KNOWLEDGE MANAGEMENT AT ECOPETROL S.A.

A REAL CASE OF IMPLEMENTATION

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Ecopetrol, a company that innovates, transforms and manages its knowledge.
AGENDA

1. Our Dream and Reason to Exist

2. Knowledge Management at Ecopetrol

3. Progress and Results: how do we measure?

4. How and with whom, us we reference?

5. Lessons Learned
Ecopetrol is the main petroleum company in Colombia, 4th in Latin-America

**Exploration**
- Reserves 1P: 1,857 Mbpe

**Production**
- 685 MBOED
  - Crude: 581,9 MBOED
  - Gas: 103,1 MBOED

**Refining**
- 294 Mbd
  - Barranca: 217,6 Mbd
  - Cartagena: 76,4 Mbd

**Transportation**
- Pipeline network for crude oil and products: 9,160 km
  - 1,204,5 MBOD
- 826,1 MBOED

**Marketing**
- Local Sales: 292,9 MBOED
- Exports: 533,2 MBOED
- Income for sales: 27,263 MUSD

**Researching**
- Biodiesel and Energy Diversification

Our Operation and Workteam

- About 7,000 direct employees
- More than 25,000 contractor
- Net Income: COP$15,4
- Headquarters Location: Bogota, Colombia
- Ranking No.12 - PFC Energy 50 - Jan 2011
Our challenge 2020! ...

**NO** ACCIDENTS

**NO** ENVIRONMENTAL INCIDENTS

**WITH** NORMALLITY WORK

**WITH** HARMONY WITH STAKEHOLDERS

**IN** THREE DIMENSIONS:
ECONOMIC, ENVIRONMENTAL, SOCIAL
Vision of the Ecopetrol Corporate Group

Ecopetrol, corporate group, focused on petroleum, gas, petrochemicals and alternative fuels, to become one of the 30 largest oil companies in the world, recognized for its international positioning, its innovation and its commitment to sustainable development.

Mission of the Ecopetrol Corporate Group

We find and convert energy sources into value for our customers and shareholders, ensuring the integrity of people, the safety of processes and protection of the environment, contributing to the welfare of the areas where we work, by means of committed personnel who seek excellence, integral development and the development of long-term relationships with interested parties.
How knowledge management leverages the achievement of the goals Ecopetrol S.A.?
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THE BEGINNING

APQC’s Road Map to KM Results: Stages of Implementation™

Stage 1
Get Started

Stage 2
Develop Integrated Strategy

Stage 3
Launch Value Chain KM Pilots

Stage 4
Integrate, Expand and Support

Stage 5
Institutionalize KM Across Value Chain

Source: Carla O’Dell, APQC, 2000
EVOLUTION OF ECOPETROL

STATE MONOPOLY (non integrated company) 2003

TRANSFORMATION (integrated company) 2007

INTERNATIONALIZATION 2010

Initial Public Offering

KM STRATEGY

Expanding and leveraging approach

APQC implementation model

General Policy for Knowledge and Technology Management

Experiences in KM Measurement: ECOPETROL Story, Sonia Helena Castro, ICKM - 2008
IN ECOPETROL
WHAT IS KNOWLEDGE MANAGEMENT?
IN ECOPETROL
KNOWLEDGE MANAGEMENT IS TO MAKE
THE BEST USE OF INTERNAL AND EXTERNAL
KNOWLEDGE TO MEET BUSINESS GOALS
KNOWLEDGE MANAGEMENT AT ECOPETROL

IN锡CULATION, INSURANCE, TRANSFER AND SUSTAINABILITY OF KNOWLEDGE, TECHNOLOGY AND KEY PRACTICES IN AREAS OF OPERA锡ON

CULTURE MANAGEMENT

INFORMATION TECHNOLOGY MANAGEMENT

PROCESSES, METHODS AND MECHANISMS

ENABLERS
KNOWLEDGE MANAGEMENT AS PART OF THE CONSOLIDATION STRATEGY OF ECOPETROL

PROMISE OF VALUE

“We consider Knowledge and Technology Management, and Innovation as key factors in creating value and competitive advantage for the organization. We strengthen organizational learning, incorporating new knowledge and best practices of the industry. “

ECOPETROL COMPREHENSIVE POLICY – 7th Principle, Dec 2010

BEHAVIORS

ROLES AND RESPONSIBILITIES

MECHANISMS
**KM ROLES AND RESPONSIBILITIES**

We all are responsible by the insurance knowledge.

