

Technical Meeting on Instrumentation and Control, and Computer Security for Small Modular Reactors and Microreactors

IAEA Headquarters, Vienna, Austria
21–25 February 2022

Ref. No.: EVT2100684

Monday 21 February 2022		
Time (CET)	Item	Speaker
10:15 – 10:45	Participants Connecting to WebEx	
10:45 – 10:55	Opening remarks	<i>Aline Le Grand des Cloizeaux</i> Director of the Division of Nuclear Power, IAEA
		<i>Elena Buglova</i> Director of the Division of Nuclear Security, IAEA
10:55 – 11:00	Technical Meeting chair welcome	<i>Kathleen Heppell-Masys</i> Canadian Nuclear Safety Commission (CNSC)
11:00 – 11:30	Key drivers to the development of nuclear power and the case of SMR/MRs	<i>Henri Paillere</i> IAEA/Division of Planning, Information and Knowledge Management
11:30 – 11:45	Coffee break	
11:45 – 12:15	How SMR/MRs designs are different from traditional NPP	<i>Peter S. Hastings</i> World Nuclear Association (WNA)
12:15 – 12:45	Overview of SMR/MR technology development for near term deployment	<i>Hadid Subki</i> IAEA/ Division of Nuclear Power
12:45 – 13:15	Panel session on previous presentations	<i>Moderator: Kathleen Heppell-Masys</i> Canadian Nuclear Safety Commission (CNSC)
13:15 – 14:15	Lunch break	



14:15 – 14:45	Risk-Informed and performance based I&C design for SMR and microreactors - An integrated approach	<i>Matt Gibson Electric Power Research Institute (EPRI)</i>
14:45 – 15:15	Features of I&C necessary for SMR/MRs designs and operation	<i>Richard Wood University of Tennessee Knoxville (UTK)</i>
15:15 – 15:30	Coffee break	
15:30 – 16:00	IAEA guidance on safety, computer security and I&C engineering	<i>Rodney Busquim, Janos Eiler and Alexander Duchac IAEA/Division of Nuclear Security, Division of Nuclear Power, Division of Nuclear Installation Safety</i>
16:00 – 16:15	Working group (WG) introductions	<i>Kathleen Heppell-Masys, Canadian Nuclear Safety Commission (CNSC)</i> <i>Bob Anderson, Idaho National Laboratory (INL)</i> <i>Mike Rowland, Sandia National Laboratories (SNL)</i> <i>Paul Smith, Austrian Institute of Technology GmbH (AIT)</i> <i>Ricardo Marques, University of Sao Paulo (USP)</i> <i>Sofia Guerra, Adelard LLP</i> <i>Thuy Nguyen, Consultant</i>
16:15	Adjourn	<i>Kathleen Heppell-Masys Canadian Nuclear Safety Commission (CNSC)</i>

Tuesday 22 February 2022		
Time (CET)	Item	Speaker
09:40 – 09:45	Welcome and Day 1 recap	<i>Kathleen Heppell-Masys Canadian Nuclear Safety Commission (CNSC)</i>
09:45 – 10:15	HTR-PM	<i>Jianghai LI Institute of Nuclear Energy Technology (INET), Tsinghua University (THU)</i>
10:15 – 10:45	NUWARD™	<i>Thierry Noel Électricité de France (EDF)</i>
10:45 – 11:15	Design and operation features that are important for SMRs	<i>Thuy Nguyen Consultant</i>
11:15 – 11:30	Coffee break	
11:30 – 12:00	Safety-security interaction	<i>Mike StJohn-Green Consultant</i>

