



Implementation of the PIMS Project in CEMEX

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CEMEX is a growing global building-solutions company that produces, distributes, and markets cement, ready-mix concrete, aggregates, and related building materials ...

- Operations in more than 50 countries across four continents.
- Annual production capacity of more than 93 million metric tons of cement .
- Annual production levels of approximately 74 million cubic meters of ready-mix concrete and 166 million metric tons of aggregates.
- 66 wholly owned cement plants, more than 1,900 ready-mix concrete facilities, and a minority participation in 11 cement plants.
- 394 aggregate quarries, 258 land-distribution centers, and 80 marine terminals.



Notes:

Source: http://www.cemex.com/tc/tc_gl.asp

Data as of December 31, 2006

Cement Plants, and in general, Industrial Plants, rely on its automation systems to assure the continuity and integrity of the operations ...

- In regard to Automation and Process Control Systems there are several factors that demand the development of a strategic vision, and the resulting master plan is the key to a successful Automation program:
 - ▶ Assure the sustainability of operations.
 - ▶ Standardize criteria and suppliers.
 - ▶ Support the company's growth by following a standard.
 - ▶ Reduce working capital.
 - ▶ Promote global negotiations.

A Strategic Vision to achieve the above mentioned factors is a must ...

The industry's accelerating rate of change affects the Automation assets; additionally, global competition demands the optimization of the operations using Automation and Control Systems ...

How To?

Eliminate Automation risks due to obsolescence?

Preserve Automation Assets and extend their lifetime?

Reduce capital requirements?

Maximize operational effectiveness?

Increase asset utilization?

Reduce cost and increase profits?

Eliminate information barriers?

Empower personnel?

Create a collaborative environment?

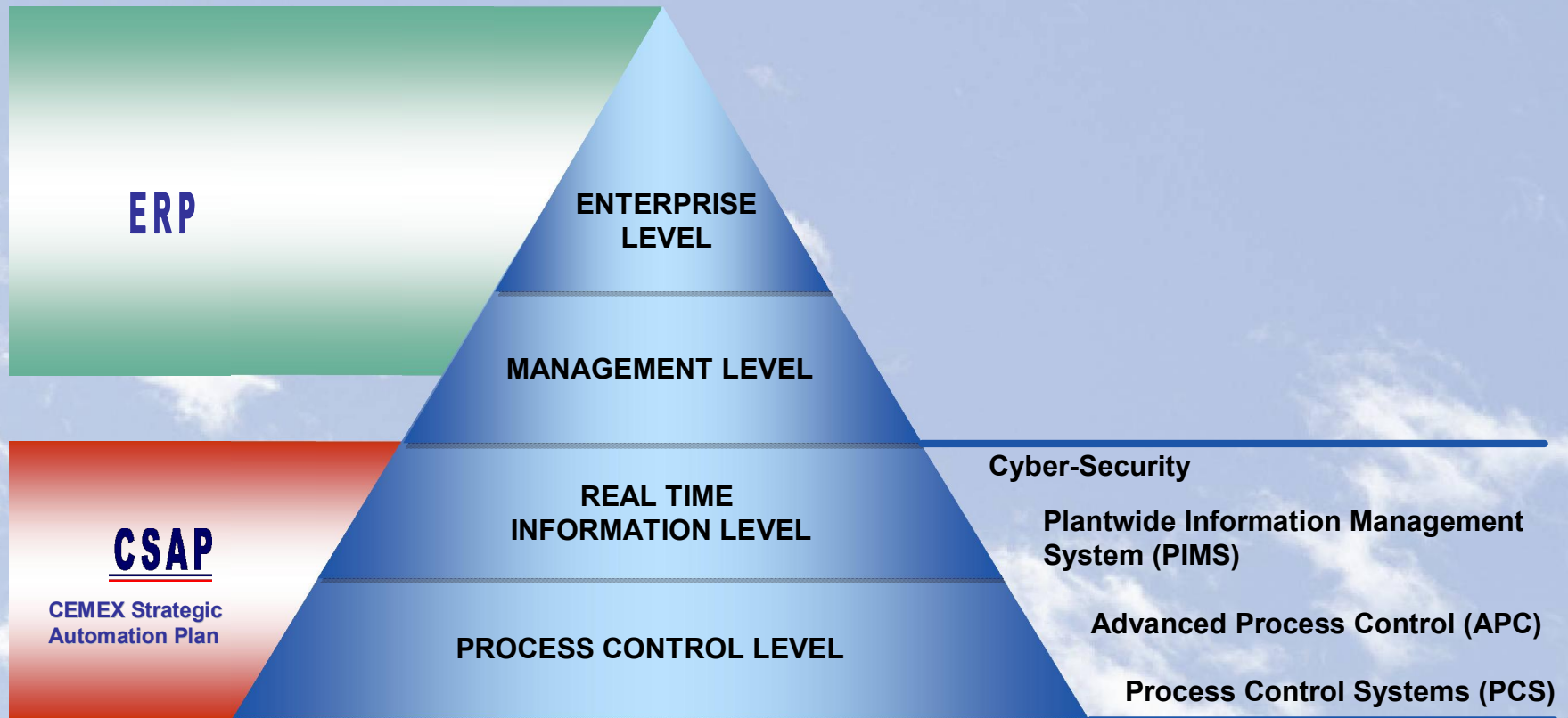
Comply with regulations?