<table>
<thead>
<tr>
<th>Role</th>
<th>Responsibilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRESIDENCY</td>
<td>Monitors the implementation</td>
</tr>
<tr>
<td>VP INNOVATION - ICP</td>
<td>Leader of the process, ensures full and effective implementation of results</td>
</tr>
<tr>
<td>OPERATING UNITS</td>
<td>Implementers</td>
</tr>
<tr>
<td>DEPARTMENTS OF SUPPORT</td>
<td>Implementers and functional leaders for specific initiatives</td>
</tr>
<tr>
<td>OTHERS VP</td>
<td></td>
</tr>
<tr>
<td>CORPORATE UNITS</td>
<td>Guide and regulate policies, guidelines and procedures.</td>
</tr>
</tbody>
</table>

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*We all are responsible by the insurance knowledge.*

---

*Monitors the implementation*

*Leader of the process, ensures full and effective implementation of results*

*Implementers*

*Implementers and functional leaders for specific initiatives*

*Guide and regulate policies, guidelines and procedures.*
KM MECHANISMS, METHODS AND TOOLS

Technological Environment Forums

Working sessions for monitoring and controlling within the Vice and Departments

Corporate University

Business Team in Knowledge and Technology Management

Communities of Practice
KM MECHANISMS, METHODS AND TOOLS

Strategic and Tactical Technology workshops

Work Events for Knowledge Transfer

Succes Stories

Lessons Learned

My site

Cross-cutting teams

Dialogue Spaces

Technology Committee
CORPORATE PROGRAM FOR IMPLEMENTATION OF KNOWLEDGE MANAGEMENT VISION

INCORPORATION, INSURANCE, TRANSFER AND SUSTAINABILITY OF KNOWLEDGE, TECHNOLOGY AND KEY PRACTICES IN OPERATING AREAS

KM UNIQUE VISION

CULTURE MANAGEMENT

INFORMATION TECHNOLOGY MANAGEMENT

PROCESSES, METHODS AND MECHANISMS

ENABLERS
CULTURE MANAGEMENT

KM within the Integrated Management System of ECOPETROL S.A

ECOPETROL Pillars of Culture Model that leverage Knowledge Management

- Espíritu de equipo
- Compromiso con la Vida
- Liderazgo
- Pasión por la excelencia
- Anticipación e Innovación
- Ética
- Responsabilidad
- Respeto
- Integridad

Integrated Management System

- Strategy and Leadership
- Value Chain
- Improvement
- Information and Knowledge
- People
- Risks
- Resources

Gestión del Cambio
Comunicaciones


**ENABLERS STRATEGIES: MANAGEMENT OF CULTURE**

- Technical and human competences associated with KM.
- Integration of competences to profiles and to the development of training plans in accordance with the levels in the organization.
- Regulatory framework that leverages the knowledge transfer.
- Mentor Program for closing gaps in competences.

- Strategies and plans for communications and divulgation at all levels.
- Induction in KM to new employees.

- Across performance objective: knowledge miles.
- Encourage the culture in KM through special recognition: symbols and signs.
- Recognition Program.
INFORMATION TECHNOLOGY MANAGEMENT: COLLABORATIVE TOOLS

- Technology is not the focus of the solution.
- There are processes, tools, methods and tools that support the collaboration and knowledge sharing.

