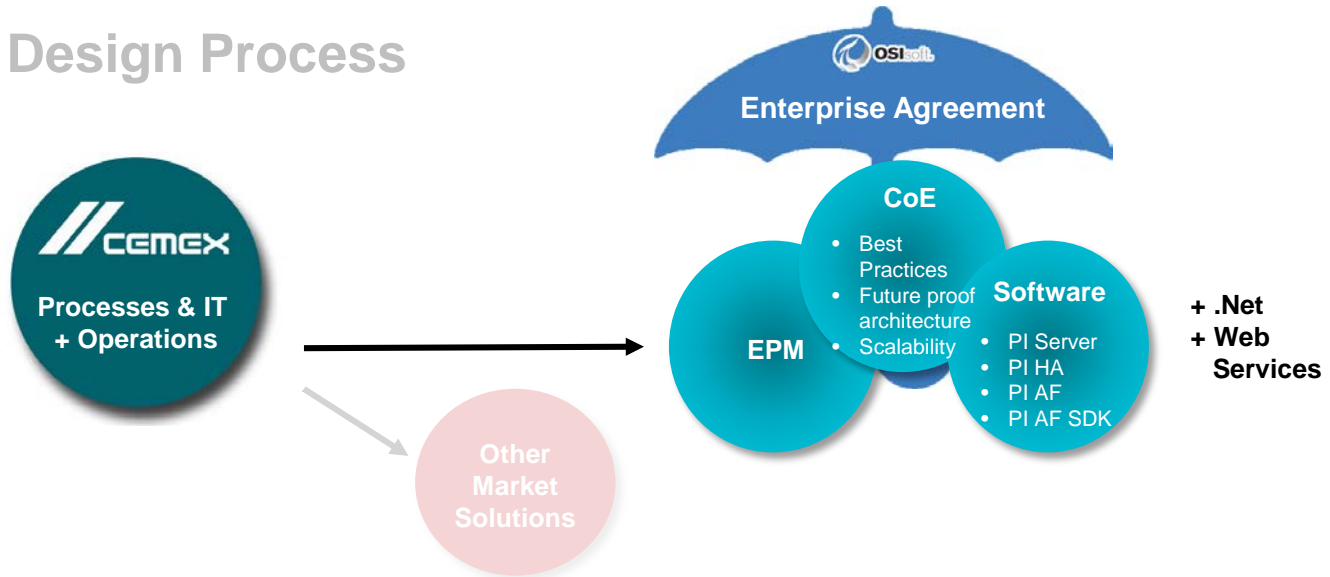
- 20 year old platform
- Manual data
- Non standard validation process



- New reliable platform
- Automatic Data in Real time
- Faster validation and reconciliation