Be open yet secure?

To address all those issues the CEMEX Strategic Automation Plan (CSAP) Initiative was launched; this Initiative established the foundation to define the Automation and Control Standards ...

- The main objectives of the CSAP Initiative are:
 - ▶ Develop and implement a 5-year plan to eliminate the obsolescence of the Process Control System.
 - ▶ Standardize the Process Control Systems.
 - ▶ Optimize the operations using Advanced Process Control Systems.
 - ▶ Support the decision-making process by using Real Time Information Systems.
 - ▶ Integrate Process Control Networks (PCN) with Business Networks through.
 - ▶ Assure the integrity of our Automation Assets by a Cyber Security Program.

The CSAP Initiative covers the two bottom levels (Process Control and Real-Time Information) of the typical pyramid describing the information flow ...



A CSAP Committee was formed with Automation Specialists of the different CEMEX Regions and Countries to build and develop this initiative ...

- A Committee composed of 11 Worldwide Members was conformed to address all the issues of the CSAP Initiative.
- This Committee brought together CEMEX talent and experience to create a space for conversation and discussion.



For the PIMS Component –subject of this presentation- a multidisciplinary team to evaluate the different technologies was formed; the final goal was the implementation in all of CEMEX ...

- Different actions were performed for each component of the CSAP Initiative.
- The Committee recognized the use of the Real-Time Information Systems (PIMS in CEMEX) to empower our operations.
- The final goal was the approval of the CEMEX Technology Council and the implementation in all of CEMEX.
- A multidisciplinary team to evaluate the different technologies was formed.

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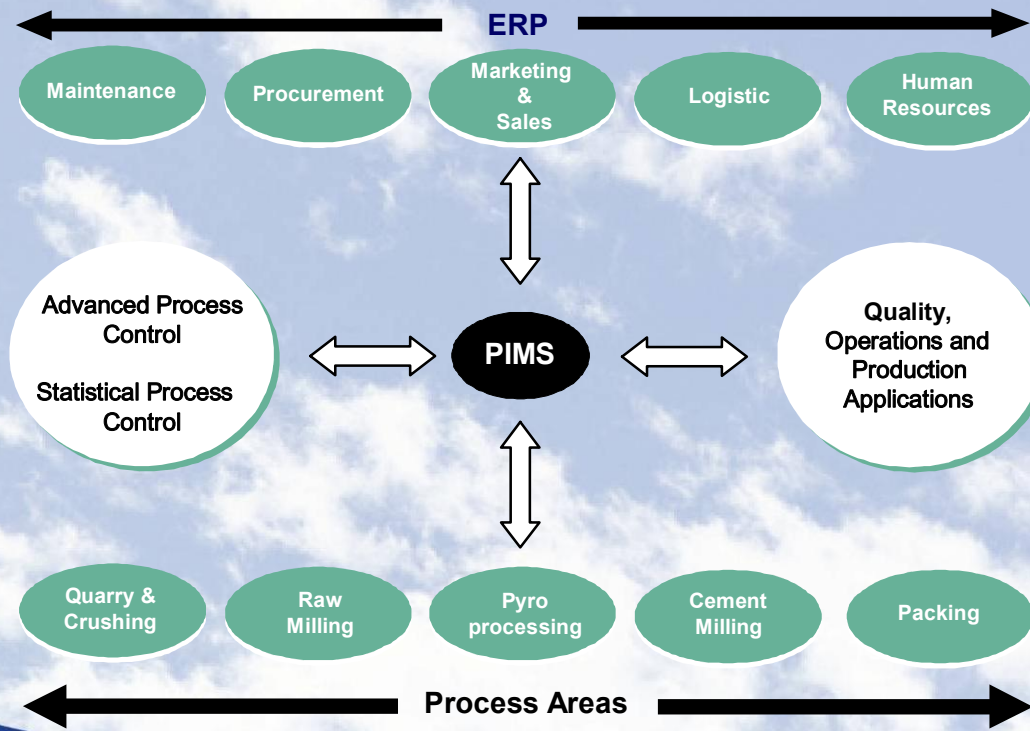
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The PIMS System is a Platform to integrate the operations and process information of the Plant in one system; the final objective is to support the Plant's decisions using Real-Time Information ...

● What is a PIMS System in CEMEX?

- ▶ Platform to integrate the operations and process information of the Plant in one single System.