- Portals for Knowledge, Technology and Innovation Management, such as My Site, Technology Forums, Lessons Learned, Communities of Practice, Success Stories, Technical Information Center, among others.
KNOWLEDGE MANAGEMENT GOVERNANCE

1. Business Team in Knowledge and Technology Management

Colombian Petroleum Institute

Vice Presidency of Innovation and Technology

Information Technology Department

2. Implementation Teams

3. Application Teams
WHERE IS THE KNOWLEDGE IN ECOPETROL?
WHERE IS THE KNOWLEDGE IN ECOPETROL?
WHERE IS THE KNOWLEDGE IN ECOPETROL?
KNOWLEDGE IDENTIFICATION, CAPTURE AND DISSEMINATION
WHERE IS THE KNOWLEDGE IN ECOPETROL?
AN EXAMPLE OF KEY PRACTICES - 2012

- Technical Excellence in National and International Prospects
- Timing Structure Evaluation
- Practices Within the Process of New Businesses in E&P
- Efficient Processes in Well Stimulation
- Heavy Crude Oil Process Operation
- Management Development and Operation of Mature Oil Fields
- Line Integrity Practices
- Port Management
- Oil Measurement and Accounting Management Process
- Planning Process of Supply Chain
KNOWLEDGE SUSTAINABILITY IS NOT A FACT IS A PROCESS

Agree best practice

Update and develop supporting documentation

Upgrade staff skills

Implementing in-depth coverage

Sustainability (Sistematic learning)

Facilitators:
- Communities of Practice
- Conversations
- Corporate University
- Forums
- Knowledge Events
- Committees
- Methods
- Change Management

External References
Lessons Learned
ECOPETROL´S KM MEASUREMENT MODEL

A - Agree (10%)

Sustain and improve 30%

P - Develop (20%)

Install and implement

Competent staff 20%

C - Competent Cover 20%

D - Compliance Coverage 20%
<table>
<thead>
<tr>
<th>STEP</th>
<th>WEIGHT (%)</th>
<th>LANDMARK</th>
<th>VERIFICATIONS AND CHECKING</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>10</td>
<td>Agreed best practice</td>
<td>Objective, reach and coverage are shared</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Performance indicators exist</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Line managers accept the agreement</td>
</tr>
<tr>
<td>2</td>
<td>20</td>
<td>Shared documental support</td>
<td>Critical support documents are defined, done, placed and updated adequately</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Location is unique and known by people</td>
</tr>
<tr>
<td>3</td>
<td>20</td>
<td>Competent people</td>
<td>Roles and responsibilities are defined clearly</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Induction, training and coaching are given for each role played</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Individual competences are proved</td>
</tr>
<tr>
<td>4</td>
<td>20</td>
<td>Coverage performance</td>
<td>Practice is implemented in 100% of agreed coverage</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Knowledge loss risk is managed</td>
</tr>
<tr>
<td>5</td>
<td>30</td>
<td>Systematic learning</td>
<td>There is a systematic way for seeking, generating, incorporating and sharing learned lessons</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Improvements implementation is verified and the practice and indicators are feedbacked</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Experiences in KM Measurement: ECOPETROL Story, Sonia Helena Castro, ICKM - 2008
HOW PERMEATE THE ORGANIZATION?

TACIT KNOWLEDGE

COMMON KNOWLEDGE

EXPLICIT KNOWLEDGE

IMPLICIT KNOWLEDGE

KNOWLEDGE MANAGEMENT
HOW PERMEATE THE ORGANIZATION?

NEW METHODS FOR HELP MEET THE GOALS

TEAMWORK

ASSOCIATED TO ACTIVITIES WORK

COLLABORATIVE TOOLS

INSURANCE AND SUSTAINABILITY PRACTICES AND PROCESSES
AGENDA

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PERFORMANCE MEASUREMENT OF KNOWLEDGE MANAGEMENT

✓ Performance Objectives associated with the Knowledge Management (Miles Knowledge).

✓ Process Indicator associated with the assurance model of knowledge in key practices and processes.

✓ Performance indicators for operational business sensitive to the sustainability of the knowledge of key practices.

✓ Documentation and dissemination of success stories and strategies associated with knowledge management activities.

✓ Compliance of milestones.

✓ Metrics and statistics on the use of portals and collaboration tools on the Intranet.
ACHIEVEMENTS IN OPERATIONS

- Recognition to communities of practice of Combustion and electric team during corporate event of maintenance.

