



The IRD Knowledge Management Maturity Assessment

D M Rodrigues¹, P R Perrotta¹, M E Acar¹, A A Silva¹, G Cavalcante¹, P F de Jesus¹, M A Wasserman¹, F B Razuck¹

¹ Institute of Radiation Protection and Dosimetry, 3773, Rio de Janeiro, Brazil

fernando.razuck@ird.gov.br

Abstract. The Institute of Radiation Protection and Dosimetry (IRD) is one of the institutes of the National Nuclear Energy Commission (CNEN), being considered a national and international reference in research, development and teaching activities in the area of radiation protection, dosimetry, medical physics and metrology of ionizing radiation. Despite this importance, over the years, it is possible to observe a decrease in the number of employees due to the increase in retirements and a decrease in the hiring. In this sense, this paper focuses on evaluating the impact on the IRD's intellectual capital generated by the growing number of retirements. This study is justified by the insufficient documentation and transfer of technologies, experiences and acquired knowledge, due to the absence, in the past, of a KM culture. To assess the level of KM maturity in the IRD, a self-assessment methodology developed by the International Atomic Energy Agency (IAEA) was applied to help identify strengths and areas for development in the organization's overall KM strategy. This self-assessment has eight categories and the analysis of the results is based on the difference (Δ Score) found between the current score and the desired score. Thus, the categories with the highest scores are those where the greatest KM efforts should be prioritized. This work revealed two relevant aspects to be treated as strategic institutional objectives: Human Resources Processes for KM and Knowledge Capture. As expected, KM tools show their potential to detect and quantify issues to be addressed and prioritized by institutional decision makers.

1. Introduction

The Institute of Radiation Protection and Dosimetry (IRD) is one of the institutes of the National Nuclear Energy Commission (CNEN), being considered a national and international reference in research, development and teaching activities in the area of radiation protection, dosimetry, medical physics and metrology of ionizing radiation [1].

In addition to the various activities related to research and education in these areas, it maintains, develops and disseminates metrology standards, trains and coordinates actions in response to possible nuclear and radiological emergencies [1].

Already the CNEN is a federal agency linked to the Ministry of Science, Technology and Innovation (MCTI), created in 1956 to develop the national nuclear energy policy. The CNEN establishes norms and regulations in radioprotection and is responsible for regulating, licensing and inspecting the production and use of nuclear energy in Brazil.



The CNEN also invests in research and development, focusing on the safe use of techniques and materials that permeate the various applications of the nuclear sector, resulting in benefits for society [2].

Despite this importance, it is possible to observe, over the years, a decrease in the number of employees at CNEN and IRD, due to the aging of workers, an increase in the number of retirements and a decrease in the hiring of new employees, due to economic and political issues in the country [3].

The imminent risk of losing almost 40% of the IRD technical working force, due to possible retirement and the lack of planned replacement in an already restricted workforce to execute a great number of activities, the IRD Directorate has supported knowledge management initiatives to mitigate the loss of critical institutional knowledge and ensure the continuity of activities aimed at fulfilling the institutional mission.

The reduced number of employees to perform the most diverse tasks makes employees very busy accumulating functions and with little time to dedicate to knowledge management (KM), despite recognizing the importance of this issue.

Another major challenge is that the lack of replacement of employees also makes it difficult to find people to whom knowledge can be transferred through mentoring, as well as other KM activities.

The importance of KM to the nuclear field, known as Nuclear Knowledge Management (NKM) is highlighted by the International Nuclear Energy Agency (IAEA), which states that KM is in fact that building, collecting, transferring, sharing, preserving, maintaining and utilizing knowledge is essential to developing and keeping the necessary technical expertise and competences required for nuclear power programs and other nuclear technology [4; 5].

This is because, for the IAEA, knowledge is the most valuable asset for any radioactive installation, given that advanced and specialized knowledge in nuclear engineering and science is required for the safe and effective design, construction, licensing, commissioning, operation, maintenance and decommissioning of nuclear technology-based systems, which may have long life cycles in changing contexts [4; 5].