# Production Data Validation (DVM)

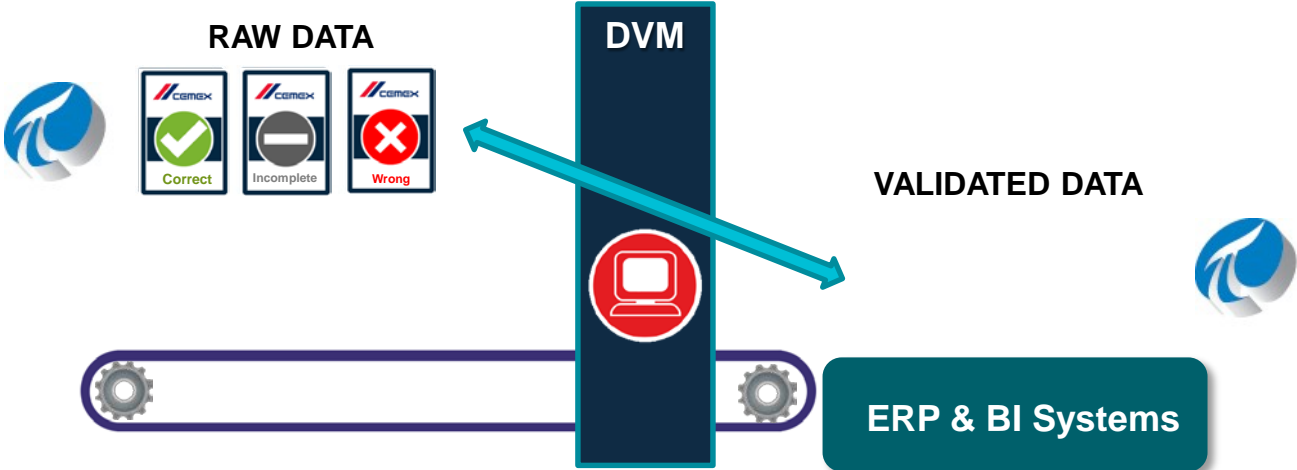
## Design Process





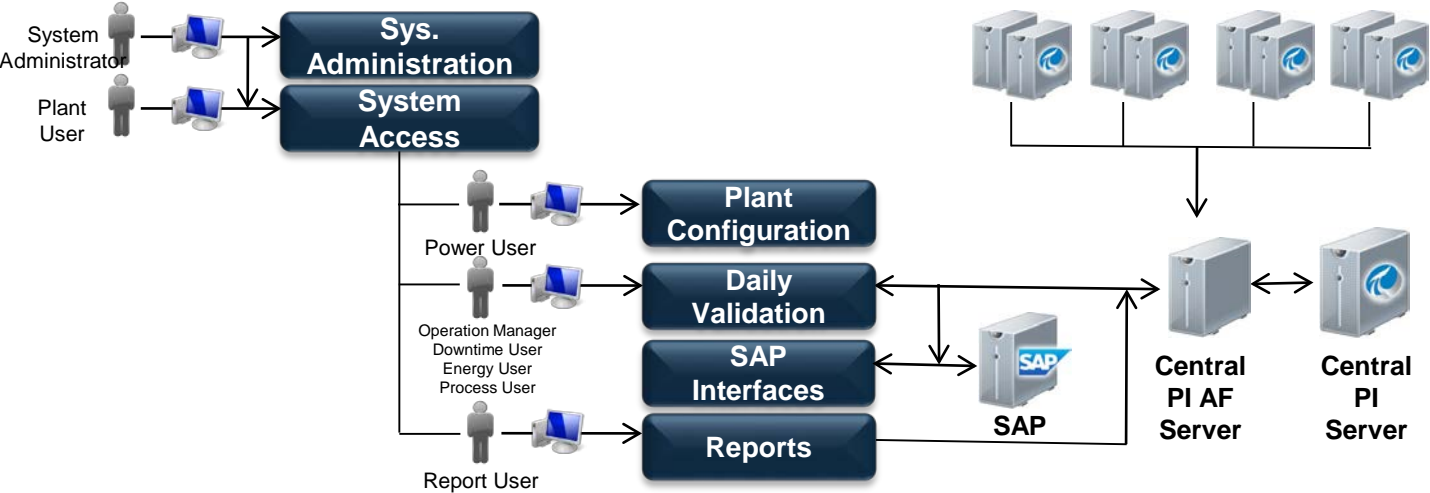
# Production Data Validation (DVM)

## Functionality



# Production Data Validation (DVM)

## Architecture



# Production Data Validation (DVM)

Sys.  
Administrator

Plant  
Configuration

Daily  
Validation

SAP  
Interfaces

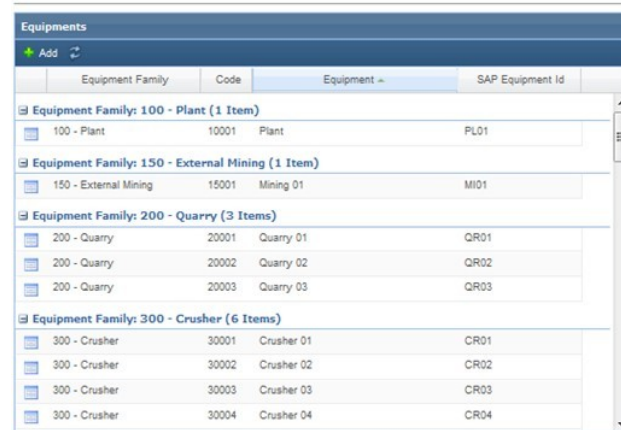
Reports

- PIMS-DVM enables to manage central catalogs
- This assures consistency
- The main catalogs in PIMS-DVM are:

• Users	• Equipments
• Country	• Material Family
• Plants	• Materials
• Equipment Family	

## Equipments

In this page you will be able to create and update equipments.