- Global reduction in rotating equipment failure was achieved in Refinery: From 2.25 to 0.7 between 2007 and 2008 by implementing best practices in Basic Equipment Care (BEC).

- Structured programs in shutdown plant in Refinery, combustion, crude oil diets and performance of operational excellence program.

- Operator certification through the Corporate University.

% Rotating Equipment in good condition in Paraffins

- Increase in capacity from 140 to 200 Barrels/hour (Nov. 2008)
**Historias de Éxito**

En este primer boletín, contaremos cómo se hizo la reparación de la Torre de Agua de Enfriamiento (TAE), ubicada en la Refinería de Cartagena.

**HISTORIA N°1**

HEMO ESCOGIDO EL LENGUAJE DEL COMIC PARA CONTAR DE UNA MANERA MÁS ATRACTIVA EL APRENDIZAJE ORGANIZACIONAL Y LLEVARLO A LA PRÁCTICA A TRAVÉS DELAS HISTORIAS DE ÉXITO.

**EN ESTE PRIMER BOLETÍN, CONTAREMOS CÓMO SE HIZO LA REPARACIÓN DE LA TORRE DE AGUA DE ENFRÍAMIENTO (TAE), UBICADA EN LA REFINERÍA DE CARTAGENA.**

**EL CONOCIMIENTO APlicado, LA CREATIVIDAD Y EL TRABAJO EN EQUIPO DEL PERSONAL A CAUSO AYUDAN A RESOLVER PROBLEMAS. ÉSO ES UNA HISTORIA DE ÉXITO.**

**HISTORIA N°1**

**IMAGINÉSE QUE EN ESTA TAE (TORRE DE ENFRÍAMIENTO), QUE SERVE PARA BAJAR LA TEMPERATURA A ESOS INMENSOS TANQUES...**

¡CLARO QUE ES PELIGROSO, LUEGO, VACÍARON EL AGUA DEL TANQUE PEQUEÑO, DEJANDO EL ÁREA DEL DAÑO EN SECO Y BRINDANDO SEGURIDAD A LOS TÉCNICOS. DESPUÉS REMOVARON EL CONCRETO DAÑADO Y Rellenaron LA GRIETA CON EL CONCRETO FLUIDO!

**Y AUNQUE LUEGO, EL AGUA DE ESTE BENDITO TANQUE ESTÁ A MÁS DE 40°C...**

¡POOR FORTUNA, UN EQUIPO INVESTIGÓ, PROBÓ Y PENSÓ EN DISTINTAS SOLUCIONES DE REPARACIÓN CON EL MENOR IMPACTO SÍN APAGAR LA PLANTA Y SIN COCINAR A LOS TÉCNICOS.

**ENTONCES, HICIERON UN TANQUE PROVISIONAL DENTRO DEL TANQUE GRANDE, DONDE ESTABA LA GRIETA, Y LO AISLARON PARA QUE EL AGUA HIRVIERA NO SE COLARÁ.**

**Y PARA EL USUARIO FINAL, LA HISTORIA DEL ÉXITO: NO HAY CAMBIO, SIGUE IGUAL.**
La Empresa tiene 161 mil nuevos accionistas
Bogotá, 20 de octubre de 2011. Más del 80% de los inversionistas son personas naturales y pagaron en efectivo.

Crecimiento del 87% en producción del Magdalena Medio
Magdalena Medio, 20 de octubre de 2011. Esta cifra hace referencia al incremento reportado en los campos de esta zona del país en los últimos 4 años.

Ceremonia de abotonados en El Centro
El Centro, 20 de octubre de 2011. Los líderes de Magdalena Medio y el Comité Directivo de Ecopetrol realizaron un homenaje a 29 trabajadores por sus 10 y 20 años de servicio a la Empresa.