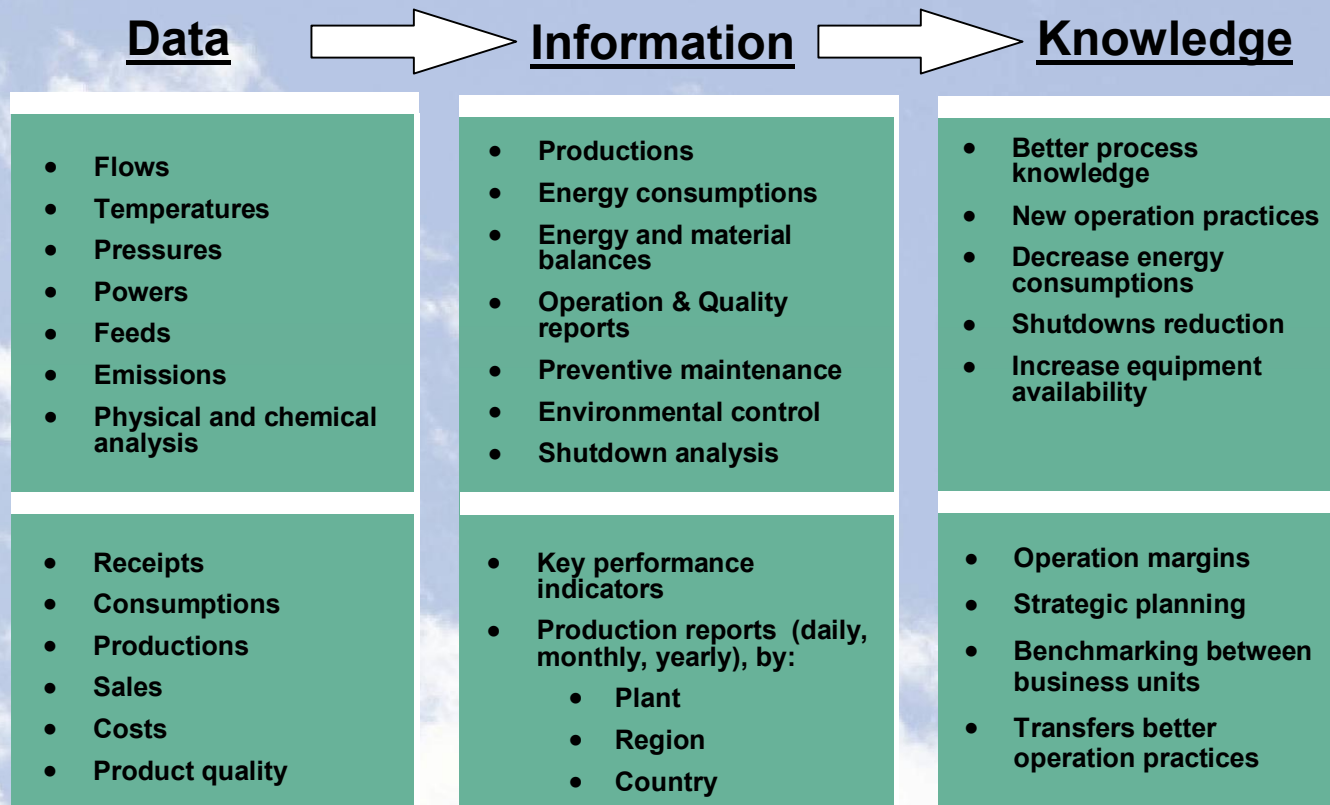
The PIMS' objective is to provide the information to support the key decisions of the Plant, at different levels.

The objective of the PIMS Project is to define a standardized model to gather, consolidate and analyze the process information of our Cement Plants ...

● The objectives of the PIMS Project are:

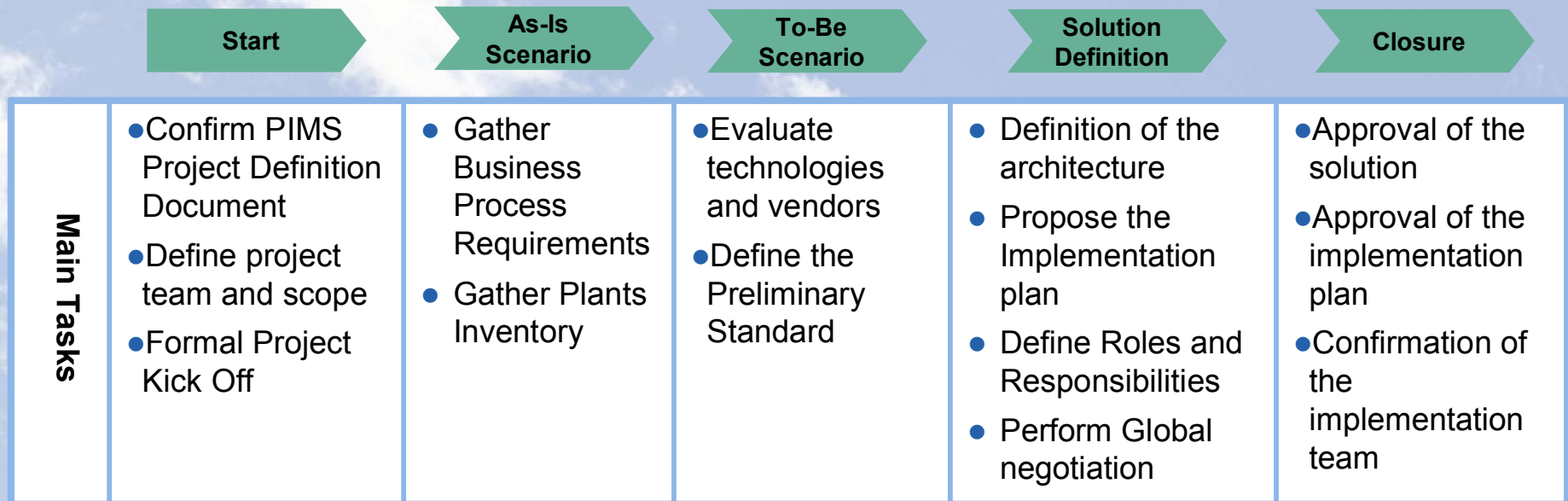
- ▶ Design a standardized model for data gathering, consolidation and analysis of manufacturing information:
 - Minimizing the delay time & maximizing automation
 - Avoiding human intervention
 - Supporting the integrity of the Information
- ▶ Declare a standard practice for the use of the Real-Time Information Systems in CEMEX.
- ▶ Select the technology and architecture to support the defined model, that aligns with the CEMEX Enterprise Architecture.

The added value is a better knowledge of our operations by transforming data into information, and information into Knowledge ...



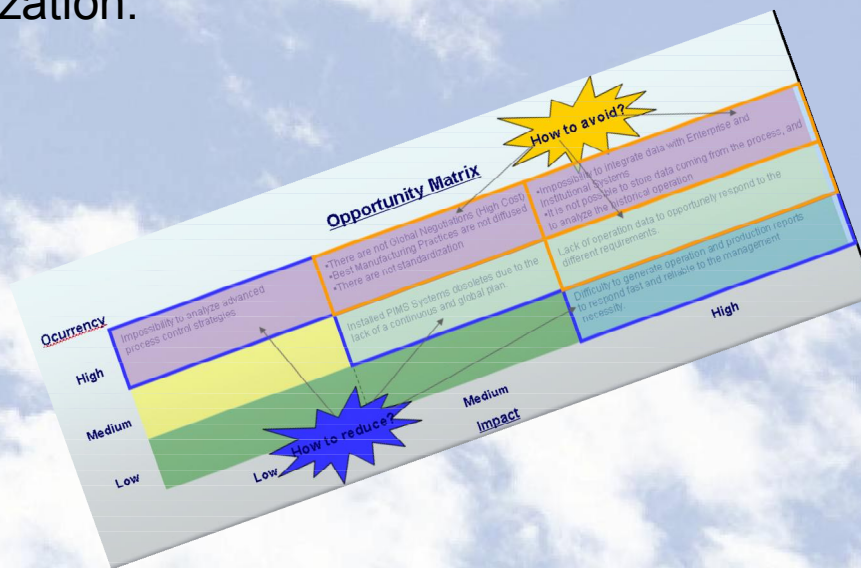
A formal process to evaluate the different PIMS Technologies was put into action; the process involved people from different disciplines, assuring a level of expertise in all the domains ..

- The process used to evaluate the different PIMS Technologies was the following:



The Plant Inventory detected areas of opportunity for the Plants already having a PIMS System, as well as for the Plants without such a system ...

- The first activity was to gather the Real-Time Information Systems existing in CEMEX; the main findings were:
 - ▶ Three different PIMS Systems were used in CEMEX:
 - ▶ At least, in 70% of the plants there were area of opportunity to integrate Process Information and to share this with the rest of the organization:



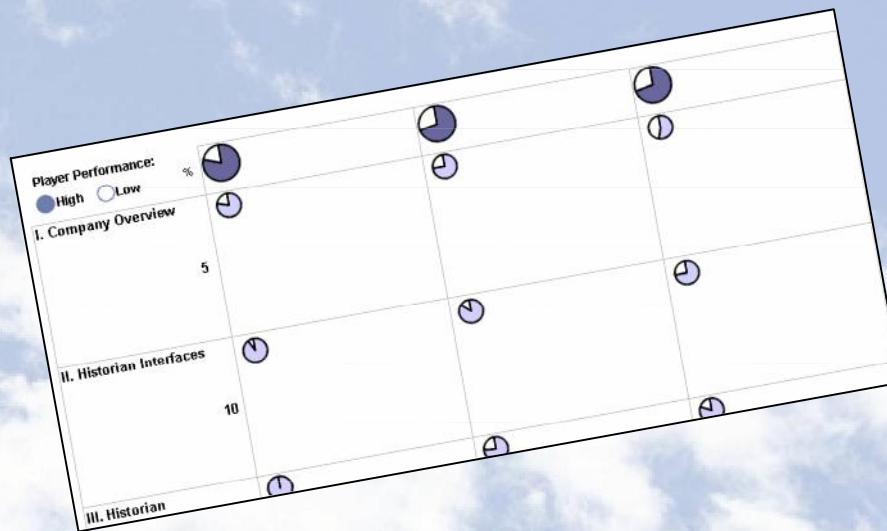
The different technologies and vendors were analyzed using the CEMEX IT Standard Process; once again, the process involved people from different disciplines, assuring a level of expertise in all the domains ..