Equipment Family	Code	Equipment	SAP Equipment Id
<b>Equipment Family: 100 - Plant (1 Item)</b>			
100 - Plant	10001	Plant	PL01
<b>Equipment Family: 150 - External Mining (1 Item)</b>			
150 - External Mining	15001	Mining 01	MI01
<b>Equipment Family: 200 - Quarry (3 Items)</b>			
200 - Quarry	20001	Quarry 01	QR01
200 - Quarry	20002	Quarry 02	QR02
200 - Quarry	20003	Quarry 03	QR03
<b>Equipment Family: 300 - Crusher (6 Items)</b>			
300 - Crusher	30001	Crusher 01	CR01
300 - Crusher	30002	Crusher 02	CR02
300 - Crusher	30003	Crusher 03	CR03
300 - Crusher	30004	Crusher 04	CR04

# Production Data Validation (DVM)

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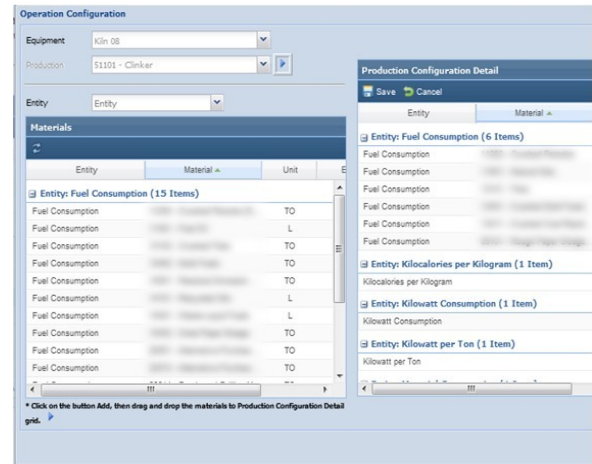
Reports

- The Power User configures the plant site
- Selects equipment, materials and products used within the cement production line
- This process is based on the homologated catalogs
- The main plant administration processes are:

- Equipments

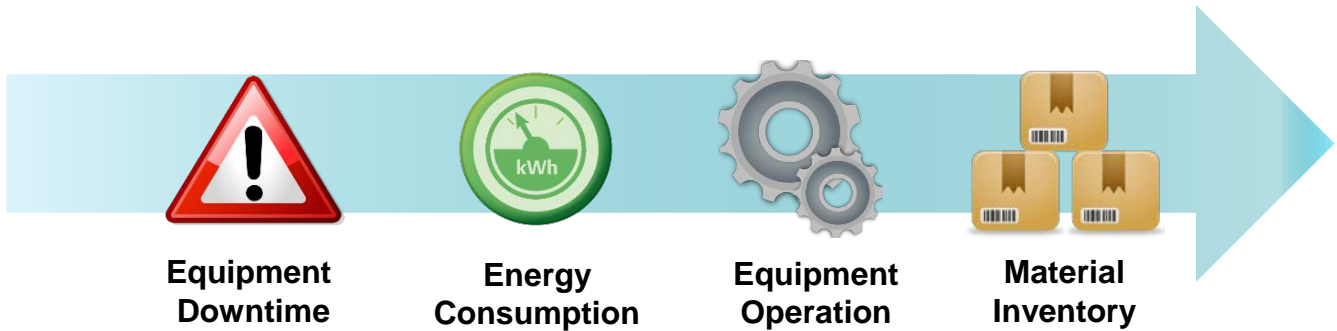
- Materials

- Operation - Correlate Equipment with materials and products



- *PIMS-DVM has drag and drop capabilities*
- *The AF structure is generated automatically through AF SDK*

# Production Data Validation (DVM)



# Production Data Validation (DVM)

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## Equipment Downtime

- Real time downtime events are shown
- Users classify each event and time
- The result will provide the basis of uptime to calculate:
  - Performance KPIs
  - Energy Consumptions
  - Fuel Consumptions
  - Maintenance
- It is possible to schedule future downtime events

The screenshot displays the DVM software interface. At the top, there are filters for Date (10/11/2012) and Equipment. Below these are validation status indicators: Downtime Validation (checked), Energy Validation (checked), Operation Validation (unchecked), and Inventory Validation (unchecked). There are also buttons for 'Obtain automatic events', 'New Downtime', and 'Schedule Downtime'.