El Oso, área de protección ambiental de Ecopetrol en el Huila
Neiva, 20 de octubre de 2011. Desde la SOH se viene

En Ecopetrol la gestión social la hacemos todos
Ruben Hernan Castro García

Teléfono: Ext. 47152
Correo electrónico: rubenHe.castro@ecopetrol.com.co
Dependencia: Unidad de Investigación
Lugar de trabajo: Edificio 1 Piso 2 ICP
Fecha de Cumpleaños: agosto 16
Última actualización: hace 9 meses

Mis lecciones aprendidas

Ver todas

Lecciones Aprendidas Proyecto Recobro Químico
25/05/2011 15:05:38
Lecciones Aprendidas de la Fortaleza Tecnológica
Gerenciamiento del Proceso de Inyección de Agua
03/12/2010 8:36:44
Proyecto Recobro Mejorado - Fase 2
13/10/2010 12:11:02
Proyecto estrategias de desarrollo áreas Lisama y Llanito
13/10/2010 12:10:27

Mis foros de discusión

Ver todos

Mis encuestas

Ver todos

Mis vínculos

General
"Estatus EOR COL"
"Historia y Criterios Empíricos WF VMM SPE 123068-MS "Definition of Reservoir Compartment"

Jerarquía de la organización

Andres Reyes Harker,
Ruben Hernan Castro García,
Andres Roberto Mora Bohorquez,
Ariel Uribe Rodriguez,
Edgar Fernando Castillo Monroy,
Favio Yovany Jimenez Inocencia,
Hugo Alejandro Garcia Duarte,
im_icp_uin
Jose Ricardo Sandoval Ruiz
SUCCESES AND RESULTS
SUCCESSES AND RESULTS

McKinsey Quarterly

Boosting the productivity of knowledge workers

Eric Matson and Laurence Prusak

The key is identifying and addressing the barriers workers face in their daily interactions.

Ecopetrol's technical forums break down the natural barriers between occupations and promote knowledge sharing across geographic boundaries.
SUCCESSSES AND RESULTS
KM&T 2011

- 30 PATENTS GRANTED
- 115 NEW PATENT APPLICATIONS
- 33 TRADEMARKS
- 126 RECORDS COPYRIGHT
- 34 Colombia
- 57 ABROAD
- 24 PCT Fase
- MU$ 48

HISTORICAL PATENTS LOCATED

- TYPES OF TECHNOLOGY PATENT PROTECTED
  - Refinacion
  - Produccion
  - Transporte
  - Biocombustibles

NATIONAL INDICATORS

EMPRESAS NACIONALES CON MAYOR NUMERO DE PATENTES INVENCION SOLICITADAS EN COLOMBIA (ULTIMOS 5 AÑOS)

- 199 TECHNOLOGICAL PRODUCTS

SUCSESSES AND RESULTS
KM&T 2011
GLOBAL MAKE 2011

2011 Global MAKE (Parent) Finalists Position Rankings

1. Apple  
2. Google  
3. IBM  
4. Fluor  
5. Schlumberger  
6. Tata  
7. Samsung  
8. Microsoft  
9. APQC  
10. PwC  
11. Siemens  
12. Toyota  
13. ConocoPhillips  
14. Infosys Limited  
15. POSCO  
17. McKinsey & Company  
18. Unilever  
19. Hewlett-Packard  
20. Accenture  

21. Royal Dutch Shell  
22. Ernst & Young  
23. Facebook  
24. Larsen & Toubro  
25. Mars  
26. IKEA  
27. Banco Santander  
28. BMW  
29. MITRE  
30. Petrobras  
31. MindTree  
32. Deloitte  
33. Wipro Technologies  
34. KPMG  
35. Cognizant Technology Solutions  
36. British Broadcasting Corporation  
37. Fujitsu  
38. Ecopetrol  
39. Syngenta  
40. World Bank  
41. Telefónica  
42. Arup  
43. Woods Bagot  
44. WorsleyParson  
45. Asian Development Bank  
46. Nestlé

