

NUCLEAR KNOWLEDGE MANAGEMENT OVERVIEW at INR

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Institute for Nuclear Research-Pitesti

INR was founded in 1971, which represents the technical support for the development of nuclear power areas in Romania.

Its topmost mission is the performance of scientific research and activities related to the peaceful use in atomic energy.

Especially during the last 15 years the institute activity was focused mainly on applicative research and, particularly, on the Cernavoda NPP requirements.



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Institute for Nuclear Research-Pitesti

The main areas of INR activity are the following:

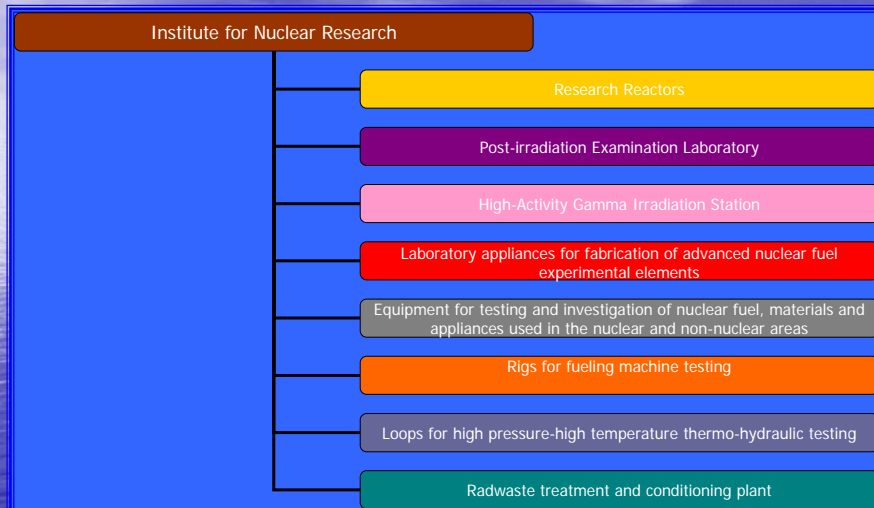
- Reactor physics and nuclear safety;
- Irradiation testing;
- Post-irradiation examination of nuclear fuel and nuclear materials;
- Radioisotopes and irradiation technologies;
- Nuclear materials and corrosion;
- Assessment of nuclear fuel performances;
- Out-of-pile testing;
- Radwaste characterization and treatment;
- Electronics, instrumentation and control;

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- Qualification testing for nuclear equipments and components;
- Radiation protection, environment protection and civil defense;
- Design of nuclear equipments;
- Nuclear prototypes;
- Technological transfer;
- Technical quality control;
- Metrology and computer technique;
- Quality management.

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The institute infrastructure is characterized by diversity, efficiency, and reliability, the following assets being illustrative:



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Integrated Management System

INR has completed an Integrated Management System for Quality, Environment, Safety and Health, based on guidelines published by the IAEA and also on national and international standards.

The system has been developed and implemented within the institute in order to:

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Objectives:

- Demonstrate the institute capability to consistently provide and perform services that satisfy customers requirements and those of the applicable regulations;
- Increase customers contentment by ensuring the quality of products/services, at the same time complying with the legislation related to environment protection, safety and health;
- Ensure an efficient operation of the main topic (research-development) and of the other Basic processes (design, operation and decommissioning of nuclear facilities, etc.)

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The Integrated Management System works through the interaction of four groups of processes, as follows:

- Management processes;
- Base processes related to activities within the lifetime of nuclear facilities;
- Support processes;
- Measuring, analysis and upgrading processes.

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The concept of management science related to the institute activities relies on four levels of knowledge, which include:

- Research & Development;
- Control of production and of service supply; Exploitation of nuclear facilities;
- Decommissioning of nuclear facilities;
- Issues related to environment, safety and health.

Interaction and sequence of the four groups of processes is displayed in Fig. 2. The main purpose is the functioning of basic processes.

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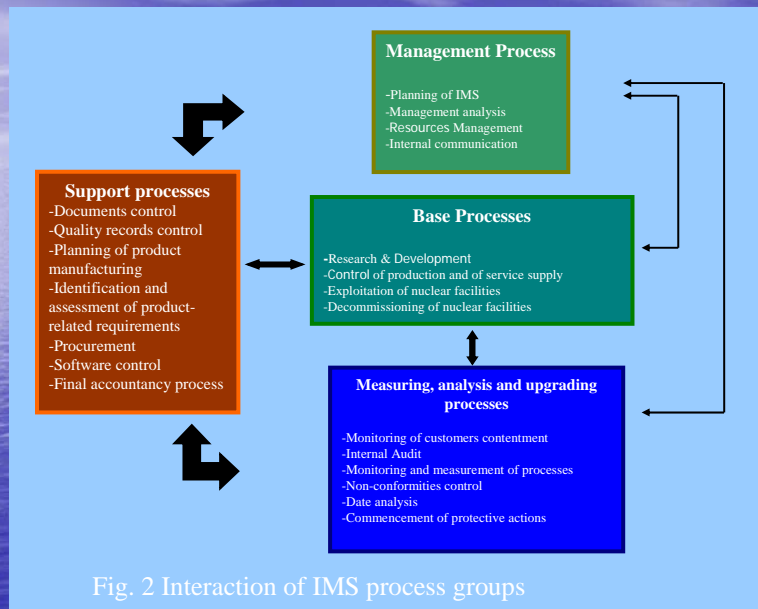


