IAEA
International Atomic Energy Agency
Atoms for Peace and Development

Technical Meeting on Modernization of Instrumentation and Control of Nuclear Power Plants Designed According to Earlier Standards: Safety Considerations

IAEA Headquarters, Vienna, Austria
and virtual participation via Cisco Webex

27–31 March 2023

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Information Sheet

Introduction

Modernization of instrumentation and control (I&C) systems in nuclear power plants (NPPs) is required to cope with the obsolescence of existing I&C systems and to ensure the safety of continued operation. One of the major challenges in NPP modernization projects is the need to apply new and updated regulations to facilities that were designed according to earlier standards. In I&C modernization projects, analog-type I&C components are often replaced with digital-type components, which would need to meet new or updated regulations for digital systems.

I&C modernization projects bring opportunities to enhance the safety of NPPs, but also challenges to the operators in the development of the safety case, due to the need to provide sufficient evidence to assure themselves and the regulators that the safety of the I&C system is maintained by the digital replacement.

Moreover, as digital and computer technology is advancing quickly, national and international standards and guidance for digital systems have also evolved quickly, in parallel with technology developments. This has brought challenges to regulators as they enhance their capability and put in place new regulations to address these developments.

At the end of the 1990s and in the 2000s, the IAEA Department of Nuclear Energy, Division of Nuclear Power, published a series of documents providing information and good practices on I&C modernization projects [1]. Although some of those IAEA publications briefly touched on safety aspects of the modernization projects, their focus was not to address in detail the safety challenges and opportunities of those projects.

In the early 2000s, IAEA published two Safety Guides NS-G-1.1 "Software for Computer Based Systems Important to Safety in Nuclear Power Plants", and NS-G-1.3 "Instrumentation and Control Systems Important to Safety in Nuclear Power Plants", which were later revised and combined into a single Specific Safety Guide No. SSG-39 "Design of Instrumentation and Control Systems for Nuclear Power Plants" published in 2016.

In the last several years, relevant experience has expanded significantly; many NPPs have carried out I&C modernization projects, digital systems using the latest technology, advanced monitoring systems and operator support systems have been installed in NPPs, and Member States have accrued significant experience in applying the relevant IAEA Safety Standards to I&C related projects. Therefore, new and applicable experience can be shared among organizations in Member States involved in those projects.

Objectives

The objective of the event is to provide a platform for Member States to exchange information on the state-of-the art knowledge and experience on modernization of I&C systems for NPPs, with specific focus on safety considerations, including opportunities for safety improvements, as well as safety challenges, including those related to licensing.

IAEA intends to develop a new publication (TECDOC) to compile the outcomes of the meeting. The scope and contents of the TECDOC will also be discussed during the meeting.

Target Audience

Participation is solicited from staff members of regulatory bodies, NPP operators, utility organizations, design and engineering consultant organizations, as well as from international organizations engaged in activities related to NPP safety and regulation. To ensure maximum effectiveness in the exchange of information, participants should be actively involved in the subject of the event.

The event is, in principle, open to all officially designated persons. The IAEA, however, reserves the right to restrict participation due to limitations imposed by the available facilities. It is, therefore, recommended that interested persons take the necessary steps for the official designation as early as possible.

[1] IAEA TECDOC-1016 "Modernization of Instrumentation and Control in Nuclear Power Plants" (1998), IAEA TECDOC-1066 "Specification of Requirements for Upgrades Using Digital Instrument and Control Systems" (1999), IAEA TECDOC-1389 "Managing Modernization of Nuclear Power Plant Instrumentation and Control Systems" (2004), IAEA TECDOC-1402 "Management of Life Cycle and Ageing at Nuclear Power Plants: Improved I&C Maintenance" (2004), and IAEA Nuclear Energy Series No. NP-T-1.4 "Implementing Digital Instrumentation and Control Systems in the Modernization of Nuclear Power Plants" (2009).

Working Language(s)

English.

Topics

The event will address recent experiences in Member States in specific areas related to the modernization of I&C systems for NPPs, with focus on safety considerations. Topics to be covered will include, but not be limited to:

Lessons learned from modernization of I&C systems including human-system interfaces:
- Strategy to cope with the obsolescence of I&C systems and components;
- Safety benefits of I&C system modernization;
- Safety challenges in I&C system modernization projects;
- Licensing issues in I&C system modernization;
- Challenges related to the application of digital displays in main control rooms designed to earlier standards;
- Relation between I&C modernization and plant lifetime management; and
- Reverse engineering for the replacement of analogue components with digital components.