12:00 – 12:30	SMR safety features	<i>Koroush Shirvan Massachusetts Institute of Technology (MIT)</i>	
12:30-13:30	Lunch break		
13:30–14:50	Working group session 1 – Digital innovations	Working group session 2 - Safety/security interface	Working group session 3 - Regulations
13:30 – 13:50	Safety I&C technologies for SMRs and ARs <i>Presenter: Arnaud Duthou, Framatome Grenoble</i>	Formal approach to use the security models for design and evaluation of the NPP I&C security architecture <i>Presenter: Vitaly Promyslov, Trapeznikov Institute of Control Sciences, Russian Academy of Science</i>	Overview of regulatory approach on I&C and computer security to consider during licensing of new small modular reactors and microreactors. <i>Presenter: Rafael Faria, Brazilian National Nuclear Energy Commission (CNEN)</i>
13:50 – 14:10	Smart sensing and computer security of SMRs <i>Presenter: Jianghai Li, Institute of Nuclear Energy Technology, Tsinghua University (INET/THU)</i>	Cyber by design: strategies for the protection of SMR/MR digital systems against cyber attack <i>Presenter: Bob Anderson, Idaho National Laboratory (INL)</i>	Technical and regulatory challenges of autonomous control for advanced small modular reactors <i>Presenter: Yong Chang Liu, Canadian Nuclear Safety Commission (CNSC)</i>
14:10 – 14:30	Technical requirements for performance of process sensors in SMRs <i>Presenter: Alex Hashemian, Analysis and Measurement Services Corporation (AMS)</i>	Safety and security integration of I&C and computer security <i>Presenter: Deepak Kumar, Nuclear Power Corporation of India Ltd. (NPCIL)</i>	CNSC regulatory approach to cyber security for SMRs <i>Presenter: Chul Hwan Jung, Canadian Nuclear Safety Commission (CNSC)</i>
14:30 – 14:50	Some I&C challenges for the deployment of remotely operated SMR/MR fleets <i>Presenter: Ricardo Marques, University of Sao Paulo (USP)</i>	Computer security of digital I&C systems for small modular reactors and microreactors <i>Presenter: Anton Andrashov, RPC Radics LLC</i>	Managing cyber security supply chain risks for small modular advanced reactors <i>Presenter: Mike Rowland, Sandia National Laboratories (SNL)</i>
14:50– 15:10	Coffee break		
15:10 – 16:30	Working group 1 discussion <i>Ricardo Marques, University of Sao Paulo (USP)</i> <i>Thuy Nguyen, Consultant</i>	Working group 2 discussion <i>Bob Anderson, Idaho National Laboratory (INL)</i> <i>Paul Smith, Austrian Institute of Technology GmbH (AIT)</i>	Working group 3 discussion <i>Mike Rowland, Sandia National Laboratories (SNL)</i> <i>Sofia Guerra, Adelard LLP</i>
16:30	Adjourn (WG 1 Chair)	Adjourn (WG 2 Chair)	Adjourn (WG 3 Chair)

Wednesday 23 February 2022

Time (CET)	Item	Speaker
09:40 – 09:45	Welcome and Day 2 recap	<i>Kathleen Heppell-Masys Canadian Nuclear Safety Commission (CNSC)</i>
09:45 – 10:15	CAREM SMR	<i>Cecilia Laura Alberto Argentina National Energy Commission (CNEA)</i>
10:15 – 10:45	NuScale Power's 'VOYGR' SMR	<i>Kevin Deyette NuScale Power</i>
10:45 – 11:15	Supply chain	<i>Shannon Eggers Idaho National Laboratory (INL)</i>
11:15 – 11:30	Coffee break	
11:30 – 12:00	U.S.A. regulatory efforts for cyber security of advanced reactors	<i>Ismael Garcia Nuclear Regulatory Commission (NRC)</i>
12:00 – 12:30	IEC international standards	<i>Ted Quinn Paragon Energy Solutions</i>
12:30– 13:30	Lunch break	

13:30–14:50	Working group session 1 – Digital innovations	Working group session 2 - Safety/security interface	Working group session 3 - Regulations
13:30 – 13:50	Use of digital twins for computer security assessment for SMR <i>Presenter: Rodney Busquim, IAEA/Division of Nuclear Security</i>	On some cybersecurity issues when implementing FPGA in I&C systems <i>Presenter: Nicolas Chevaux, Électricité de France S.A. (EDF)</i>	Overview of the IEC cybersecurity standards for nuclear I&C <i>Presenter: Ludovic Pietre-Cambacedes, Électricité de France S.A. (EDF)</i>
13:50 – 14:10	Computer security implications of digital twins for small modular reactors <i>Presenter: David Allison, Austrian Institute of Technology GmbH (AIT)</i>	Security process hazards analysis for nuclear reactors <i>Presenter: Gary Lynn Johnson, Consultant</i>	IAEA Incident and Emergency Centre – Emergency preparedness and response considerations <i>Presenter: Frederic Stephani, IAEA/Incident and Emergency Centre</i>
14:10 – 14:30	Development of an integral small modular reactor digital twin for control systems design purposes. <i>Presenter: Felipe Marques, Brazilian Navy Nuclear Development Directorate</i>	Practice of integration between safety and security in ACP100 Safety class DCS design and manufacturing process <i>Presenter: Hao Peng, Nuclear Power Institute of China</i>	Integration of small modular reactor into energy supply system of energy option countries in Africa <i>Presenter: Alemayehu Desta, Egyptian Nuclear & Radiological Regulatory Authority (ENRRA)</i>