- The different technologies and vendors were analyzed using the CEMEX IT Standard Process:
 - ▶ Market Research to define Technologies and Vendors (Long List)
 - ▶ Define Potential Technologies and Vendors (Candidates)
 - ▶ Request for Information (RFI)
 - ▶ Workshops
 - ▶ Request for Proposal (RFP)
 - ▶ Evaluation Matrix Fill Out
 - ▶ Recommendation



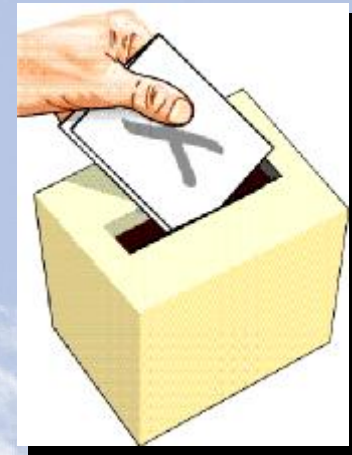
An Evaluation Matrix to analyze the different technologies and vendors was developed; this Evaluation Matrix was the base for the Technical Recommendation of the PIMS System ...

- The following concepts were analyzed as part of the Evaluation Matrix:
 - ▶ Company Overview
 - ▶ Interfaces
 - ▶ DataBase
 - ▶ Client Tools
 - ▶ Applications
 - ▶ Solution Cost
 - ▶ Alignment with the CEMEX's Enterprise Architecture



Once the process to evaluate the PIMS Technologies finished, the next step was the approval of the CEMEX Technology Council ...

- To validate the implementation of the PIMS Technology in all of CEMEX, as well as the recommended technology, an internal voting process was carried out by the Members of the CEMEX Technology Council.
- Additionally, this voting process helped us to:
 - ▶ Measure the knowledge of the CEMEX Technology Council regarding the PIMS Systems.
 - ▶ Hear the main concerns.
 - ▶ Establish some considerations for the implementation plan.



To finish the process, a Global Negotiation was performed with OSIsoft; this Global Negotiation included the implementation of the PI System in all CEMEX's Cement Plants ...

- A Global Negotiation (Enterprise Agreement) was performed with OSIsoft for the use of the PI Software, including the following:
 - ▶ Unlimited PI Software (1).
 - ▶ Implementation Services.
 - ▶ Remote Monitoring in the OSIsoft's Network Operation Center (NOC)
 - ▶ Maintenance Fee.
- This Global Negotiation was led by Global Sourcing, and supported by IT Strategic Alliances and Technology Vicepresidency.

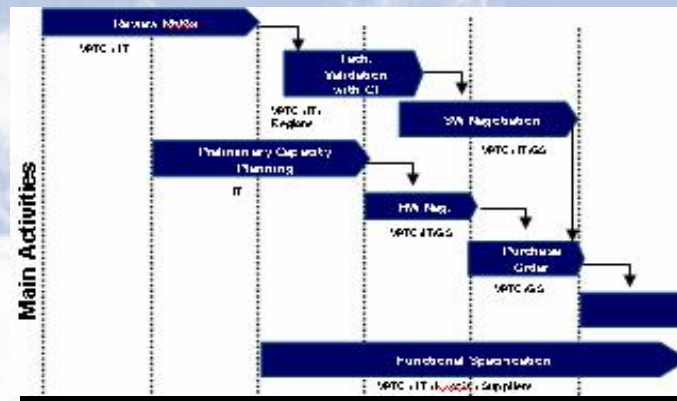
Notes:

(1) Rlink, Sigmafine and IT Monitor are not included



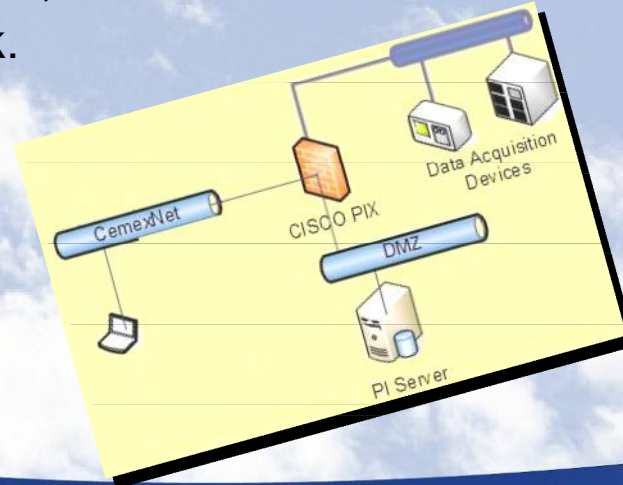
Prior to the RollOut, some additional processes were accomplished: architecture of the solution, capacity planning, establishing of standards, PIMS Team definition and the implementation plan ...