AMÉRICA LATINA
### LEADERS IN THE OIL & GAS SECTOR

<table>
<thead>
<tr>
<th>Rank</th>
<th>Company</th>
<th>Country</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Schlumberger</td>
<td>the Netherlands</td>
</tr>
<tr>
<td>2.</td>
<td>Chevron</td>
<td>United States</td>
</tr>
<tr>
<td>3.</td>
<td>ExxonMobil</td>
<td>United States</td>
</tr>
<tr>
<td>4.</td>
<td>Royal Dutch Shell</td>
<td>the Netherlands</td>
</tr>
<tr>
<td>5.</td>
<td>ConocoPhillips</td>
<td>United States</td>
</tr>
<tr>
<td>6.</td>
<td>Statoil</td>
<td>Norway</td>
</tr>
<tr>
<td>7.</td>
<td>Petrobras</td>
<td>Brazil</td>
</tr>
<tr>
<td>8.</td>
<td>Halliburton</td>
<td>United States</td>
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<tr>
<td>9.</td>
<td>Ecopetrol</td>
<td>Colombia</td>
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<tr>
<td>10.</td>
<td>BG Group</td>
<td>United Kingdom</td>
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<tr>
<td>11.</td>
<td>Total</td>
<td>France</td>
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<td>12.</td>
<td>Baker Hughes</td>
<td>United States</td>
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<td>13.</td>
<td>BP</td>
<td>United Kingdom</td>
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<tr>
<td>14.</td>
<td>Valero Energy</td>
<td>United States</td>
</tr>
<tr>
<td>15.</td>
<td>ENI</td>
<td>Italy</td>
</tr>
<tr>
<td>16.</td>
<td>SK Holdings</td>
<td>S. Korea</td>
</tr>
<tr>
<td>17.</td>
<td>Petronas</td>
<td>Malaysia</td>
</tr>
<tr>
<td>18.</td>
<td>Sinopec</td>
<td>China</td>
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<tr>
<td>19.</td>
<td>China National Petroleum</td>
<td>China</td>
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<tr>
<td>20.</td>
<td>Repsol YPF</td>
<td>Spain</td>
</tr>
<tr>
<td>21.</td>
<td>Sasol</td>
<td>South Africa</td>
</tr>
<tr>
<td>22.</td>
<td>Reliance Industries</td>
<td>India</td>
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<tr>
<td>23.</td>
<td>Saudi Arabian Oil</td>
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<tr>
<td>24.</td>
<td>Gazprom</td>
<td>Russia</td>
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<tr>
<td>25.</td>
<td>Pemex</td>
<td>Mexico</td>
</tr>
</tbody>
</table>

*Table 17: Leaders in the Oil & Gas Sector.*
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4. How and with whom, us we reference?
5. Lessons Learned
BENCHMARKING

- Exchanges with Companies
  - Referencing with Colombian companies
  - Referencing inside the Corporate Group
  - Referencing with International Companies
BENCHMARKING

- Assistance to national and international events as participants and speakers
- Environment Forum on Knowledge Management 2007
- Studious Level Meeting on Knowledge Management 2011

- Global Affiliations Memberships
- Participation in global studies
AGENDA

1. **Our Dream and Reason to Exist**

2. **Knowledge Management at Ecopetrol**

3. **Progress and Results: how do we measure?**

4. **How and with whom, us we reference?**

5. **Lessons Learned**
SOME SUCCESS FACTORS

✓ The alignment of knowledge management with the strategic objectives of the organization and aim to solve "real problems".

✓ A visible vision of Knowledge Management is a good starting point.

✓ Synergy and permanent alignment with analysis and process improvement programs, implementation of management systems, quality, etc., Not to compete for resources.

✓ A Team:

"Maker" Credible, Sponsored by everyone, Representative of Areas and key programs, self-motivated, Self-critical

✓ Implementation scheme for pilots to generate early victories

✓ Model for measuring, monitoring and ongoing support by senior management
The support of strategic level is essential for success in the program.

The example of leaders is essential to motivate.

The KM is about people and their relationship to other human beings.

The processes need to understand and promote human needs and motivations of those involved in them.

The recognition is based not only on money are very important symbols and signs.

Tools are not the focus to the solution but are very useful if it's clear that support the process.

There is no universal method or model, each organization must find what is required and what is the best way to approach from their own culture.

Knowledge is expensive and can not have shortcuts to sustainability in organizations.
GRACIAS
THANK YOU
MERCI