The main data table shows validated events for 11/22/2012 4:14:36 by Carlos Adrian Chapa Padilla. The table is organized by equipment type:

Equipment	Downtimes	Total	Day
<b>Equipment: Crusher 01 (3 Items)</b>			
Crusher 01	Downtime 30001_19450	00:00:00	07
Crusher 01	Downtime 30001_19451	00:00:00	07
Crusher 01	Downtime 30001_19452	00:00:00	06
<b>Equipment: Crusher 02 (2 Items)</b>			
Crusher 02	Downtime 30002_19453	00:00:00	06
Crusher 02	Downtime 30002_19454	00:00:00	05
<b>Equipment: Dryer 02 (1 Item)</b>			
Dryer 02	Downtime 30002_19449	00:00:00	23
<b>Equipment: Finish Mill 05 (1 Item)</b>			
Finish Mill 05	Downtime 00005_19455	00:00:00	23

On the right side, a smaller window shows a list of events with a red warning triangle icon overlaid on it. The events listed are 'Inactive Event' and 'Active Event', both with a downtime of 30001\_19450.

# Production Data Validation (DVM)

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## Energy Consumption


- Real time energy consumptions are displayed
- Users validate the daily information and provide insight on:
  - Month to Date consumptions
  - End of Month consumptions

Date: 1/7/11/2012    Equipment Family: Equipment Family    Equipment: Equipment    Close Energy v

Downtime Validation ✓    Energy Validation ✓    Operation Validation ✓    Inventory Validation ✓

Validated on: 2012/11/02 15:51:19    By: Carlos Adrian Chapa Padilla

Plant	Equipment Family	Equipment	MTD KWH	Raw KWH	Validated KWH	Month Projected KWH	Raw KWH/Ton
Monterrey	300 - Crusher	30001 - Crusher 01	✓				
		30002 - Crusher 02	✓				
		30003 - Crusher 03	✓				
		30005 - Crusher 05	✓				
		30000 - Crusher 00	✓				
		300 - Dryer	30001 - Dryer 01	✓			
	30002 - Dryer 02	✓					
885 - Petcoke/Coal	88501 - Petcoke/Coal	88501 - Petcoke/Coal	✓				
		88502 - Petcoke/Coal	✓				
		400 - Raw Mill	40005 - Raw Mill 05	✓			



# Production Data Validation (DVM)

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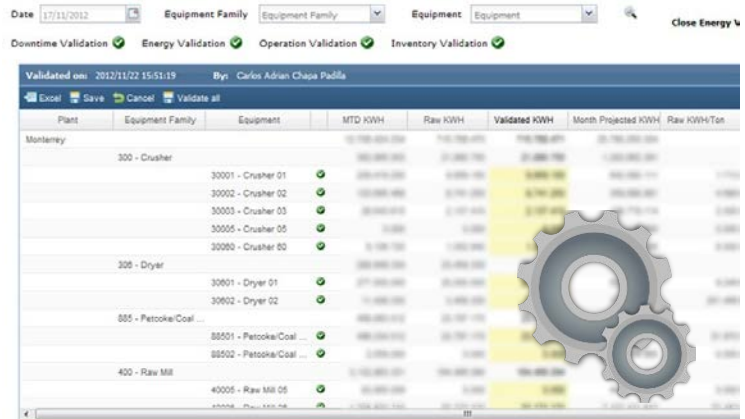
SAP  
Interfaces

Reports

## Equipment Operation

Real time operation data and calculations are shown

- Material Consumption
- Working Hours by product
- Energy consumption by product
- Fuel consumption by product
- Produced Material
- KPIs



Validated on: 2012/11/22 15:51:19 By: Carlos Adrian Chapa Padilla

Plant	Equipment Family	Equipment	MTD kWh	Raw kWh	Validated kWh	Month Projected kWh	Raw kWh/Ton
Monteney	300 - Crusher	30001 - Crusher 01	11000000	11000000	11000000	11000000	11000000
		30002 - Crusher 02	11000000	11000000	11000000	11000000	11000000
		30003 - Crusher 03	11000000	11000000	11000000	11000000	11000000
		30005 - Crusher 05	11000000	11000000	11000000	11000000	11000000
		30080 - Crusher 80	11000000	11000000	11000000	11000000	11000000
	300 - Dryer	30601 - Dryer 01	11000000	11000000	11000000	11000000	11000000
		30602 - Dryer 02	11000000	11000000	11000000	11000000	11000000
	855 - Patoka/Coal...	85501 - Patoka/Coal	11000000	11000000	11000000	11000000	11000000
		85502 - Patoka/Coal	11000000	11000000	11000000	11000000	11000000
	400 - Raw Mill	40005 - Raw Mill 05	11000000	11000000	11000000	11000000	11000000



