

The Spanish Nuclear Fission Technology Platform CEIDEN: an example of networking in R&D, Education & Training and Knowledge Management



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4th ASEM Seminar on Nuclear safety
“Knowledge management to enhance nuclear safety”
29 October 2015

What is CEIDEN?

What is?

- **CEIDEN is a Spanish Organization for the coordination of the efforts and needs of Nuclear Fission Technology R&D.**

What does?

- **Definition and development of joint projects, and the presentation of a common position for national and international commitments and proposals in the Nuclear Fission R&D field.**

Who?

- **CEIDEN includes all sectors related to R&D Nuclear Fission in Spain.**

VISION of CEIDEN Technology Platform

Foster R&D activities focused on the safe, reliable and competitive operation of actual nuclear installations and the fuel cycle, and the development of new nuclear projects

Objetives

- Boost growth of scientific and technological basis of nuclear fission
- Promote and coordinate nuclear R&D initiatives among Companies, Government Agencies, Research Centers and Universities
- Suggest the National R&D Plan strategy guidelines in the Nuclear Fission Sector.
- Advise and coordinate the participation in international projects
- Promote the Spanish nuclear technology in appropriate forums.

CEIDEN ORGANIZATION

Consejo Gestor CEIDEN: Executive Committee

- **President: Rosario Velasco (CSN)**
- **Secretary: Pablo T. León (ENDESA)**

SECTOR	ENTITY	
Utilities (3 rep):	ENDESA	
	IBERDROLA	
	GNF	
Fuel Cycle (2 rep):	ENUSA	
	ENRESA	
R&D Institutions (2 rep):	TECNALIA	GDES
	CIEMAT	
Universities (1 rep):	UPM	UPC
Eng & Const. Companies (1 rep):	GNF ENG	IBERD.ING.
Equipment Manufacturers (1 rep):	ENSA	
Services Companies (1 rep):	TECNATOM	ENWESA
Regulator (2 rep):	CSN	
Government (1 rep):	MINETUR	
Government (1 rep):	MINECO	

All Nuclear Cycle represented at CEIDEN, from fuel manufacturing to waste disposal

