The Challenge of Keeping Simulators Up To Date

San Diego, January 2017
Challenges

- Availability for operation with an intensive use
- Adequate response to training needs
- Modernization projects
- Maintenance needs
- Use as an engineering tool
- Customer satisfaction
- Inspections & audits
- Continuous improvement
- (...)

All at the same time
## Tecnatom Group

<table>
<thead>
<tr>
<th>Mission</th>
<th>Vision</th>
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<tbody>
<tr>
<td>• Contribute to improving the safety and efficiency of our clients’ plants</td>
<td>• Be a leading company recognized internationally for both its technology and its professionals</td>
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### Business Group
- Subsidiaries in France, Brazil, China, UAE and USA
- Projects in more than 30 countries worldwide
- Energy: Nuclear, Fossil, Renewable
- Aerospace and Industrial Sectors

### Core Activities
- Control Rooms, Simulation and I&C
- Training, Plant Operation & Emergency Support
- Inspection, Testing & Engineering

### Shareholders
- Iberdrola: 30%
- Endesa: 45%
- Gas Natural Fenosa: 15%
- Treasury Stock: 10%
Figures (Year 2015)

**Turn Over**

<table>
<thead>
<tr>
<th>Year</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
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<tbody>
<tr>
<td>Thousands euros</td>
<td>117,993</td>
<td>122,066</td>
<td>122,778</td>
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**Workforce**

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<th>Year</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
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<tbody>
<tr>
<td>Employees</td>
<td>998</td>
<td>1,060</td>
<td>1,071</td>
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**Investment**

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<th>Year</th>
<th>2013</th>
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<td>Thousands euros</td>
<td>15,773</td>
<td>15,378</td>
<td>14,198</td>
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SPANISH TRAINING CENTRES SET UP & OPERATED BY TECNATOM
Sizing and Organization

**Operation**
- Specification and acceptance of changes in the simulator
- Execute Periodic Tests

**Modeling**
- Development and modification of the models and codes

**Technical Support and Instrumentation**
- Management of the calculation environment, interfaces, I/O, communications, arquitecture SW/HW, estimulated systems and Instructor Console

**HW Technicians**
- Training in simulators environments, architecture, system administration (Engineers)
- HW: technical personnel

**Project Organization**
- Operators training program (Engineers)
- Technology training. Simulation tools and environments. (Engineers)

**SAE**

**Engineers pool**
SIMULATORS O&M STAFF

Spain

Garoña NPP Full Scope Simulator

1 Test Operator
1 I&C Technician

2 Test Operators
2 SW (I&C) Engineers
1 I&C Technicians

Tarragona Training Center

1 Human Performance Simulator

O&M Average Staff
3,5

Special Projects Average Staff
1,5

2 Test Operators
2 I&C Technicians

1 Test Operator
1 I&C Technician

Modelling Engineers

Engineers Pool
Configuration Management

Standards & Regulations: Procedures

Methodology: Guidelines


Support daily operation
Support methodology
Procedures & Guidelines

Procedures

- Simulator configuration identification
- Changes identification and Work Order (WO) generation
- Simulator Testing and Validation
- WO resolution strategy
- WO implementation
- WO documentation

Guidelines

- Assign the impact on training for each WO
- Define and document post-event tests
- Define the training materials
- Define how to follow up the simulator physical fidelity
- Execute reactor core performance testing
- Follow up plant modifications
**CMS: SICOSIS**

**What is the system contribution?**

- **Assuring** simulators maintenance and update fulfill regulations requirements
- **Supporting** maintenance processes and methodology: new simulation load
- **Making daily operation easy** : HW discrepancies; incidents management; operation performance indicators
- **Managing** simulator applications databases: Instructor Station, I/O System, source code, ...

**Web Application**  **Proccess Support**  **Work Flow**

**Diff. Profiles: instr/techn**  **Diff. sites**  **Zero paper**

**Interface diff. actors**  **Testing Program**  **Plant Mods**
Automatic Simulators Operation: SOAS-Web

FEATURES
• Web Application
• Possibility of selecting and configuring any dynamic task
• Executes automated tasks with a single click
• Schedules hourly, daily, weekly and monthly tasks
• Different access profiles
• On-line reports to the notification page and mobile devices
• History management

ADVANTAGES
• Access from any device with Internet
• Insight into the status of all the simulators at a glance
• Human-machine interface designed to be user friendly
• Executions are automated, avoiding errors and reducing costs
• Task scheduling is permitted
Corporate Applications

Digital Signature

Document Management

SVN server

SICOSIS
## New Load Yearly Planning

### 2017

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<th>2017</th>
<th>Diciembre</th>
<th>Enero</th>
<th>Febrero</th>
<th>Marzo</th>
<th>Abril</th>
<th>Mayo</th>
<th>Junio</th>
<th>Julio</th>
<th>Agosto</th>
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Figures

- Training sessions Hours > 8,000
- Nº Work Orders > 300
- Nº Simulation Loads → 14
- Nº Special Projects → 4 (2 SCDR+DEH+AFW)
- Inspections & Audits → 2: CSN + Self evaluation. No findings
- Examinations → 14 RO/SRO Candidates. No simulator issues
KPIs

SERVICE QUALITY INDICATORS

SIMULATORS OPERATION

- Unavailability
- Number of incidents/100h
- Plant Modification delay

STATE OF THE SIMULATORS

- Corrective WO Opened
- Instructors Satisfaction
- RO/SRO Satisfaction

<table>
<thead>
<tr>
<th>Reference</th>
<th>Unavailability</th>
<th>Number of incidents/100h</th>
<th>Plant Modification delay</th>
<th>Corrective WO Opened</th>
<th>Instructors Satisfaction</th>
<th>RO/SRO Satisfaction</th>
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<tbody>
<tr>
<td>Real</td>
<td>0,6%</td>
<td>1,8</td>
<td>9 months</td>
<td>20</td>
<td>80</td>
<td>80</td>
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<tr>
<td>Reference</td>
<td>0,57%</td>
<td>2,1</td>
<td>10 months</td>
<td>25</td>
<td>84</td>
<td>88</td>
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DEADLINES COMPLIANCE

NEW LOAD PROMOTION
End users survey

CUSTOMER SATISFACTION SURVEY 2016

ALMARAZ
ASCÓ
COFRENTES
TRILLO
VANDELLÓS
Main difficulties come from making the O&M activities compatible with a high utilization for training and engineering.

Several projects taking place in parallel make the need of a sound work plan.

Well established methodology and adequate tools optimize simulator O&M.

Our commitment is to increase the users satisfaction, while optimizing the O&M process.

In the current economical situation, reduce O&M costs but maintaining quality is a primary goal.

Tecnatom has the Staff, the Methodology and the Tools to keep the fleet updated.
Questions?