- Prior to the RollOut the following processes were accomplished:
 - ▶ Definition of the PIMS Architecture
 - ▶ Realization of the Capacity Planning
 - ▶ Establishment of Standards
 - ▶ Definition of the Move to Operation (M2O) Process
 - ▶ Elaboration of the Implementation Plan
 - ▶ Definition of the PIMS Team and Training



The definition of the PIMS Architecture and the Capacity Planning Process were performed by IT, Neoris and Technology Vicepresidency, with the support of OSIsoft ...

- To define a suitable PIMS Architecture, some scenarios were tested in our Central Offices; main conclusions:
 - ▶ Independent PI Servers for each Cement Plant.
 - ▶ Grinding Plants will be connected remotely to the PI System of the nearest Cement Plant.
- The Capacity Planning Process specified the required hardware to support the PIMS Architecture, as well as to measure the impact in the bandwidth of the CEMEX Network.



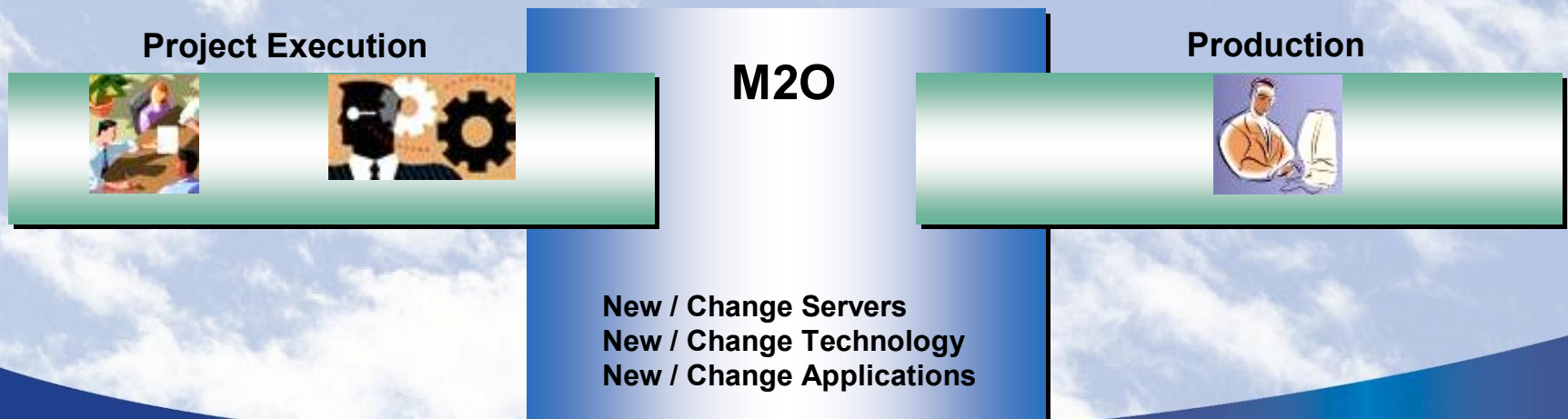
Some standards to be used in all the Cement Plants were established; those standards aim to facilitate the implementation and maintenance of the PIMS Systems ...

- To facilitate the implementation and maintenance of the PIMS Systems some standards were defined; some examples are:
 - ▶ Servers Name
 - ▶ KPIs
 - ▶ Parameters of the tags: exception, compression, scan classes, etc.
 - ▶ Etc.

