

THOUGHTS ON KNOWLEDGE MANAGEMENT
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for Nuclear Facilities
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Introduction

A nuclear power plant is highly technology intensive. It is possible to say that a nuclear power plant and related facilities are actually burning and processing “technology” rather than fissile materials such as uranium and plutonium in their crude form. Therefore, how we manage “technology” is fundamental to the use of nuclear power.

This technology potentially can provide huge benefits for mankind, but at the same time, contains risks resulting from the extra-high level and extra high speed of heat generation and radiation emissions through nuclear chain reactions. Therefore, maintaining safety and preventing accidents are an intrinsic precondition for the sustainable use of this technology in order to enjoy its benefits.

In order to safely control this technology, both scientific theoretical knowledge and practical empirical knowledge regarding complex man-machine systems are essential, covering the wide spectrum of design, construction, commissioning, operation, waste management and decommissioning. This is why knowledge management is vitally important for nuclear safety. Not only scientific knowledge, but also practical knowledge based on hands-on experience and international information sharing are particularly relevant.

We should not try to manage knowledge for the sake of knowledge management and, typically, for passive preservation of knowledge alone. Our issue is how to better manage knowledge actively rather than to continue to discuss what knowledge management is. Quality control and quality assurance of our knowledge and the actual application of knowledge management for concrete cases are most important to avoid being occupied with the management of trivialities (garbage in/garbage out [GIGO]), which is a tremendous waste of time and resources. From our experience, we are convinced that transparency and openness, information sharing, mutual learning and the creation of an effective safety culture can all contribute significantly to positive outcomes of this effort for improving the management of safety knowledge. In this sense, we need to focus on the practical application of knowledge, good practices and successful cases.

So what have we done in the nuclear safety area... quite a lot. The IAEA Safety Standards, in recently established unified safety fundamentals, Principles 1 and 2, identify the operator and regulator of the country as having primary responsibility for safety. Safety responsibility and capability can neither be imported nor transferred by easy outsourcing without active and continuous efforts for in-depth learning. Safety knowledge cannot be acquired by a country, (both operators and regulators) as a readily available commodity. It has to be created and nourished in the country, by the country and for the country. The traditional teacher student approach needs to be replaced by creative management of knowledge through international experience sharing and mutual learning. The real learning process can take place only when it is active enough to embed and embody the lessons learned for the continuous improvement of safety. Creative and continuous learning are the essential elements of knowledge management, particularly in the area of nuclear safety.

To view concrete examples of active and continuous learning, we need to look no further than IAEA safety standards which crystallize the state-of-the-art safety knowledge through the open and transparent peer review process and strategic feedback from their application, thus representing international consensus and today's good practices worldwide. As you know, our safety services such as OSART and IRRS are based on these standards, which further enhance knowledge management, information sharing and feedback.

We can also look at the benefits of international networking and, as you can observe in the PC demonstration in the corridor, the Agency has been developing Regional Nuclear Safety Networks such as the "Asian Nuclear Safety Network" and "Ibero American Radiation Safety Network" which will be eventually interconnected as the Global Nuclear Safety Network. The G8 Summit meeting in Germany early this month referred to this global network and supported the "further enhancement of the evolving web-based systems and networks for information exchange and co-operation in nuclear safety matters, as implementation of nuclear conventions, cooperation on safety standards and harmonization of safety approaches, exchange of operating experience and resolution of generic safety issues."

The safety community is faced with many new challenges in the nuclear and radiation areas. As the existing fleet of NPPs age, new nuclear power programmes emerge, mature programmes expand, and the use of radiation sources increase, managing safety knowledge becomes a cornerstone of sustainable development. The complexity of these issues requires enhancing opportunities and mechanisms for the exchange of knowledge and is reliant upon cooperation among all the nuclear safety professionals. Opportunities for exchanging information and sharing knowledge must be actively sought,

employing tailor-made knowledge management. Research and development Institutions tracking new scientific information, creating new technologies, and addressing new challenges in a proactive manner play an important role in support of operators and regulators.

An added challenge for the nuclear community is to apply state-of-the-art knowledge management techniques that have been applied successfully in other fields while adjusting them to the specific conditions of NPPs. This requires inter alia, development of a knowledge-base, structure, process flows, mapping knowledge domains and analysing feedback through mutual learning. The technical, scientific and safety support to operators and regulators differs significantly among countries, but whatever organizational framework has been chosen, international cooperation, networking and technical and scientific information sharing are essential. In order to prevent another serious accident which will erase the high expectation of nuclear power development worldwide, we need new thinking and a new approach adapted to the global information age. This is why I prefer to use the phrase '*Vitae Nova*' rather than '*renaissance*' which requires fresh insights, overcoming old mindsets and promoting modest but careful consideration. We still have significant room for further improvement of our knowledge management skills in order to better meet the newly expanding and increasingly complex challenges of nuclear development and safety in an innovative and effective manner.

In closing, I would like to refer to the famous words of the 16th century philosopher, Sir Francis Bacon, "knowledge is power." In the renaissance days of Francis Bacon, this phrase symbolically expressed new hope for the powerful effects of the application of universal scientific knowledge for changing the world. However, it was also criticized in retrospect to be the symbol of arrogance and complacency in the blind pursuit of power and influence by scientists and engineers who made many mistakes as well as countless contributions for human society. In the area of nuclear safety, particularly in light of bitter experiences of recurrent accidents, even in countries with mature nuclear programmes, fundamental lessons for managing safety knowledge are to overcome arrogance and complacency among its users. I remind you of the DG's speech in the last General Conference stating, "nuclear safety is not an issue that can ever be regarded as 'fixed'. The continuing recurrence of events makes clear that the promotion of a strong safety culture – for both operators and regulators – should always be viewed as a 'work in progress.'"