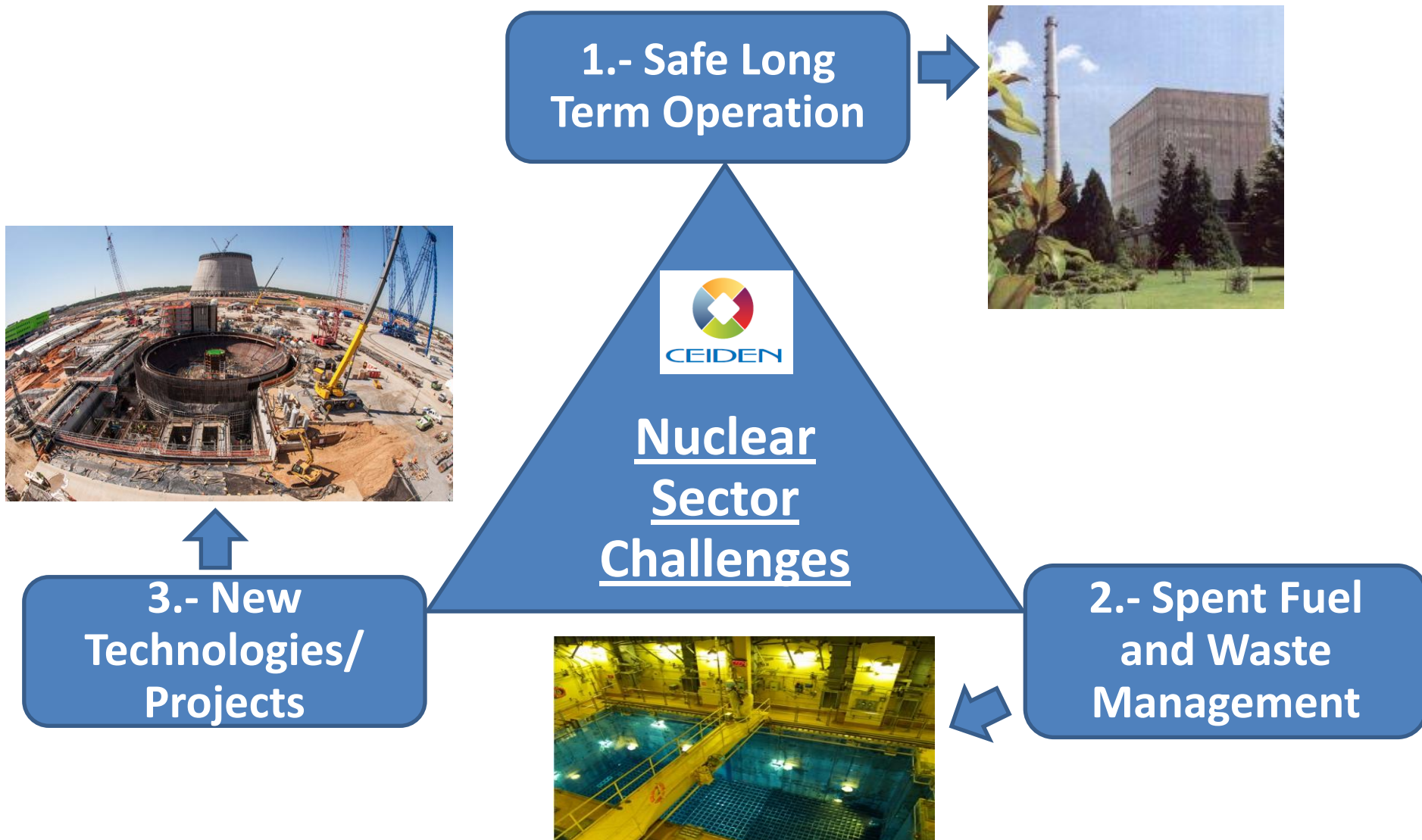
General Assembly



Nº CEIDEN Members: 97

Nº Collaborative entities (foreign/international organizations): 16

STRATEGIC AGENDA



MATERIALS DEGRADATION

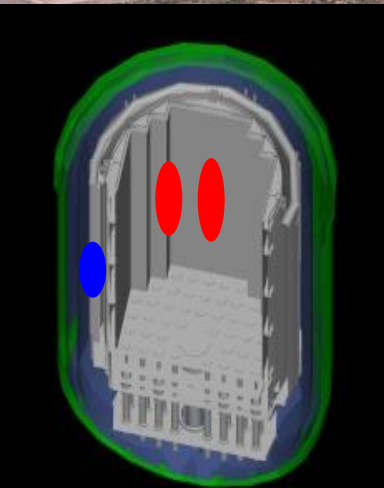
Materials Studies from Jose Cabrera (Zorita) NPP, currently beign dismantled

ZIRP Project

- ❖ **Objective:** To harvest part of the Internals of the Reactor Vessel, for laboratory testing, and evaluation of the extracted materials degradation and aging properties
- ❖ **1st Phase Participants:** CSN, ENRESA, Gas Natural, UNESA/CCNN, CIEMAT, GNF Engineering, ENUSA and TECNATOM
- ❖ **2nd Phase:** Lead by EPRI, with participation of NRC, CSN, SSM, Tractebel, Vattenfall, MHI. Tests being performed at Studsvik

Concrete Project

- ❖ **Objective:** To harvest some of the concrete structures of the plant, to experimentally study the variation of the characteristics of these materials
- ❖ **Participants:** CSN, ENDESA, ENRESA, GNF-GNF Engineering, IBERDROLA, and IETcc (CSIC)



NUCLEAR FUEL

Storage and Transport of Spent Fuel Program

- ❖ **Objective:** Forum to promote and coordinate research projects on used nuclear fuel, which support an optimized management
- ❖ **Participants:** CSN, ENRESA, ENUSA, UNESA/CCNN, CIEMAT, GNF Engineering, ENSA, TECNATOM, ETSICM

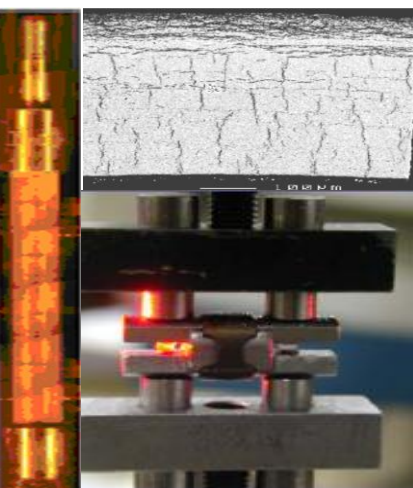
Projects: based on domestic gap analysis some Projects were launched
Completed:

- ❖ **Zirlo cladding creep in high burnup PWR fuel**
- ❖ **Zry-2 cladding creep in BWR irradiated fuel**
- ❖ **Isotopy assay characterization of high burnup PWR fuel**
- ❖ **Isotopy assay characterization of BWR fuel**
- ❖ **Failure modes and criteria of the irradiated cladding**
- ❖ **Irradiated cladding fracture under low-speed impacts**

On-going:

- ❖ **High corrosion PWR irradiated fuel rods behaviour under severe conditions of dry storage/transport**

- Some projects were further extended under different agreements with other international partners, such as: EPRI, WEC, DOE, ORNL, IRSN, EDF, Vattenfall, NEA/OECD,...
- Active participation in the "Extended Storage Collaboration Program (ESCP)" promoted by US nuclear industry



Almacenamiento temporal
centralizado de residuos
de alta actividad



Bóvedas
(en diseño
preliminar)



RADIATION PROTECTION AND DOSIMETRY

CEIDEN



Development of in vitro methods for internal dosimetry

- ❖ **Objective:** To increase national capacities for assessment of internal doses from alpha & beta emitters in the body through biological samples
- ❖ **Participants:** CIEMAT, UNESA, ENUSA, ENRESA, CSN, Tecnatom, Geocisa, Medidas Ambientales, Iberdrola Ingeniería and GNF Engineering.



Neutron measurements and standards laboratory

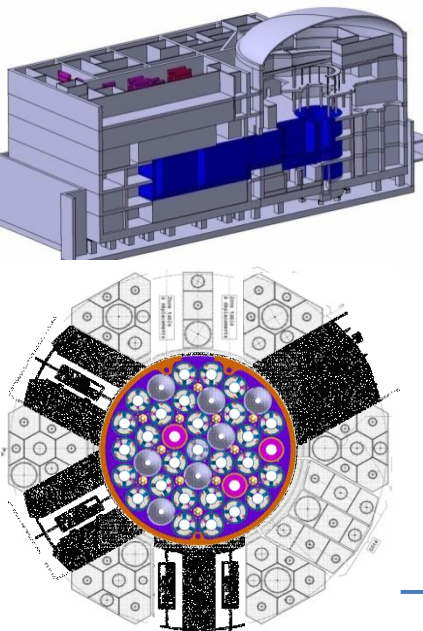
- ❖ **Objective:** To coordinate users of the neutron standards laboratories (at CIEMAT & UPM), helping to specify proposed applications and promoting industrial and R&D applications of neutron instruments
- ❖ **Participants:** CIEMAT, UPM, UAB, USAL, USE, ESS-Bilbao, GDES, NPPs/UNESA, SEPR, Univ. Hospitals 12 October & Rio Hortega.



- In 2014, a Spanish National Platform (PEPRI) dealing with Protection Radiation R&D was also created

NEW NUCLEAR PROJECTS

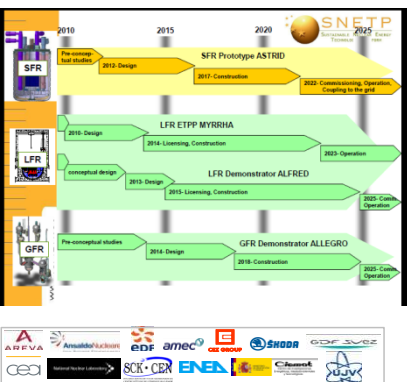
JULES HOROWITZ REACTOR PROJECT



- ❖ **Objective:** Participate in the design, construction and operation of experimental fission reactor Jules Horowitz (JHR)
- ❖ **Participants:** Spanish consortium: CIEMAT, CSN, ENUSA, TECNATOM, Empresarios Agrupados, ENSA and GNF Engineering
- ❖ **Spanish contribution:** € 10 M, gives the consortium a 2% of the rights of use of the facility for future R&D projects that require irradiation of samples