PIMS Standards

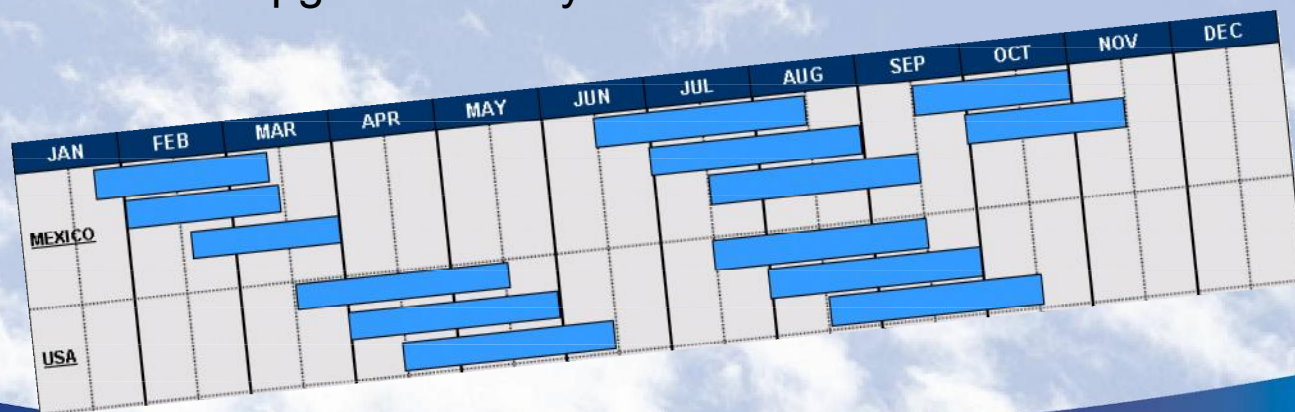
A Move to Operation (M2O) process was defined by IT, Neoris and Technology Vicepresidency; this process aims to involve all the actors and assure the implementation process ...

- The Move to Operations (M2O) process is the link between Project Execution and IT Operation.
- Whenever a new service or application needs to be delivered by the project team to be operated by the IT operation teams, certain process must be executed: that's the scope of M2O, and is applicable to both application software related projects and pure technology projects.



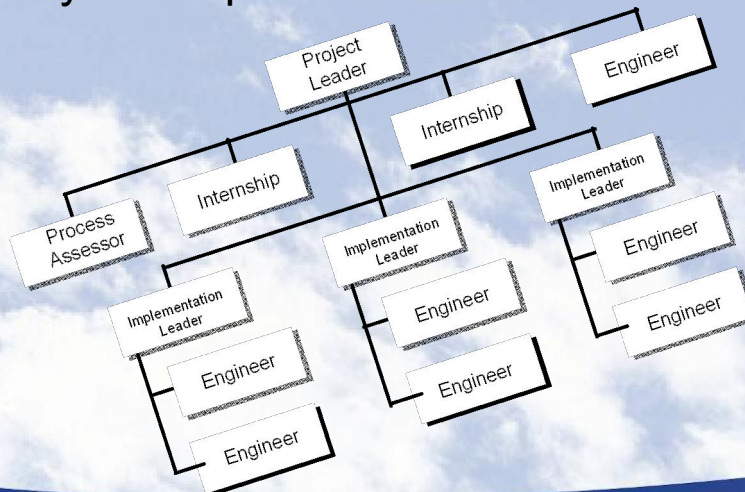
The Implementation Plan covers two years, and includes all the Cement and Grinding Plants; the 2007 scope reaches 14 Countries, 34 Cement Plants and 4 Grinding Plants ...

- The PIMS System was approved to be installed in a 2 years program, covering 82 Cement and Grinding facilities
- The 2007 Implementation Plan was defined together with the Regional Technical and Operation VPs:
 - ▶ Reaches 14 Countries.
 - ▶ Covers 34 Cement Plants and 4 Grinding Plants: 29 new Systems and the upgrade of 9 Systems...



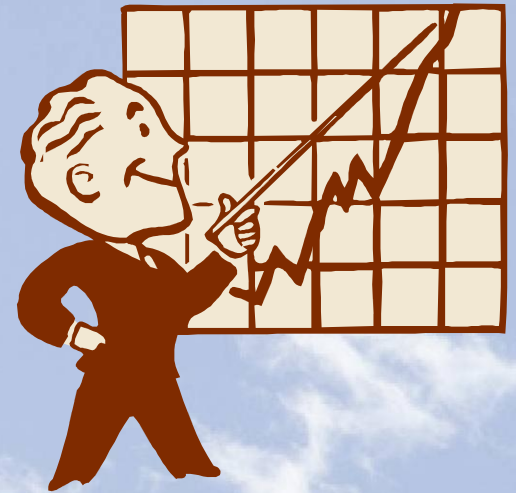
The final stage was the formation of the PIMS Team, as well as the training; the team was designed to implement -as an average- three new PIMS Systems per month ...

- The PIMS Team was formed and trained; to assure the successful of the implementation, the team involves people from different areas:
 - ▶ IT
 - ▶ Neoris
 - ▶ Technology Vicepresidency
- The PIMS Team was designed and built to implement -as an average- three new PIMS Systems per month.



The Rollout began towards the end of January 2007; up to now, the progress is going according to plans and no big potential deviations are expected for the rest of the year ...

- The Rollout began towards the end of January 2007.
- Up to now, the progress is going according to plans.
- No big potential deviations are expected for the rest of the year.
- The 2007 implementation plan will be accomplished on-time.