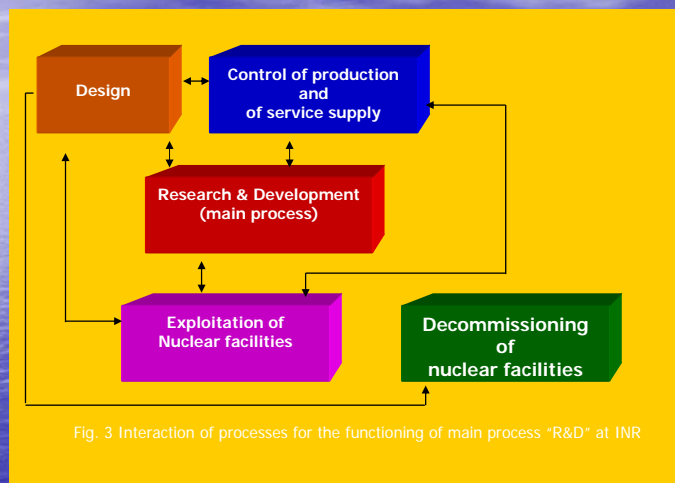
Fig. 2 Interaction of IMS process groups

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Research & Development

- The first knowledge level within the Integrated Management System consists of know-how implementation. This depends on the institute characteristics, on the existing infrastructure and assets and on the personnel experience.
- According to Law 198/2000 the institute is enabled to perform R&D activities, applications and engineering related to the national technical support in the nuclear area, as well as works specific to international cooperation.
- These activities are conducted in the framework of 18 R&D programs intended for the objectives that belong to the institute from the National Nuclear Program.
- The interaction of the main groups of processes which govern the institute activities with the aim to develop R&D knowledge is presented in Fig. 3.

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The research route of the INR allows the exchange of knowledge and know-how increase both with domestic and foreign partners, thus:

- Collaboration with AECL – CANADA provides the development of joint research activities in the following areas:
 - CANDU nuclear fuel;
 - Nuclear safety;
 - Management of nuclear plant lifetime.
- Collaboration with specialized laboratories in the USA for exchange of information and cooperation in the field of peaceful uses of atomic energy.
- Cooperation topics now under development:
 - Radwaste management;
 - Production of radioisotopes for medicine at the TRIGA-INR Reactor;
 - Management and marketing.

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Operation of nuclear facilities

- The operation of nuclear facilities is a basic IMS process which includes all activities carried out between commissioning and decommissioning, in order to ensure the purpose for which the plant has been built.
- The process requires a high level of operation technical knowledge and is identified by a series of nuclear safety requirements for all normal operation modes: startup, operation within parameters, beginning of shutdown, maintenance. The incidents foreseen by plant design are also considered.
- The operation of nuclear facilities is procedure-based. The procedures itemize the responsibilities and the ways of complying with the following requirements:

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- Scheduling and control of operation activities;
- Personnel training and qualification;
- Interfaces control;
- Utilization of acquired expertise;
- Control of installations, processes and operation practices;
- Verification and confirmation of operation activities;
- Control of alterations;
- Draw-up and implementation of operation, transitory and emergency procedures;
- Identification of equipments;
- Control of radioactive contamination;
- Radwaste management;
- Radiation protection;
- Maintenance timing;
- Control of chemical agents;
- Figure out and evaluation of the emergency program efficiency.

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Management knowledge related to nuclear facilities decommissioning

- This kind of knowledge should lead to the draw-up of programs for the assessment and implementation of decommissioning activities, consisting of formal documents, technical reports, procedures, etc.
- At the same time, one should keep in view that, between the groups of basic decommissioning processes and management processes, a close correlation and interaction must exist with regard to internal communication. This one should allow identification and coordination of knowledge required for the progress of decommissioning and ensures they are correct.
- The structural knowledge regarding decommissioning processes have in view three major objectives:
 - Strategic framework;
 - Planning Process;
 - Dismantling Process.

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A Case Study

The Multi-Zonal Research Reactor is located on the INR Pitesti site just near TRIGA research reactor. This facility was created for neutron research but has never been operated as a nuclear facility.

KM concept for the decommissioning of the Multi-Zonal Research Reactor is targeting next objectives:

- Planning Process;
- Dismantling Process;
- To secure technical quality and safety standards during decommissioning project;
- To minimize risk related to the duration and budget of decommissioning project;

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The plan for decommissioning of the Multi-Zonal Research Reactor following next steps:

- Elaboration and approval of decommissioning plan;
- Issuing the official decision for permanent shutdown;
- Elaboration of licensing documentation and submission to CNCAN;
- Obtaining the decommission license and implementation of decommissioning activities according to decommissioning license;
- Issuing the Final Decommissioning Report at the end of decommissioning activities;
- Issuing the Final Radiological Survey Report.

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Knowledge management related to environment, safety and health

- Identification and evaluation of environment aspects;
- Identification of environment-related requirements;
- Readiness for emergency situations and response capacity;
- Monitoring and assessment of the main characteristics of those activities which can have a major impact on the environment;
- Identification of hazards, assessment and control of risks related to safety and health;
- Operational control.

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Monitoring and assessment of the main characteristics of those activities which can have a major impact on the environment considers the following aspects:

- Development of information in order to identify significant environment features;
- Monitoring of emissions and discharges for compliance with the environmental and other legal requirements;
- Management of wastes resulted from the various activities;
- Management of water, energy and raw material consumption.

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Remarks

- Promoting the R&D programs within the institute allowed the drawing up of new technologies and products with applicability in the nuclear field and, preponderantly, in the development of nuclear power in Romania.
- Nuclear knowledge management is considered a part of the Integrated Management System.
- The role of the IAEA was and remains significant in the development of information and knowledge resources.
- The internal and international collaborations of the institute, the exchange of information and the transfer of knowledge to future generations will represent, in perspective, aspects of the managerial policy of the institute.