Developing Competencies for Nuclear Safe Operation

October 2015

tecnatom

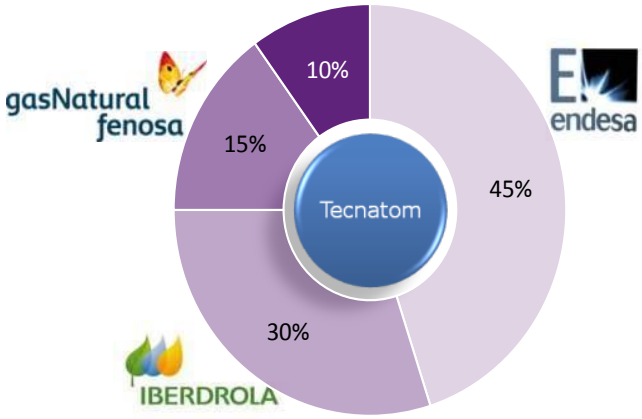
Content

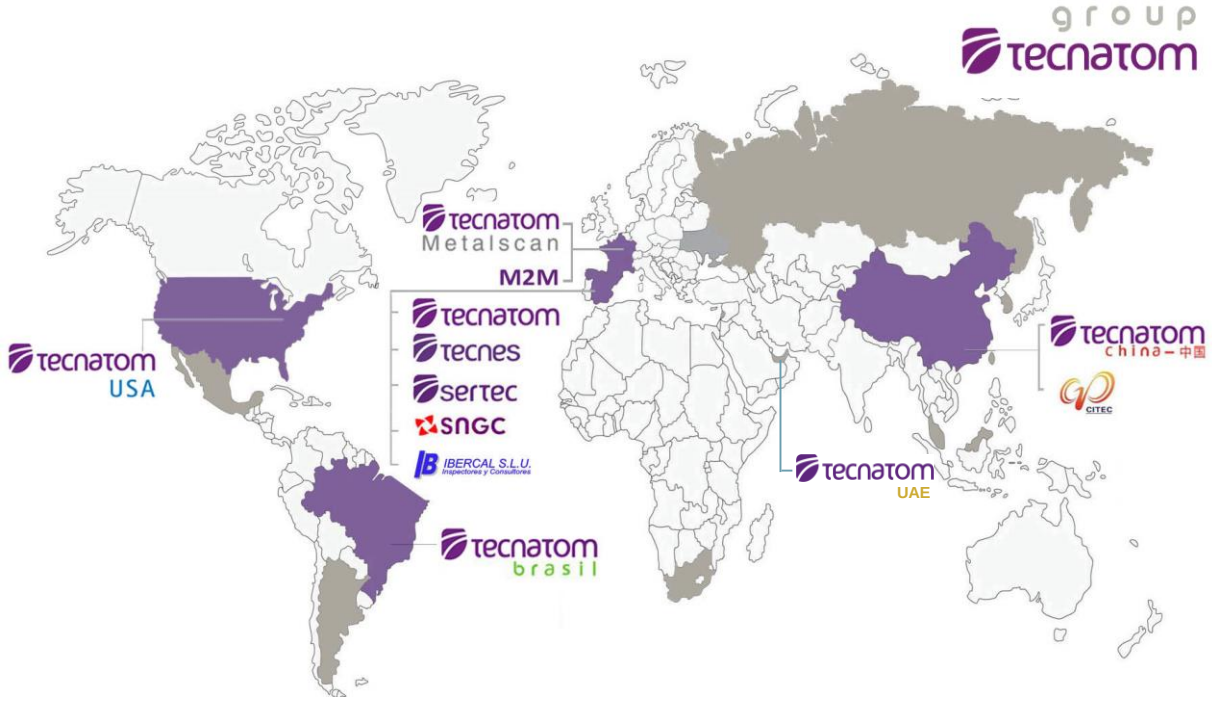
1 Introduction to Tecnatom Group

Mission

To contribute to the improvement of safety, availability and economic efficiency of energy and industrial facilities, for the accomplishment of the objectives of our shareholders and clients.