# Production Data Validation (DVM)



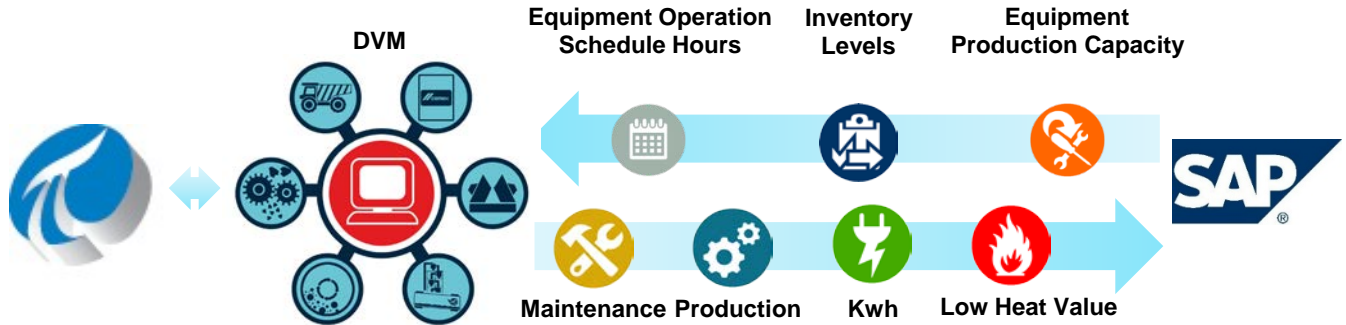
## Material Inventory

- Material balance is achieved in this step
- The previous day inventory from SAP are received as initial inventory
- The user compares physical inventory vs. the calculated inventory
- If all is OK the User closes day validation

Validated On: 2012/11/22 18:52:23 By: Carlos Adrian Chapa Paele

SAP Code	Material	Initial Inventory	Production	Consumption	Calculated Invent.	Physical Inventory	Inventory Differ.	Calculated Prods.	Production Differ.
1200000312	...	100.000	0.000	0.000	100.000	0.000	-100.000	100.000	100.000
1200000307	...	100.000	0.000	0.000	100.000	0.000	-100.000	100.000	100.000
1200000304	...	100.000	0.000	0.000	100.000	0.000	-100.000	100.000	100.000
1200000303	...	100.000	0.000	0.000	100.000	0.000	-100.000	100.000	100.000
1200000289	...	100.000	0.000	0.000	100.000	0.000	-100.000	100.000	100.000
1200000290	...	100.000	0.000	0.000	100.000	0.000	-100.000	100.000	100.000
1200000289	...	100.000	0.000	0.000	100.000	0.000	-100.000	100.000	100.000
1200000286	...	100.000	0.000	0.000	100.000	0.000	-100.000	100.000	100.000
1200000307	...	100.000	0.000	0.500	99.500	0.000	-99.500	0.000	0.000
1200000426	...	100.000	0.000	0.000	100.000	0.000	-100.000	100.000	100.000
1200000311	...	100.000	0.000	0.000	100.000	0.000	-100.000	100.000	100.000
1200000310	...	100.000	0.000	0.500	99.500	0.000	-99.500	0.000	0.000
1200000292	...	100.000	0.000	0.000	100.000	0.000	-100.000	100.000	100.000