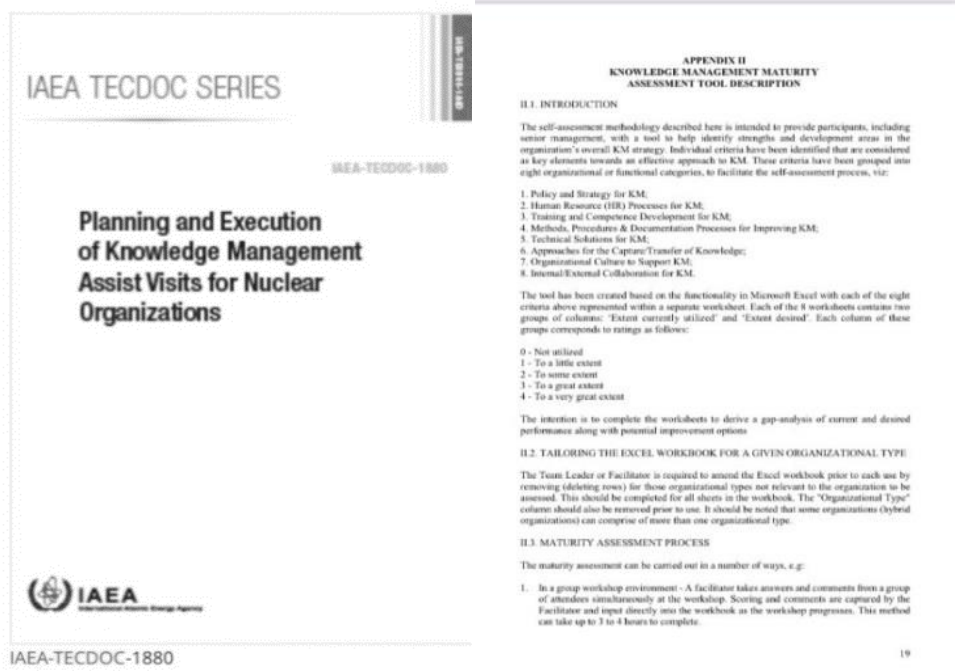
In this sense, this paper focuses on evaluating the impact on the intellectual capital of the IRD for the areas of radiation protection and dosimetry, generated by the increasing number of retirements.

This study is justified by the insufficient documentation and transfer of technologies, experiences and knowledge acquired in decades of research and development, due to the absence, in the past, of a culture of KM.

2. Materials and Methods

To assess the level of maturity of KM at IRD, the tool developed by the IAEA was applied [6] – figure 1.

Figure 1. Maturity Tool of IAEA



Source: [5]

The self-assessment methodology is a tool to help identify strengths and development areas in the organization's overall KM strategy and it has eight categories as described below:

1. **Policy & Strategy For KM:** This category addresses the need for a knowledge management system to have a written policy and implementation strategy, as well as the need to establish the responsibilities and attributions involved. Policies are typically statement of intent or commitments to specific goals or desired outcomes. Strategies and actions to comply with this policy must be established, monitored and evaluated in terms of their effectiveness.

2. **HR Processes for KM:** This category addresses strategic workforce planning to ensure that current and future human resource needs are met. In addition to succession planning, risk assessment of loss of critical knowledge, recruitment, exit interviews conducted when people leave the organization, and personnel development plans for KM are tools to ensure that an organization maintains a skilled workforce.

3. **Training & Competence Development for KM:** This category is related to the use of a systematic approach to training that includes knowledge management; Competencies; Coaching and mentoring; Use of simulators for training; Training in virtual environments (e-learning); Training for professional updating and improving of professional performance.

4. **Methods, Procedures & Documentation Processes for Improving KM:** This category deals with document management systems and processes, including creating, editing, producing, storing, indexing, and disposing of documents. This usually refers to electronic documents and uses specific software for document management.

5. **Technical Solutions for KM:** This category addresses the application and integration of strategies, systems and information technologies (IT) that support knowledge management. These IT technologies and systems include databases, document and content management systems, the use of the Internet and social networking technologies - Access to scientific information such as scientific libraries, journals and databases); tools to capture and transfer knowledge; concept maps; content management; knowledge repository; portals; Yellow pages; wikis and blogs, among others.

6. **Approaches to Capture/Transfer of Knowledge:** This category addresses the identification, analysis, capture and dissemination of knowledge that is critical for the Organization, which involves

taxonomy development; critical knowledge identification processes; knowledge collection processes; interviews; concept maps; communities of practice; “coaching” and “mentoring”; video capture; workplace training and storytelling.

7. Organizational Culture to Support KM: This element addresses the practices, behaviours and attitudes that exist within an organization that together demonstrate the value placed on knowledge that lead to a high level of knowledge sharing. Trust, openness and active collaboration are hallmarks of a positive knowledge management culture.

8. Internal/External Collaboration for KM: This category evaluates the Organization in relation to its collaboration and participation activities with internal and external bodies and networks involving universities; exchanges with educational institutions; conferences; joint research projects; communities of practice; joint seminars and other national and international R&D institutions.

3. Results and Discussion

This tool was translated and adapted for application in the IRD in partnership with the IAEA. It has been applied in a group of pre-selected servers according to the affinity with each category.

Following the IAEA methodology, each of the eight categories were answered by 10 respondents qualified to carry out the assessment of the aspect being evaluated.