Shareholders





- *Projects in more than 30 countries worldwide*
- *Large Portfolio of Technical Capabilities and Services Range*
- *Fossil and Renewable Power Plants*
- *Aerospace and Industrial Systems*
- *Technological Independence for Services and Equipment Supply*

Founded in 1957

Core Activities

- Non-Destructive & Functional tests
- Simulation, **Training** & Operation Support. Since 1973

2 Relevant Current Training Activities

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Operation of Training Centers in Existing Plants

- Ascó I & II
- Vandellós II
- Cofrentes
- Almaraz I &II
- Trillo
- Garoña

Performing all the training activities for Initial and Continuous Programs
Maintaining and Updating Training Facilities and Media

Support for the Operation of Training Centers in Existing Plants

- Angra I & II
- Koeberg I & II
- Laguna Verde I & II
- Atucha I & II

- Instructors
- Methodology
- Development of training materials
- Development of SAT

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Training Services for New Reactors

Support to Westinghouse ® AP-1000 Reactor

- SAT & Training Material development.
- Delivering training NPP´s in China & USA
- AP 1000 Simulator Validation

Support to ENEC in Barakah Project ® APR 1400

- Delivering of Fundamentals & Preparatory courses
- Delivering of Operation course for licensing Operators
- Development of Question & Answers

Training Consultancy for NUGEN

- Development of the Complete Project for the Establishment of the RO Training Center

Initial Training for Horizon.

- Delivering Training in Nuclear Fundamentals & ABWR Technology for Engineers

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Ministry of Education and Development of Poland

- Delivering Nuclearization Courses for University graduates and professors

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- Delivering Technology courses using IAEA simplified Simulators

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Specific Training for Utilities Personnel

Initial & Continuing training for NRA personnel

Post Graduates Courses with Universities and Companies

2 Summary. Tecnatom Training Figures

We are a “Nuclear Knowledge Management” Organization

MORE THAN 40 YEARS OF EXPERIENCE

Transferring Critical Knowledge during Generational Change (1999-2015)

- **More than 2000 NEW EMPLOYEES in nuclear in the last 10 years. Including more than 400 LICENCED OPERATORS for New and Existing NPP.**
- Continuing Human Performance Improvement through Training: **AVERAGE: 500 STUDENTS PER YEAR in Existing NPP**




Experience in different nuclear technologies:

GENERATION II (PWR, BWR, KWU)
GENERATION III (AP1000, ABWR)
GENERATION IV (PBMR)

HUMAN RESOURCES CAPABILITY

160 full time instructors + 30 part time SME
…qualified at the excellence references

AN INDEPENDENT TRAINING SERVICES SUPPLIER

Operational Excellence

Based on INPO performance indicators

Excellent Plants have a strong **Leadership**.

In Excellent Plants **Self-Critique** is a habit.

Excellent Plants have an **Operational focus**.

Excellent Plants have **Equipment** with an exceptional performance.

Excellent Plants use **Training** for Performance Improvement. Training Health is a lead indicator.

The Elements in Developing Competencies for Safe Operation

1. Leadership and Safety Culture
2. Training for Performance Improvement
3. The continuous improvement process in Training
4. The Strategic Role of the Instructors

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3.1 Leadership and Safety Culture

"A Healthy Safety Culture has to be lead by example and clear behavior expectations"

Leaders have to be trained and educated

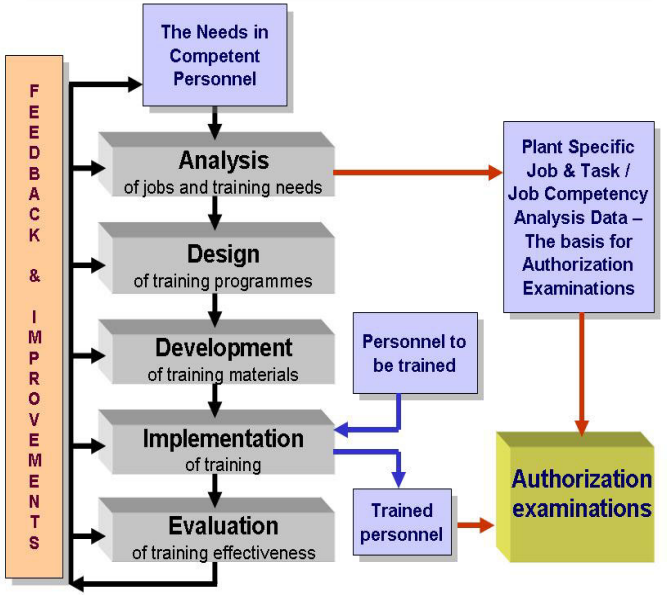
Complete Programs for Education and Training of Leaders:

- Top Management
- Middle Managers
- Supervisors

3.2 Training for Performance Improvement

- The main objectives of training are:
  1. To meet the specific needs of the different job positions.
  2. To promote the managers expectations and to reinforce safe behaviours.

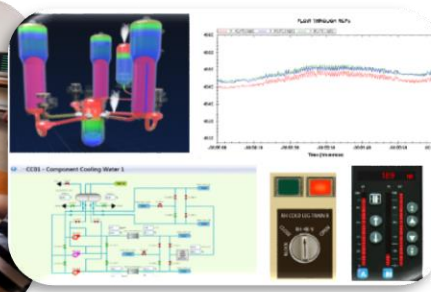
- Systematic Approach to Training methodology (SAT) has two important outcomes:
  1. Tailor made initial training programs for the different job positions. (Efficiency)
  2. Continuous training programs focused on performance improvement. (Positive impact in the Plant)



3.2 Training for Performance Improvement

Theoretical Training in interactive Classroom:

- **Refreshing fundamentals**
- **Operating Experience**
- **Specific needs by Blended Learning**



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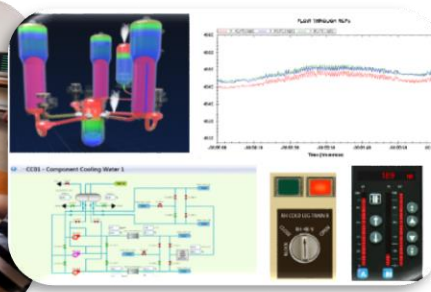


Practical Training in the correct setting:

- **Control Room Simulators** (TO; RO; CRS & SS SRO)
- **Learning Simulators** (Engineers, Managers, & Supervisors)
- **Workshops** (Maintenance Supervisors & Technicians)
- **Field simulators** (Field Operators, Supervisors & Technicians)

"We train like we work; we work like we train"