# Production Data Validation (DVM)



# Production Data Validation (DVM)

Sys. Administrator

Plant Configuration

Daily Validation

SAP Interfaces

Reports

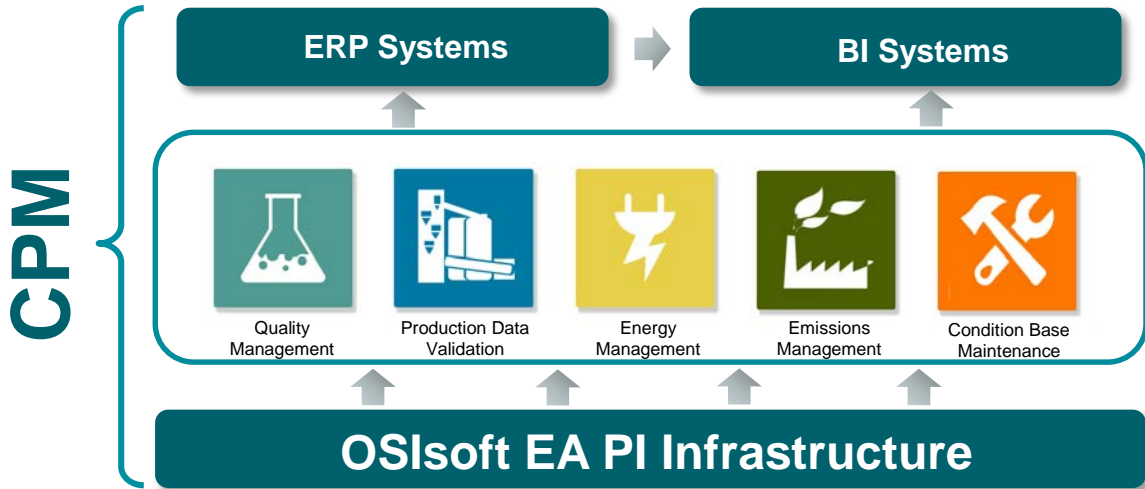
## Reports

- Equipment Operation Report
- Fuel Consumption Report
- KWH Consumption Report

The screenshot displays a web-based interface for reporting. At the top, there is a navigation bar with links for Home, Administration, Catalogs, Plant Configuration, Validation Process, and Reports. Below this, there are filters for Date (12/11/2012), Equipment Family (Equipment Family), and Equipment (Equipment). The main content is a table with the following columns: Equipment, Product, SAP Code, UOM, Production Today, Production Month, KWH Today, and KWH Mon. The table lists data for several equipment units, including Quarry 01, Quarry 02, Crusher 01, Crusher 02, Crusher 03, and Crusher 05, with their respective production and energy consumption values.

Equipment	Product	SAP Code	UOM	Production Today	Production Month	KWH Today	KWH Mon
20001 - Quarry 01	Block Concrete	100000	TG	0,400,000	70,000,000		
20002 - Quarry 02	Block Clay	100000	TG	1,000,000	10,000,000		
	20% Block Concrete			0,400,000	70,000,000	0,000	0,000
	20% Block Clay			1,000,000	10,000,000	0,000	0,000
30001 - Crusher 01	Crusher Concrete	100001	TG	1,000,000	10,000,000	0,000	0,000
	Crusher Clay Concrete	100002	TG	1,000,000	10,000,000	0,000	0,000
30002 - Crusher 02	Crusher Concrete	100003	TG	1,000,000	10,000,000	0,000	0,000
	Crusher Clay	100004	TG	1,000,000	10,000,000	0,000	0,000
	Crusher Clay Concrete	100005	TG	1,000,000	10,000,000	0,000	0,000
30003 - Crusher 03	Crusher Concrete	100006	TG	1,000,000	10,000,000	0,000	0,000
	Crusher Clay	100007	TG	1,000,000	10,000,000	0,000	0,000
	Crusher Clay Concrete	100008	TG	1,000,000	10,000,000	0,000	0,000
30005 - Crusher 05	Crusher Concrete	100009	TG	1,000,000	10,000,000	0,000	0,000

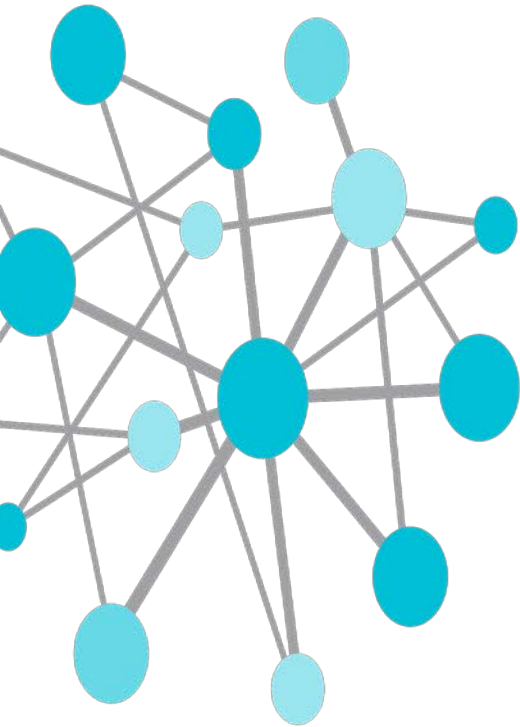
# Conclusions: Cement Production Model



# Conclusions: Business Value Outcome

- Real time data validated for decision makers
- Easier way for plants to review operational data
- Ensures data accuracy and reliability
- Standardizes validation rules and criteria between all plants
- Maintain evidence and references for future audits
- Reduces further data corrections and inventory adjustments
- TCO reductions

Now we had started to replace old and obsolete tools, meeting the operations needs and reducing the total cost of ownership



THANK  
YOU

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