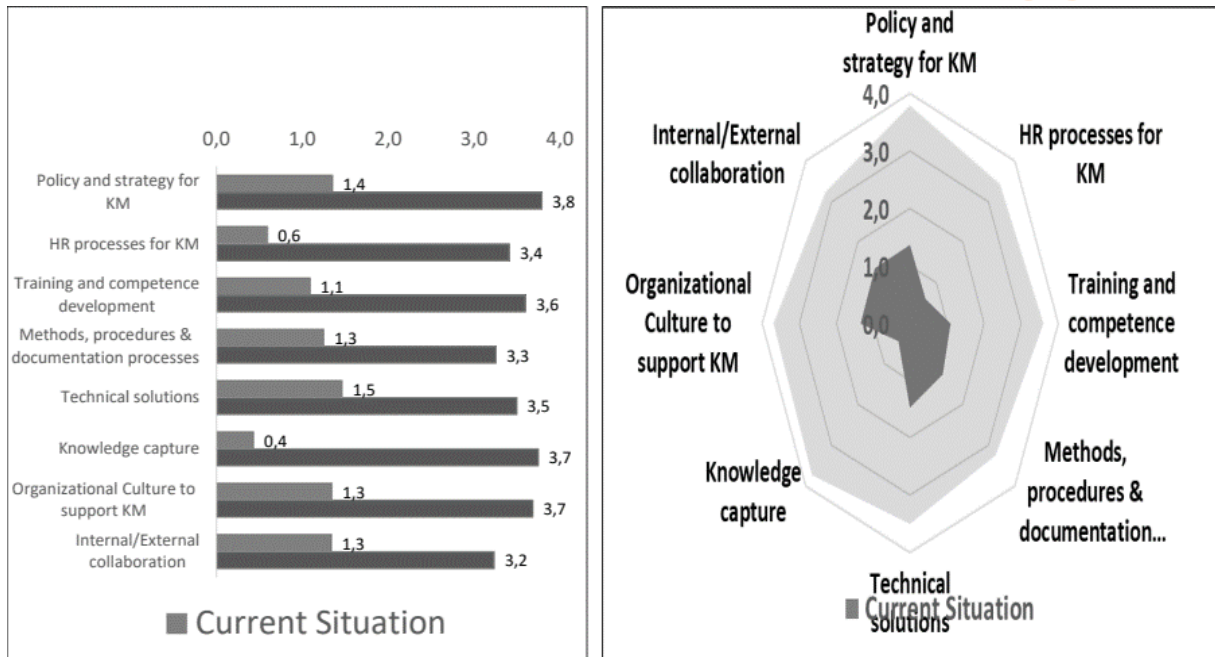
The analysis of the results is based on the difference (Δ Score) found between the current score and the desired score (Table 1 and Figure 2).

Table 1. Effort score results reported by categories considered to assess the level of KM maturity at IRD.

Criteria	Current Situation Score	Desired Situation Score	Δ Score
1-KM policy and strategy	1,4	3,8	2,4
2-HR process for KM	0,6	3,4	2,8
3-Training and competence development	1,1	3,6	2,5
4-Methods, procedures and documentation	1,3	3,3	2,0
5-Technical solutions	1,5	3,5	2,0
6-Knowledge capture	0,4	3,7	3,3
7-Organizational culture to support KM	1,3	3,7	2,4
8-Internal/External Collaboration	1,3	3,2	1,9

Source: The authors

Figure 2. Effort score results reported by categories considered to assess the level of KM maturity at IRD



Source: The authors

This gap can vary from 0 to 5, so that the higher the score, the greater the difference between the current situation and what is desired to be achieved. In this way, the highest scoring categories are those where the greatest KM efforts should be prioritized (Figure 2).

So, the gaps found in the IRD maturity assessment were:

- (1) Policy & Strategy for KM – 2,4;
- (2) HR Processes for KM – 2,8;
- (3) Training & Competence Development for KM – 2,5;
- (4) Methods, Procedures & Documentation Processes for Improving KM – 2,0;
- (5) Technical Solutions for KM – 2,0;
- (6) Approaches to Capture/Transfer of Knowledge – 3,3;
- (7) Organizational Culture to Support KM – 2,4; and
- (8) Internal/External Collaboration for KM -1,9.

This work reveals two relevant aspects to be addressed as strategic institutional objectives: (a) Human Resource Processes for KM (HR) and (b) Knowledge Capture (KC).

HR process can be improved by encouraging the use of KM tools to map profiles and planning for capacity building to the existing workforce, as well as, together with other sections, propose other strategies to mitigate the loss of knowledge, while permanent recruitment of new workers is not possible.

Some KM activities that can be implemented to improve the human resource development are workforce planning; succession planning; risk assessment for critical knowledge loss; employee development plans for KM; job profiles or equivalent to assess and monitor skills/competency and supportive training and learning environment.

To improve the aspect related to knowledge capture some KM activities such as some KM activities to capture knowledge are Identification of Critical Knowledge; Concept mapping; Communities of practice (CoPs); Coaching; and Mentoring.

4. Conclusion

It could be encourage the institute technicians workers to join the IRD Post Graduate Program to broaden their knowledge and also encourage the transfer of knowledge among co-workers. Maturity assessment



for KM in the IRD was very helpful to discuss specific issues for the Institute and to guide the development of a knowledge management program for the IRD.

The identification of KM practices to benefit and improve existing KM activities to support the organization's objectives is achieved. A study has already been carried out to identify the holders of critical knowledge of the technical areas of the IRD.

And currently is updating this result and expanding the identification to all areas of the IRD. As expected, KM tools shows its potential to detect and quantify issues to be addressed and prioritized by institutional decision makers.

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