14:30 – 14:50	Digital I&C and technology strategy for SMRs <i>Presenter: Tony Zettle, Alithya Digital Technology Corporation</i>	Integrated safety and security in SMR/MRs early design <i>Presenter: Francisco Lemos, Brazilian Nuclear and Energy Research Institute (IPEN)</i>	Design & construction of SMR NPP in Russia <i>Presenter: Aleksey Padalko, Rusatom Automated Control Systems JSC</i>
14:50– 15:10	Coffee break		
15:10 – 16:30	Working group 1 discussion <i>Ricardo Marques, University of Sao Paulo (USP)</i> <i>Thuy Nguyen, Consultant</i>	Working group 2 discussion <i>Bob Anderson, Idaho National Laboratory (INL)</i> <i>Paul Smith, Austrian Institute of Technology GmbH (AIT)</i>	Working group 3 discussion <i>Mike Rowland, Sandia National Laboratories (SNL)</i> <i>Sofia Guerra, Adelard LLP</i>
16:30	Adjourn (WG 1 Chairs)	Adjourn (WG 2 Chairs)	Adjourn (WG 3 Chairs)

Thursday 24 February 2022			
Time (CET)	Item	Speaker	
09:40 – 09:45	Welcome and Day 3 recap	<i>Kathleen Heppell-Masys, Canadian Nuclear Safety Commission (CNSC)</i>	
09:45 – 10:15	ACP100	<i>Hao Peng Nuclear Power Institute of China/China National Nuclear Corporation (NPIC/CNNC)</i>	
10:15 – 10:45	Rolls-Royce SMR	<i>Steven Moor Rolls-Royce (UK)</i>	
10:45 – 11:15	Safety, security and safeguards interfaces and challenges for SMRs	<i>Shahen Poghosyan IAEA/ Division of Nuclear Installation Safety</i>	
11:15– 11:30	Coffee break		
11:30 – 12:15	System integration approach to safety-security	<i>John Thomas Massachusetts Institute of Technology (MIT)</i>	
12:15 – 12:45	Regulatory challenges arising from an International Market	<i>Michelle Catts GE Hitachi Nuclear Energy</i>	
12:45–13:30	Lunch break		
13:30–14:10	Working group session 1 – Digital innovations	Working group session 2 - Safety/security interface	Working group session 3 - Regulations

3:30 – 13:50	Selected I4.0 cybersecurity concepts for SMRs and MRs <i>Presenter: Karl Waedt, Framatome GmbH</i>	Remote monitoring and control of a small modular reactor – Proof-of-concept design, construction and deployment <i>Presenter: Dave Trask, Canadian Nuclear Laboratories (CNL)</i>	Application of dynamic methodology to assess computer security influence in digital I&C system of a small modular reactor <i>Presenter: Richard Vital, Brazilian National Nuclear Energy Commission (CNEN)</i>
13:50 – 14:10	Development of online monitoring technologies for autonomous microreactor operations <i>Presenter: Brent Shumaker, Analysis and Measurement Services Corporation (AMS)</i>	Using model-based system engineering approach to threat scenarios assessment in SMRs <i>Presenter: Sergio Yukio Sato, Atech S.A Grupo Embraer</i>	Digital I&C system solutions for SMR in China <i>Presenter: Yongbin Sun and Wanchun Yang, China Techenergy Co. Ltd.</i>
14:10– 14:30	Coffee break		
14:30 – 16:30	Working group 1 discussion <i>Ricardo Marques, University of Sao Paulo (USP)</i> <i>Thuy Nguyen, Consultant</i>	Working group 2 discussion <i>Bob Anderson, Idaho National Laboratory (INL)</i> <i>Paul Smith, Austrian Institute of Technology GmbH (AIT)</i>	Working group 3 discussion <i>Mike Rowland, Sandia National Laboratories (SNL)</i> <i>Sofia Guerra, Adelard LLP</i>
16:30	Adjourn (WG 1 Chairs)	Adjourn (WG 2 Chairs)	Adjourn (WG 3 Chairs)

Friday 25 February 2022		
Time (CET)	Item	Speaker
12:00–13:00	Working group chairs' presentations	<i>Bob Anderson, Idaho National Laboratory (INL)</i> <i>Mike Rowland, Sandia National Laboratories (SNL)</i> <i>Paul Smith, Austrian Institute of Technology GmbH (AIT)</i> <i>Ricardo Marques, University of Sao Paulo (USP)</i> <i>Sofia Guerra, Adelard LLP</i> <i>Thuy Nguyen, Consultant</i>
13:00 –14:00	Technical meeting chair's response and discussion	<i>Kathleen Heppell-Masys Canadian Nuclear Safety Commission (CNSC)</i>
14:00 –14:30	Technical meeting closing remarks	IAEA
14:30	TM adjourn	