



Technical Meeting on the Safety Implications of the Use of Artificial Intelligence in Nuclear Power Plants

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

16–20 October 2023

Ref. No.: EVT2103061

Information Sheet

Introduction

Artificial intelligence (AI) applications have been widely implemented across various industries. Those applications have demonstrated the potential of AI techniques to deal with difficult tasks such as for pattern recognition, data analysis, uncertainties in the decision-making process, problem solving and optimization of complex procedures. For the nuclear industry, and particularly for nuclear power plants (NPPs), AI applications have been introduced with potential benefits in areas and activities related to safety such as systems' design, plant operation, inspections and maintenance, as well as nuclear safety and risk analysis.

While the use of AI applications in NPPs offers potential benefits, it also presents safety challenges that must be carefully addressed to assess the safety implications for ensuring the robustness of the NPP design and its safe operation. For instance, due to the complex algorithms used and the extensive amount of data involved in the analyses, the reliability of AI applications cannot be evaluated through traditional software verification and validation methods alone. Moreover, since AI applications are based on mathematical models instead of physical models, the use of AI applications for NPP design optimization, autonomous operation and control, and safety analysis needs to be carefully substantiated.

Furthermore, AI applications can provide advanced functions that were not previously used in NPPs. For example, AI applications could provide autonomous control to mitigate abnormal status of NPPs, or they could provide additional messages which include diagnosis results or instructions for manual control to support operation and maintenance. It is challenging to demonstrate that the failure of an AI-based application would not interfere with safety functions due to the various and complex effects of AI application functions which need to be analysed. Therefore, it is necessary to accrue more experience in the safety evaluation of AI applications.

Recognizing the importance of addressing these issues, the International Atomic Energy Agency (IAEA) is organizing a Technical Meeting on the Safety Implications of the Use of Artificial Intelligence in Nuclear Power Plants. The meeting will bring together experts and stakeholders from the nuclear industry, regulatory bodies, and academia to discuss the use of AI in NPPs and its potential impact on safety. This Technical Meeting will be the first key activity within the IAEA project of the same title, i.e., “Safety Implications of the Use of Artificial Intelligence in Nuclear Power Plants”, the results of which are expected to help Member States when preparing safety evaluation frameworks for AI applications at NPPs.

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 the development and application of AI applications for NPPs with specific focus on safety considerations, including opportunities for safety improvements, as well as safety challenges, including those related to licensing.

Within the project on “Safety Implications of the Use of Artificial Intelligence in Nuclear Power Plants”, IAEA intends to develop a new publication (TECDOC) which will capture the outcomes of the meeting. The overall scope of the project and the scope and contents of the TECDOC will also be discussed during the meeting.

Target Audience

Participation is solicited from professionals from NPP design organizations, operating organizations, nuclear regulatory authorities, technical support organizations and research institutions, 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 open to representatives of all Member States with an active nuclear power programme, including those from embarking countries in Phase 3 of their nuclear power programme.

Working Language(s)

English.

Topics

The event will address recent experiences in Member States in specific areas related to AI applications for NPPs, with focus on safety considerations. Topics to be covered will include, but not be limited to:

- Safety implications of AI applications for NPPs related to:
 - Potential interference with, or impact on, the performance of the safety functions;
 - Autonomous operation and control system;
 - Support to the operator in decision making for normal operation and accident conditions;
 - Safety assessment approaches, including deterministic safety analysis and probabilistic safety assessments;
 - Independence between safety components and AI applications;
 - Software verification and validation;
 - Human factors engineering considering the interfaces between human and AI applications.
- Considerations related to the regulatory framework for AI applications:
 - Identification of gaps in the current regulatory framework for AI applications in the nuclear industry.
- Safety benefits of using and applying AI applications to NPPs:
 - Identification of safety benefits of AI applications which may not be achievable with traditional technology.

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 **31 July 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 **31 July 2023**. Authors will be notified of the acceptance of their proposed presentations by **31 August 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 **31 July 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 **31 July 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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AUSTRIA

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Fax: +43 1 26007

Email: L.Sedlazeck@iaea.org

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:

<https://www.iaea.org/events/evt2103061>

Participation Form

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To be completed by the participant and sent to the competent national authority (e.g. Ministry of Foreign Affairs, Permanent Mission to the IAEA, or National Atomic Energy Authority) of his/her country for subsequent transmission to the International Atomic Energy Agency (IAEA) either by email to: Official.Mail@iaea.org or by fax to: +43 1 26007 (no hard copies needed). Please also send a copy by email to the Scientific Secretary Y.G.Kim@iaea.org and to the Administrative Secretary L.Sedlazeck@iaea.org.

Participants who are members of an invited organization can submit this form to their organization for subsequent transmission to the IAEA.

Deadline for receipt by IAEA through official channels: 31 July 2023

| | | | |
|---|--|--------------------------------------|-------|
| Family name(s): (same as in passport) | | First name(s): (same as in passport) | Mr/Ms |
| Institution: | | | |
| Full address: | | | |
| Tel. (Fax): | | | |
| Email: | | | |
| Nationality: | Representing following Member State or invited organization: | | |
| If/as applicable: Do you intend to give a presentation? Yes <input type="checkbox"/> No <input type="checkbox"/> Title: I plan to attend virtually: Yes <input type="checkbox"/> No <input type="checkbox"/> | | | |

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

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|---------------------------------------|--------------------------------------|--|
| Family name(s): (same as in passport) | First name(s): (same as in passport) | Mr/Ms: |
| Mailing address: | | Tel.: |
| | | Fax: |
| | | Email: |
| Date of birth (yyyy/mm/dd): | | Nationality: |
| I plan to attend virtually: | | Yes <input type="checkbox"/> No <input type="checkbox"/> |

1. Education (post-secondary):

| Name and place of institution | Field of study | Diploma or Degree | Years attended from | to |
|-------------------------------|----------------|-------------------|---------------------|----|
| | | | | |
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2. Recent employment record (starting with your present post):

| Name and place of employer/ organization | Title of your position | Type of work | Years attended from | to |
|--|------------------------|--------------|---------------------|----|
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| | | | | |

3. Description of work performed over the last three years:

4. Institute's/Member State's programme in field of event:

Date: _____

Signature of applicant: _____

Date: _____

**Name, signature and stamp of Ministry of Foreign Affairs,
Permanent Mission to the IAEA or National Atomic Energy
Authority**