ESNII PROGRAM

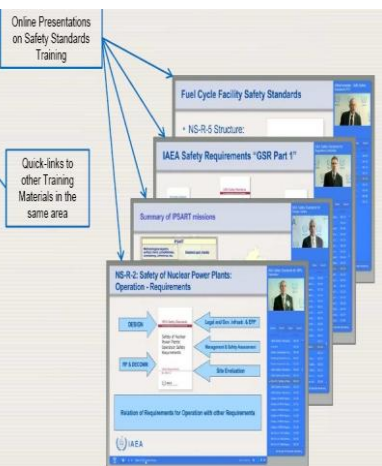
- ❖ **Objective:** Participation in the European Sustainable Nuclear Industrial Initiative program (ESNII)
- ❖ **Participants:** CIEMAT, Iberdrola, Tecnatom, Empresarios Agrupados, ENSA, GNF Engineering, UPM and UPV



CROSS-CUTTING TOPICS (1/2)

EDUCATION/TRAINING/KNOWLEDGE MANAGEMENT GROUP: FORMACION +

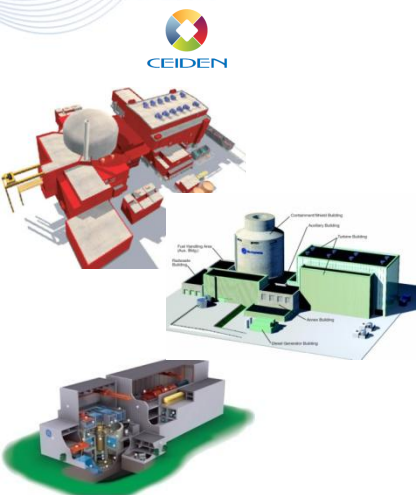
- ❖ **Objectives:** Promote coordination of education and training nationally, and Spanish participation in international programs and networks (EU EUROSAFE, IAEA, Latin America)
- ❖ **Participants:** CIEMAT, TECNATOM, CSN, UPM, UAB, UPV/EHU, UPV, UPC, UNED, Titania, ENUSA, Foro Nuclear, Thunder, INDRA and ENDESA



CAPACIDADES
ESPAÑOLAS PARA
AFRONTAR UN NUEVO
PROYECTO NUCLEAR

CAPABILITIES PROJECT

- ❖ **Objectives:**
 - Phase 1: Analyze the current capabilities of the Spanish industry to face a new nuclear project
 - Phase 2: Promote that the Spanish suppliers have the necessary skills to participate in new nuclear projects
- ❖ **Participants:** Endesa, Iberdrola, GNF, Foro Nuclear W, GE, AREVA



CROSS-CUTTING TOPICS (2/2)



HORIZON 2020

- ❖ **Monitoring** European Euratom programs within the Horizon 2020 program, in order to inform CEIDEN members of opportunities for R&D in Europe, and promote a coordinated Spanish participation



SNE-TP

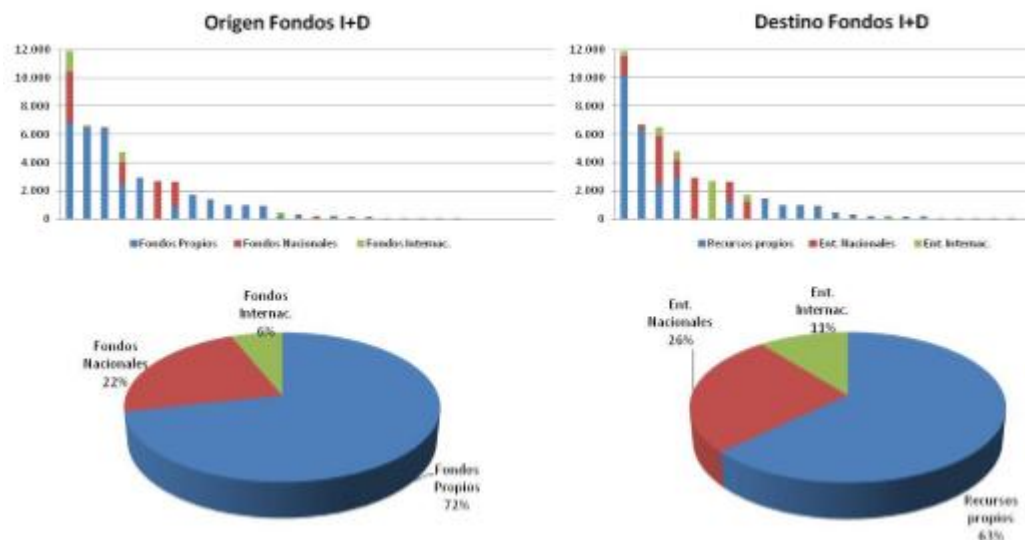
- ❖ **Monitoring** of activities of the European Technology Platform for Sustainable Nuclear Energy, which define the strategic lines of support for R&D in Europe Nuclear Fission
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NATIONAL R&D BUDGET

