

NUCLEAR KNOWLEDGE MANAGEMENT STRATEGIES IN CANADA

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The Canadian Nuclear Industry recognizes the importance of nuclear knowledge management and has already implemented a number of initiatives to maintain competency, capture and preserve existing knowledge, advance the nuclear technology, develop future nuclear workers, and maintain a critical R&D capability. Although this paper addresses the Canadian scene in general, it will focus on knowledge management from a technology development point of view. Therefore, special emphasis will be placed on activities underway at present at Atomic Energy of Canada Limited (AECL).

Maintaining competency is a high priority issue. With the on-going retirement of nuclear workers, resource management, succession planning and technical training programs are all in place at AECL. For example, a comprehensive assessment was recently completed to identify critical core competencies and the potential and timing of future retirements. Using a risk-based approach, the technology disciplines were prioritized and a plan was developed to address the requirements. The plan is now being implemented to hire, train, mentor and develop a new core of technical experts. Collaboration and knowledge sharing are important success factors in that regard. This is being achieved through cross-functional teamwork, consolidation of expertise, on-going work on nuclear power plant projects (e.g., the just completed units in China and ongoing work on unit 2 at the Romanian Cernavoda site), developing and designing new products (Advanced CANDU Reactor, ACR-700), adopting and improving Quality Management Systems (e.g., ISO 9001:2000 Global Certification and pursuing business excellence through the adoption of the Canadian Framework for Business Excellence).

Capturing and preserving existing knowledge as well as advancing nuclear technology have also received significant attention. Fully computerized engineering tools have been developed and used to document the complete design of CANDU plants, and this methodology is being used for the recent build projects. This encompasses all plant design, analysis and licensing knowledge including engineering drawings, design manuals, design reviews, analysis reports and all licensing documentation. The same system is being used today for the development of the ACR. In addition, a comprehensive feedback of experience system documents all operational issues to ensure lessons learned from operating plants are shared widely within AECL and with CANDU owners. AECL has also developed smart technology that transfers knowledge from highly specialized technical experts working in our laboratories to computer systems that can be accessed by plant operators. Such technology enables nuclear operators in monitoring station conditions, converting measured data into useful information, analyzing the information intelligently and providing recommendations to support decision making. In this way, specialized knowledge can be used throughout the nuclear industry.

Another essential element in AECL's strategy for preserving knowledge is the on-going design and development of advanced CANDU systems over the years. In this approach, each generation of CANDU reactor is firmly based on incremental advancements in technology, which ensures that future expertise is maintained and based on an extensive existing knowledge base.

Development of future nuclear workers received a boost through the University Network of Excellence in Nuclear Engineering (UNENE) program. This is an alliance of Canadian universities, nuclear power utilities, research and regulatory agencies. The purpose of UNENE is to assure a sustainable supply of qualified nuclear engineers and scientists to meet the current and future needs of the Canadian nuclear industry. In addition to full-time under-graduate and graduate degrees, UNENE, through 5 major Canadian universities also offers part-time programs designed for students already employed in the industry. Courses are offered in flexible formats, generally at nuclear sites for the convenience of the students. More information on UNENE will be presented at this conference in a different paper. In addition to UNENE programs, the nuclear industry also started a new graduates hiring program to balance the demography of nuclear workers and ensure continuity. New graduates are rotated through a few different areas before they are assigned a specific position. The industry also encourages university students to choose a nuclear career by hiring and training many summer and coop students.

Maintaining Research and Development capabilities is the backbone of any overall program to maintain competency and advance the nuclear technology. As reported in the IAEA meeting on knowledge management in June 2002, the CANDU Owners Group (COG) undertook a review of R&D capability and issued a recommendation that "the industry must implement, in the near term, an increase in funding to R&D programs to ensure that adequate core capability is maintained in key areas". The appropriate level of R&D funding is under discussion.

In conclusion, there is much awareness in the Canadian nuclear industry of the importance of knowledge management to the sustainability of nuclear energy as a major source of energy. Many issues have been addressed but additional measures will be required in the future to ensure smooth transition of knowledge to a new generation.