Development, and application to I&C modernization projects, of regulations for digital I&C systems:
- Common cause failure concerns and mitigation strategies in I&C modernization;
- Requirements for independence and redundancy in I&C modernization.

Safety considerations of the application of digital technology (including artificial intelligence) to operating NPPs, including safety enhancements from the application of digital technology to operating NPPs and licensing issues.

Participation and Registration

All persons wishing to participate in the event have to be designated by an IAEA Member State or should be members of organizations that have been invited to attend.

In order to be designated by an IAEA Member State, participants are requested to send the **Participation Form (Form A)** to their competent national authority (e.g. Ministry of Foreign Affairs, Permanent Mission to the IAEA or National Atomic Energy Authority) for onward transmission to the IAEA by **27 January 2023**. Participants who are members of an organization invited to attend are requested to send the **Participation Form (Form A)** through their organization to the IAEA by the above deadline.

Selected participants will be informed in due course on the procedures to be followed with regard to administrative and financial matters.

Participants are hereby informed that the personal data they submit will be processed in line with the Agency's Personal Data and Privacy Policy and is collected solely for the purpose(s) of reviewing and assessing the application and to complete logistical arrangements where required. The IAEA may also use the contact details of Applicants to inform them of the IAEA's scientific and technical publications, or the latest employment opportunities and current open vacancies at the IAEA. These secondary purposes are consistent with the IAEA's mandate.

Papers and Presentations

The IAEA encourages participants to give presentations on the work of their respective institutions that falls under the topics listed above.

Participants who wish to give presentations are requested to submit an abstract of their work. The abstract will be reviewed as part of the selection process for presentations. The abstract should be in A4 page format, should extend to no more than two pages (including figures and tables) and should not exceed 500 words. It should be sent electronically to Mr Yun Goo Kim, the Scientific Secretary of the event (see contact details below), not later than **27 January 2023**. Authors will be notified of the acceptance of their proposed presentations by **10 February 2023**.

In addition, participants have to submit the abstract together with the **Participation Form (Form A)** to their competent national authority (e.g. Ministry of Foreign Affairs, Permanent Mission to the IAEA or National Atomic Energy Authority) or their organization for onward transmission to the IAEA not later than **27 January 2023.**

Expenditures and Grants

No registration fee is charged to participants.

The IAEA is generally not in a position to bear the travel and other costs of participants in the event. The IAEA has, however, limited funds at its disposal to help meet the cost of attendance of certain participants. Upon specific request, such assistance may be offered to normally one participant per country, provided that, in the IAEA's view, the participant will make an important contribution to the event

The application for financial support should be made using the **Grant Application Form (Form C),** which has to be stamped, signed and submitted by the competent national authority to the IAEA together with the **Participation Form (Form A)** by **27 January 2023**.

Venue

The event will be held at the Vienna International Centre (VIC), where the IAEA's Headquarters are located. Participants must make their own travel and accommodation arrangements.

General information on the VIC and other practical details, such as a list of hotels offering a reduced rate for IAEA participants, are listed on the following IAEA web page:

www.iaea.org/events.

Participants are advised to arrive at Checkpoint 1/Gate 1 of the VIC one hour before the start of the event on the first day in order to allow for timely registration. Participants will need to present an official photo identification document in order to be admitted to the VIC premises.

Visas

Participants who require a visa to enter Austria should submit the necessary application to the nearest diplomatic or consular representative of Austria at least four weeks before they travel to Austria. Since Austria is a Schengen State, persons requiring a visa will have to apply for a Schengen visa. In States where Austria has no diplomatic mission, visas can be obtained from the consular authority of a Schengen Partner State representing Austria in the country in question.

IAEA Contacts

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Subsequent correspondence on scientific matters should be sent to the Scientific Secretary and correspondence on other matters related to the event to the Administrative Secretary.

Event Web Page

Please visit the following IAEA web page regularly for new information regarding this event:

www.iaea.org/events/EVT2103182