- ❖ CEIDEN makes an annual estimation and analysis of the Spanish R&D nuclear energy budget (this is not an easy task)
- ❖ Main results and conclusions
 - the total amount devoted to nuclear R&D in Spain in the last years is stable (46 M€ in 2012, 46 M€ in 2013, similar total budget forecasted for 2014)
 - the main contribution to the budget (72 %) comes from own resources of the entities of the sector

Ranking of contributors by subsectors

- 1 technological centers
- 2 operators
- 3 fuel cycle companies
- 4 services companies
- 5 equipment manufacturers
- 6 engineering companies
- 7 regulatory body
- 8 Academia
- 9 governmental agencies
- 10 others



CONCLUSIONS

- ❖ The CEIDEN technology platform is an entity **coordinating** the needs and efforts of R&D in the field of nuclear fission technology, nationwide
- ❖ Nearly **100 public and private entities participate in CEIDEN**, which represents the majority of the players in this field in Spain
- ❖ CEIDEN develops **a wide range of lines of specific work, involving more of 40 members and collaborative entities**. The majority of CEIDEN programs have relationships with equivalent international programs, being highly valued in this environment
- ❖ CEIDEN has established **cooperative ties with Latin American** institutions with similar objectives, especially in the field of education & training. Some Latin American institutions are collaborative members of CEIDEN
- ❖ CEIDEN objective is to transmit to the Administration and to the Spanish companies the idea that the promotion of **R&D supports nuclear Spanish industrial exports, and the safe operation of short, medium and long term of our nuclear power plants**
- ❖ The total amount devoted to nuclear R&D in Spain in the last years is stable (**around 46 M€**). The main contribution comes from own resources of the entities of the sector

Education & Training

Spanish Nuclear Capabilities



CEIDEN

FISSION TECHNOLOGY PLATFORM:

**F+ PERMANENT WORKING
GROUP**



what is CEIDEN F+?

❖ in **2007** CEIDEN set up a **permanent working group** dedicated to **E&T** issues: **CEIDEN F+**

- **initially**, this group, coordinated by representatives of Universities, made a **compilation** and **analysis** of degree studies (**masters**) in nuclear topics that are being taught in Spain
- the analysis, completed in 2010, identified 12 master courses
- the result of this analysis, included and updated in the CEIDEN website

evolution of F+

❖ in **2011** the Steering Committee of CEIDEN **extended the scope** of F+ to include the **collection and analysis of nuclear job-oriented training capabilities** in Spain, with the double purpose of:

- ✓ **identify** potential **gaps**
- ✓ offer them as a **catalogue** to facilitate participation in international programs (mainly in projects of cooperation and assistance to third countries, especially in Latin America)

❖ since 2011, F+ is **co-chaired by Ciemat and TECNATOM**



CEIDEN

F+ members

- ministry of industry
- regulatory body
- sectorial associations (1)
 - utilities (1)
 - fuel cycle companies (1)
- ✦ universities (6)
- ✦ R&D institutions + technological centers (2)
- ✦ services companies (3)

16 members
8 CEIDEN sub-sectors
all the actors in E&T field
represented

F+ international networking



F+ objectives

1. to promote and coordinate E&T programs nationwide

→ *identifying Spanish resources, strenghts and weaknesses*

2. to promote Spanish participation in E&T international programs

→ *especially by means of collaboration with national and international organizations and networks*