3.2 Training for Performance Improvement

Training Leadership

The role of Line Managers

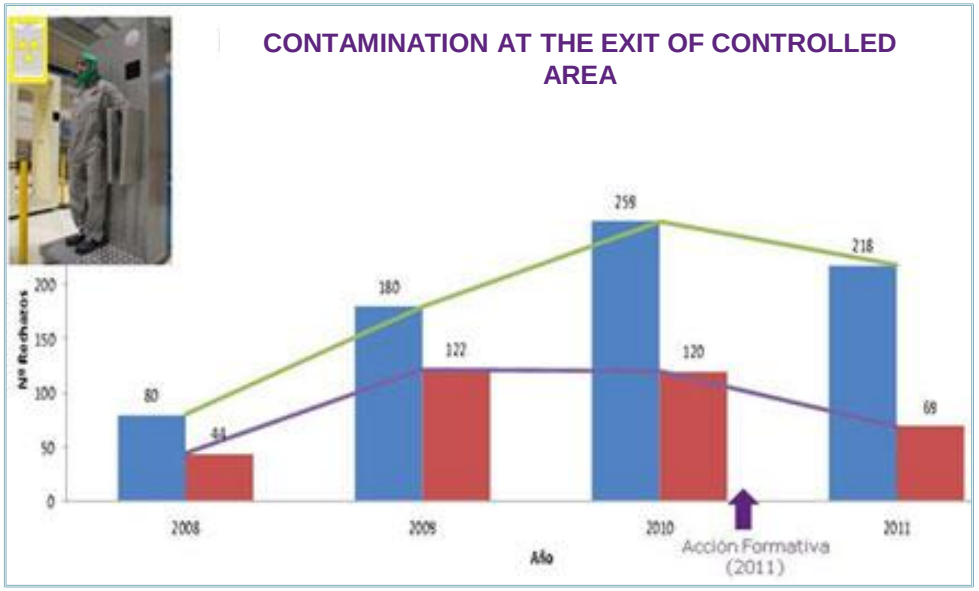
- Line management must lead training

The role of the Instructor team

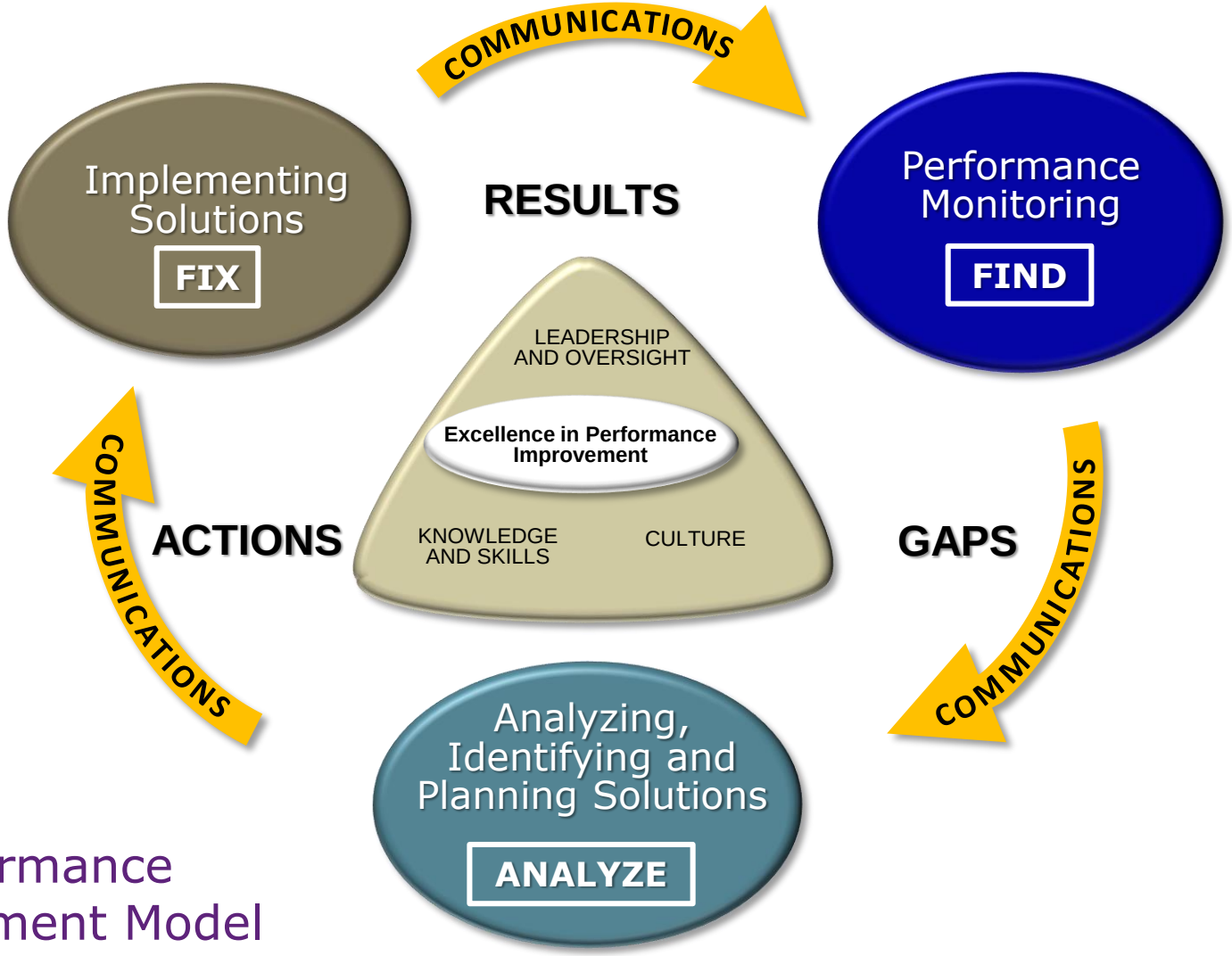
- The training organization must be focused on plant results
- Instructors as facilitators of the learning process and role modeling

