# Achieving Criticality of Preservation Knowledge

## *Sustaining Digital Preservation in the Nuclear Field*

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**Abstract – Preserving information for as long as it is required, taking into account the needs of diverse stakeholders, explaining needs to IT professionals, preserving data from legacy systems and obsolete media, managing accessibility and information security -- the concerns of the digital preservation community are shared by those working in the nuclear field. Yet the length of time knowledge needs to be accessible and understandable, the accountability for public safety, and non-proliferation concerns among others present further challenges in the preservation of information related to nuclear science and its applications. Preservation efforts in this field must be approached and executed with these challenges in mind while also aligning with community good practices.**

**Keywords – digital preservation, nuclear knowledge management, decommissioning, information security, digitization.**

**Conference Topics – Exploring New Horizons; Building Capacity, Capability and Community.**

### I. Breaking Down The Silos

Knowledge management has been a topic of discussion in the nuclear field since the outset of the 21st century, yet digital preservation of nuclear knowledge may be relegated to a side note or addressed only cursorily[1]. Preservation experts, archivists, and records and information managers in the nuclear field only come into limited contact with one another or the larger digital preservation community. The sometimes classified nature of our holdings can make it more difficult to exchange information and experiences. Without making claims to cover the full range of issues in preserving nuclear knowledge, in particular research data management aspects, this panel seeks to bring representatives working on digital preservation issues in the nuclear field together to come into dialogue with one another and with a wider digital preservation public.

Practitioners working on the preservation of nuclear knowledge from the International Atomic Energy Agency (IAEA), the Digital Preservation Coalition (DPC), Sellafield Ltd., and J&A Preservation will each address, in 8-10 minute presentations, challenges in the field. They will discuss how they relate to digital preservation challenges in general, how the approaches in the nuclear field could further inform the efforts of the digital preservation community, and how through sustained dialogue we might achieve criticality in our preservation knowledge.

### II. Long-Term Accountability To Many Stakeholders

Elizabeth Kata will introduce some of the digital preservation challenges in the nuclear field she has encountered in her work at the IAEA. With a dual mission to promote the peaceful uses of atomic energy while preventing the proliferation of nuclear weapons, the IAEA leads knowledge sharing projects on the one hand and tightly guards certain information on the other. Stakeholders are not only the Agency itself or a single nation state, but rather all Member States, the public, and commercial industries, which requires a heightened awareness for building and maintaining trust across the spectrum of stakeholders.

The need to balance access to authorized users with information security over time (such as a timeframe of 100 years used for nuclear power plants) presents a specific set of problems. Due to the complex IT environment, some aspects of commercial or community preservation solutions do not fully meet the specialized needs, requiring rethinking or expanding approaches to issues like migration or storage.

## III. Reliable Robust and Resilient Digital Infrastructure for Nuclear Decommissioning

Jenny Mitcham of the DPC will present on a collaborative project with the Nuclear Decommissioning Agency (NDA) in the UK [2]. The NDA has been charged with the complicated task of decommissioning and cleaning the seventeen principal nuclear energy plants in the UK, a task described as the largest and most important environmental restoration programme in Europe. Amongst its many challenges, the NDA is by default required to become a trusted leader for information management and digital preservation, thus the project draws on the preservation understanding of the DPC and its wider membership.

Jenny will report on this ongoing project and share some of the challenges and themes that have emerged thus far. These include the high number of legacy data systems to manage, new data collection methodologies and technologies constantly evolving, compliance within a highly regulated environment and managing semi-current records for long periods.

## IV. Digital Heritage And Shaping Nuclear Culture

The application of digital technology within a nuclear context has traditionally supported integrated digital workflows and the management of simple information objects. Increasingly though, the introduction of sophisticated Building Information Management (BIM) methodologies and virtual imaging tools is resulting in complex information constructs which have value, not only in supporting our operations, but as historical artefacts. This poses challenging questions for both nuclear site operators and the NDA concerning the long-term preservation of complex digital constructs to meet their respective needs.

Sellafield Ltd is transitioning to innovative approaches to programme delivery whilst enabling local communities to diversify away from their economic dependency on nuclear expenditure. Philip Greatorex's presentation provides a wider strategic context for this work, with a perspective on the contribution digital constructs can make as heritage artefacts.

## V. Digitizing Films Of Nuclear Tests

Jim Moye has over 40 years experience in the motion picture post-production industry and as an expert in film preservation. For the past five years he has been under contract by Lawrence Livermore National Laboratories, to digitize the scientific films from the above-ground nuclear tests.

There were 210 atmospheric nuclear tests and another nine nuclear cratering tests performed by the United States during the 1940s, 1950s, and early 1960s. Every test was extensively recorded with high quality motion picture films and photographs, providing a unique historic record of circa 10,000 films/photos. These newly digitized films/photos are now being re-analyzed using modern image processing techniques to obtain more accurate and more precise measurements of the nuclear yield of each test and other scientific data pertaining to nuclear weapon effects.

Jim will discuss the challenges with preserving this historic scientific record, including the unique technical requirements of digitizing the films to allow accurate analysis, the software for automated analysis, the requirements for secure storage and the management of more than 10 million scanned images.

## VI. IPRES 2019: Opening A Dialogue

The discussion following the presentations, moderated by William Kilbride of the Digital Preservation Coalition, will highlight the ways we learn from each other and how information and preservation professionals in the nuclear field can contribute to and gain from the digital preservation community. We will address topics such as: Is digital preservation in the nuclear industry different? Why or how? What are impediments to collaboration with the wider digital preservation community or even each other? How can we overcome them? Does the length of time material needs to be accessible combined with the length of time material needs to remain classified have an effect on the preservation approaches? If yes, how is this addressed? What records management and appraisal approaches are taken? How do we balance the importance of making the right decisions and the importance of not keeping too much? These questions and input from the audience will further open the dialogue and enable a discourse on how we can make progress together.

## REFERENCES


[1] *Nuclear Knowledge Management Challenges and Approaches*, Vienna: International Atomic Energy Agency, 2018, pp. 26-27.

[2] Reliable, Robust and Resilient: DPC supports Digital Infrastructure Project for Nuclear Decommissioning Authority, Digital Preservation Coalition. https://www.dpconline.org/news/dpc-supports-digital-infrastructure-project-for-nda