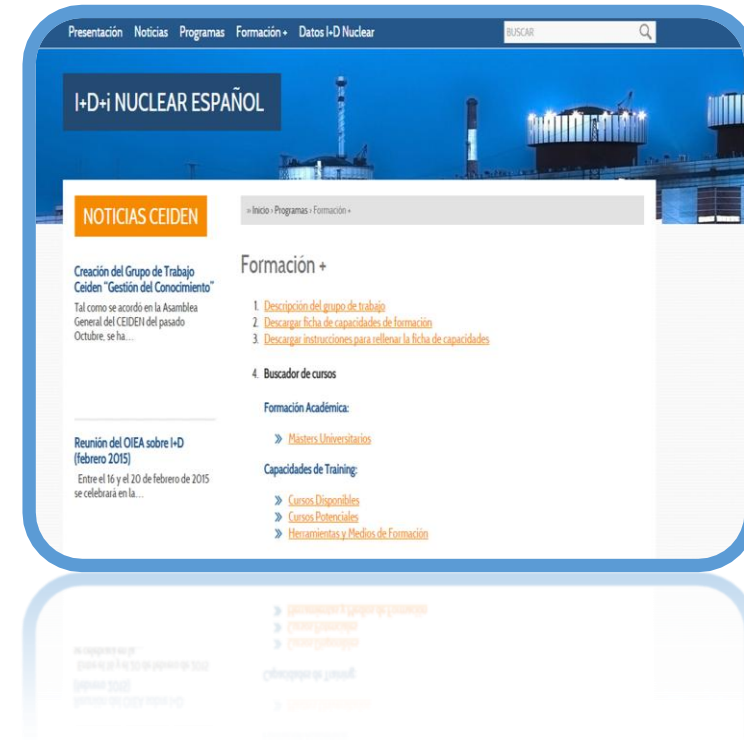
3. to promote and develop advanced projects of R&D in E&T

the training capabilities catalogue of Spanish nuclear sector is accesible to the public through the CEIDEN website:

<http://ceiden.com/formacion/>

the web search is structured as follows:

- ✓ **E&T available courses**
- ✓ **job-oriented training capabilities**
- ✓ **training tools and methods**



KEEP (Knowledge Exchange, Elicitation & Preservation)



Mission

KEEP is an initiative, under the CEIDEN Technology Platform, for ensuring an effective forum for exchange of know-how on Knowledge Management (KM) within the Spanish Nuclear Industry, so that sharing of needs, opportunities and experiences be promoted, and common products, practices or solutions for managing key knowledge be developed

Vision

KEEP aims to be a solid Nuclear Industry reference in Spain for all KM related matters, by shaping strategies in the organizations, by proposing methodology, by easing definition of competences, and by facilitating exchanging ideas, experiences, and discussions on KM

KEEP. Objectives



General Objective

Add value to the Nuclear Industry organizations in Spain by stimulating and supporting the KM

Specific Objectives

- SO1 Based on the potential impact in the organizations, identify key needs and factors that should determine KM orientation
- SO2 Propose a base methodology for KM, friendly and accessible for all the Nuclear Industry organizations in Spain
- SO3 Establishing a forum for exchange of key ideas, experiences and practices on KM
- SO4 Develop a metric to asses KM impact according to KEEP General Objective

KEEP. Agenda (1/2)

SO1 Identify key needs and factors that should determine KM orientation

- Key international references on KM → smart and structured CEIDEN web library
- Interest and significance for Spanish Nuclear organizations → Tailored Surveys
- Analysis → Workshops & Summary Report

SO2 Propose a methodology for KM, friendly and accessible for Spanish Nuclear Industry

- Define a KM reference pattern → Base Model
- Model benchmarking → gap analysis
- Analysis and Validation → self-assessment tool (CEIDEN web site)

KEEP. Agenda (2/2)

SO3 Establishing a forum for exchange of key ideas, experiences and practices on KM

- Select and define working areas and topics → [Agenda](#)
- Open Forums: focused, free → [Forums](#)
- Phases: design, launch, communication, run → [conclusions, proposals](#)

SO4 Develop a metric to asses KM impact according to KEEP General Objective

- Identify and select key factors → [performance indicators](#)
- Impact assessment → [defining metrics](#)
- Validation → [validated metric](#)

Thanks for your Attention

