EDF 1300 SIMULATORS FLEET: HARDWARE UPGRAding project
13/01/2020 – Patricia Romero
TECNATOM OVERVIEW
MISSION & VALUES

Clients
OUR PRIORITY

People
OUR STAFF MAKE THE DIFFERENCE

Innovation
INNOVATION & TECHNOLOGY, LEVERS TO ADD VALUE

Make power generation and industrial facilities to operate **safely, efficiently** and excellently

Adaptation
OUR CAPACITY FACING NEW CHALLENGES

Safety Culture
OUR SOLID COMMITMENT WITH PEOPLE AND THE ENVIRONMENT
MARKETS
Complex technological industries with the highest quality and safety standards

- Current Nuclear Fleet
- New Reactors
- Advanced Reactors
- Research Reactors
- Gas Combined
- Coal
- Cogeneration
- Renewable
- Oil & Gas
- Manufacturing
- Process Industry
- Aerospace
- Railway
- Automotive

Power Generation

Industrial

Training & Safety
Operation
Inspection & Testing
Technology & Product
SIMULATION SOLUTIONS

- Simulators Development
- Simulators Upgrading and Modernization
- Training Simulators
- Consulting Services
- Engineering simulators
- Simulators Operation and Maintenance
- Simulation Assisted Engineering

www.tecnatom.es
BACKGROUND

EDF SIMULATORS UPGRADING PHILOSOPHY & STATE
BACKGROUND

- The project was awarded to Tecnatom in an open bidding process (January 2018)

- EDF nuclear simulators have a major update every 10 years (VD= Decennial Visit)
  - Design modifications
  - Corrective modifications

- 1300 fleet is divided into 2 types or “paliers”: P4 (3 simulators) and P’4 (5 simulators)

- There is a test platform in Marseille (Glasstop type) for all simulators
**BACKGROUND**

**Objective:** 1300 Full Scope Simulators (FSS) update to VD3 Lot A.

**Starting point:**

- 8 simulators
- 2 “paliers”: P4 (3) + P’4 (5)
- Real Control Rooms state: P4 y P’4: VD3 Lot A
- Simulators state:
  - SW: VD3 Lot A
  - HW:
    - P4: VD2 (1), intermediate state VD3 J0-6 (2)
    - P’4: VD2 (5)
- Test Platform state: VD2
PROJECT SCOPE & SCHEDULE
PROJECT SCOPE

• **HW update (SDCH):**
  - P4 VD2 → P4 VD3 Lot A (1)
  - P4 VD3 J0-6 → P4 VD3 Lot A (2)
  - P’4 VD2 → P’4 VD3 Lot A (5)

• **Test Platform Configuration update:**
  - VD2 → VD3 Lot A.
PROJECT SCOPE

• **HW update tasks (SDCH):**

1) Analysis of the plant modification or corrective action
2) Hardware implementation design (taking into account SW modification already made)
3) Electrical design (taking into account SW modification already made)
4) Signals/Communication configuration files update
5) Purchase and supply of electrical, mechanical and hardware equipments
6) FAT tests (in our test laboratory)
7) Platform test (in Marseille)
8) Installation in the simulator & SAT test

• **Documentary review and update**
PROJECT SCHEDULE (2018-2022)

INT 1: NOGENT
INT 2: BELLEVILLE
INT 3: PALUEL
INT 4: CATTENOM
INT 5: FLAMANVILLE
INT 6: SAINT ALBAN
INT 7: PENLY
INT 8: GOLFECH
Test laboratory for FAT
CHALLENGES

- New client, new requirements, new standards and procedures
- Strict and tight deadlines (training depends on it!)
- Paperwork and documentary load
- Delivery times and shipments tracking
- Geographical dispersion
CHALLENGES

• People and equipments access management

• Coordination of interventions with all actors involved (EDF Project Manager & simulator responsible in the utilities)

• Storage and efficient management of components and equipments
  ➔ Creation of a guarded warehouse with restricted access dedicated to the project
STRENGTHS

- **SPANISH NUCLEAR SIMULATORS FLEET O&M**
  - Simulators: 5
  - Technology: Westinghouse, General Electric and Siemens
  - Location: Spain. **Four locations**
  - Schedule: **Continuous. 1-2 updates/year per simulator**
  - Simulators owned by Tecnatom
  - **Certified under ANSI-3.5**
  - **Centralized maintenance scheme**
  - Validation of plant modifications (S.A.E)
STRENGTHS

• **Experience** in nuclear simulators fleet maintenance (SW & HW)

• **Mastery of the tasks** associated with hardware upgrade

• **Parallel maintenance in different geographical areas**

• Management of projects with **restrictions**
STRENGTHS

• Experience in collaborative and international environments

• Paperwork for nuclear sector

• French subsidiary to support with local companies

• Short response times to face discrepancies
PROJECT STATUS

• The appropriation, development, FAT testing and platform testing phases are complete.

• In summer 2019, the first intervention began.

• The size of the team in the interventions is usually 14 people, including our local company in France.

• In January we will have completed the first 3 interventions (2 of them in parallel) and we will be preparing the fourth by the end of February 2020.
PROJECT STATUS
PROJECT STATUS
KEY TO SUCCESS / LESSONS LEARNED
KEY TO SUCCESS

- Experience and knowledge in simulator maintenance
- **Compliance with critical dates** (simulator availability periods)
- **Adaptation** to face of unforeseen events and uncertainties
- **Availability** of reinforcement personnel in cases needed
- **High-efficient and motivated team**
LESSONS LEARNED

Successive interventions, very important to learn in the first intervention (and so on) for the execution of future actions.

**• REX figure:**
- Creation of a specific management system for lessons learned and corrective actions associated with the project
- New interventions cannot be performed without taking corrective actions associated with past interventions
- Direct customer involvement in managing operational experience and lessons learned

**• Results:**
- Reduction of contingencies
- Improved EDF-TECNATOM collaboration
- Agility of interventions and even parallel work
PROJECT STATUS