Attributes of an Excellent Training:

- Challenging and interesting
- Implemented on time
- Reinforce management expectations
- Performance improvement oriented



3.3 The Continuous Improvement Process in Training



Performance Improvement Model

3.3 The Continuous Improvement Process in Training

Operating Experience

Quality audits (In-Ex)

Cause analysis

Corrective Action program (Reactive)

Peer-Review to NPP

Technical-pedagogical audits to instructors

International guidelines (INPO, WANO, IAEA…) & Networking

Benchmarking

Program Improvement actions (Proactive)

Management tips and suggestions

Training workshops

Self-Evaluations

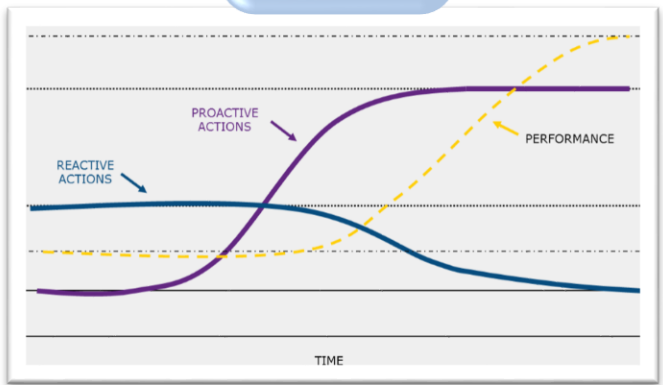
Managers Training observation

Continuous Improvement of the training process

Trend indicators (Proactive)

Post-training surveys

Partial test results



3.3 The Continuous Improvement Process in Training

INPO

(Institute of Nuclear Power Operations)
2010-2013 Agreement for Training Methodology Transfer
Since 2014: Member of the Suppliers Program

(Word Association of Nuclear Operators)
Training Managers Working Group

(European Nuclear Education Network)
Participation in the Board of Directors

(American Nuclear Society),
ANSI-ANS 3.5 Working Group
(simulators for training licensed personnel)

Participation in Training Networks

SSNTA
(Southern States Nuclear Training Association)
Member at the Operations Branch

EDF ENERGY
Participation in the Training Standard Accreditation Board

IAEA

Participation in the International Technical Working Group on "Managing Human Resources in the Field of Nuclear Energy" (TWG-MHR)

Participation in training guidelines and technical documents

EPRI ELECTRIC POWER RESEARCH INSTITUTE
Working Groups

CEIDEN
(Spanish Technology Platform for Fission Technology)
Member of the Training And Education Group

3.4 The Strategic Role of the Instructors

The Trainer is a role model

Instructor Key abilities

- Solving Students Doubts
- Focus on Important Safety Issues
- Assessing Students Apprehension of Critical Knowledge and Skills
- Capture and Transform Tacit Knowledge in Explicit Knowledge (Organizational Knowledge)

3.4 The Strategic Role of the Instructors

Training the trainers

a) Recruitment Process

Profile analysis
Selection

b) Qualification

Nuclear Fundamentals
Technical Content:
Operations (licensed and non-licensed), Maintenance, Engineering, Radiological Protection, Chemistry and Emergency Response.

…not only technical training but also soft skills training:

- Systematic Approach to Training
- Pedagogical Skills
- Emotional Intelligence
- Coaching
- Positive Reinforcement
- Error Prevention Techniques
- Trainee Assessment
- Simulator Performance Evaluation

Instructor Expectations

4. Conclusions

1. Leadership has a crucial role in **safety culture**, human behaviours and plant performance.
2. Training is a **strategic tool** for improving human performance and promoting safe behaviour.
3. International experience recommends to develop a comprehensive training system based on excellence standards such as **SAT** to contribute to **Performance Improvement**.
4. Training should **learn** from industry experience, international cooperation and benchmarking.
5. Instructors are "**the soul"** of the training process.

Tank you very much

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