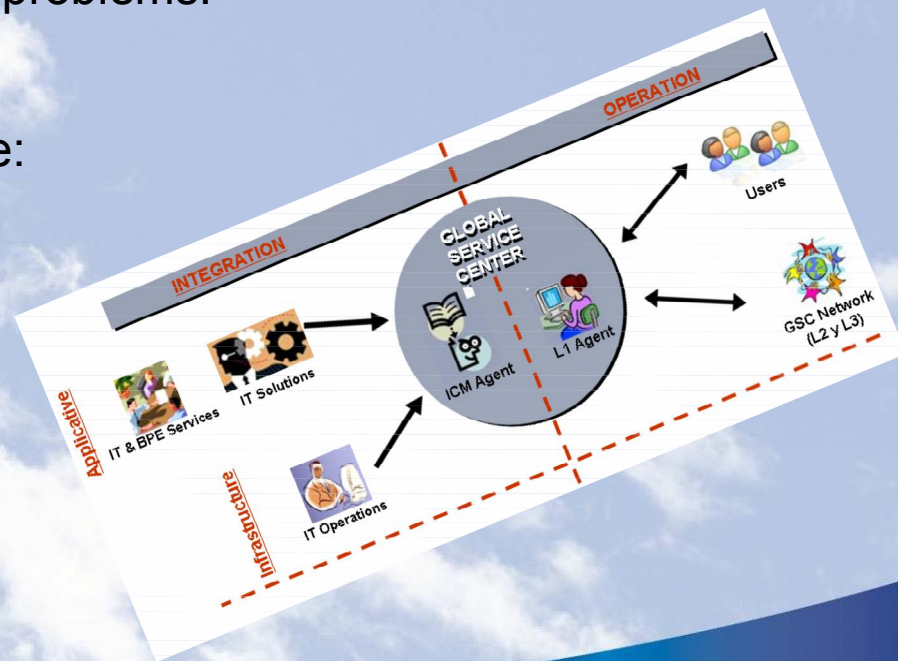
The PIMS Team's learning curve, the hardware acquisition process and the on-time communication with others functional areas have been the main issues of the project...

- The PIMS Team Learning Curve during the first two months implied some re-work and delays.
- The hardware acquisition process was not on-time in some Plants -involves people from different Regions & Functions-
- The communication with the Regions and Countries was not the optimal in some cases.
- However, all these issues were identified on-time, and the proper actions were taken.



Currently, we are working in the Move to Support (M2S) process; the M2S establishes the foundation to maintain the PIMS Systems, attend the users and solve potential problems ...

- The Move to Support (M2S) process is under construction.
- This process establish the foundation to maintain the PIMS Systems, attend to the users and solve potential problems.
- Involved Actors in the M2S process are:
 - ▶ Plants
 - ▶ Regions
 - ▶ IT
 - ▶ Neoris
 - ▶ Vicepresidency Technology



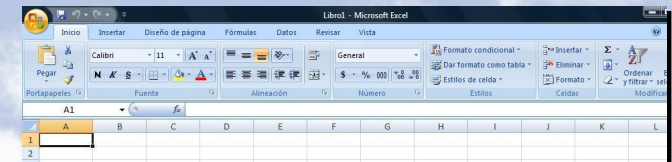
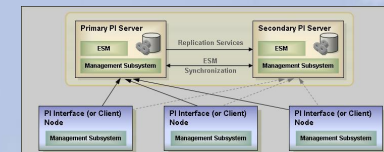
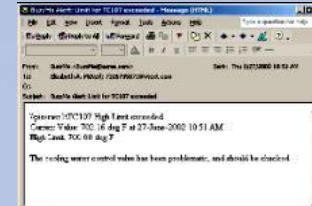
Benefits from the use of the PIMS System are appearing, as long as we move forward with the implementation; we expect more benefits as soon as more people are trained to use the system ...

- Some benefits coming from the PIMS Project are:
 - ▶ Less time to collect information: 20% of the time to obtain information and 80% for analysis and conclusions.
 - ▶ Key Performance Indicators in Real Time.
 - ▶ Improved process knowledge.
 - ▶ Ability to convert one of the most powerful corporate assets – data – into knowledge.
 - ▶ Common language for staff and technical employees.
 - ▶ Improved communication across the organization.
 - ▶ Prepare our facilities to integrate Plant Data with Enterprise and Institutional Systems.

The PIMS Basic Platform is presently being installed and configured; at the same time, the activities for the short, medium and long term are under evaluation ...

● Future Plans include:

- ▶ PI Notifications.
- ▶ Visualization in Mobile Devices.
- ▶ High Availability PI System.
- ▶ New Features with Microsoft Excel 2007 and Web Services.
- ▶ Interface with the ERP System.



In conclusion, global companies must be committed to the use and the further development of Industrial IT Technologies; and the PI System is a valuable tool to achieve this objective ...

- In conclusion, the PIMS System in CEMEX, based on the PI System, contributes to:
 - ▶ Eliminating the barriers between process control system, people, and institutional systems.
 - ▶ Integrating information from many sources.
 - ▶ Providing a common structure to encapsulate business rules.
 - ▶ Empowering people through valuable process and operation information.

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