

## Enlarged Halden HTO Programme Review Group (EHPRG) meeting 2023

Technical program. For more information: <https://ife.no/en/event/ehprg-2023/>

<b>Monday 25<sup>th</sup> September</b>			
<b>08:30 – 12:10</b>	<b>Paper No.:</b>	<b>Opening session Perspectives on the nuclear future</b>	<b>Chair: Bruce P. Hallbert, INL Secretary: Andreas Bye</b>
08:30-08:45	Mo-00	Welcome and Introduction	<b>Andreas Bye</b> , IFE. Programme Manager, Halden HTO Project
08:45-09:15	Mo-01	Opening keynote	<b>William D. Magwood, IV</b> , Director General, OECD Nuclear Energy Agency
09:15-09:35	Mo-02	Perspectives on the nuclear future in the U.S.	<b>Bruce P. Hallbert</b> , INL. Director, Technical Integration Office, DOE Light Water Reactor Sustainability (LWRS) Program
09:35-09:50	Mo-03	The energy and nuclear situation in Norway	<b>Nils Morten Huseby</b> , CEO, IFE
09:50-10:10	Mo-04	Regulatory perspective on the future of nuclear in Canada	<b>Peter Elder</b> , Vice-President and Chief Science Officer. Technical Support Branch, Canadian Nuclear Safety Commission (CNSC)
<b>10:10-10:40</b>		<b>Coffee break</b>	
10:40-11:00	Mo-05	Regulatory perspective on the future of nuclear in the U.S.	<b>John Tappert</b> , Deputy Director, Office of Nuclear Regulatory Research. U.S. Nuclear Regulatory Commission
11:00-11:20	Mo-06	The nuclear developments in China	<b>Xujia Wang</b> , Deputy Director General of SNERDI. Director of Chief Engineers Office and Director of General Technology Department of SNERDI
11:20-11:40	Mo-07	Renewing the nuclear efforts in The Netherlands	<b>Geert-Jan de Haas</b> , Programme manager Research, NRG Consultancy & Services
11:40-12:00	Mo-08	NUWARD SMR: overview of the design & Human Factors Engineering	<b>Stanislas Couix</b> , Research Scientist, EDF. Human Factors Manager, NUWARD
12:00-12:10	Mo-09	The increased nuclear research focus in Norway and the importance of HTO research for Norway	<b>Tomas Nordlander</b> , Vice President, IFE

12:10-13:30		Lunch		
13:30-16:30		Topic 1: Human Performance	Chair: Suzanne Dolecki, CNSC Secretaries: Prosper A. Kwei-Narh, Awwal Arigi	Ref.:
13:30-14:00	Mo-1-1	Keynote address: Human Performance Research in Nuclear Power Plants: Great Expectation	Jing Xing, U.S. NRC	
14:00-14:20	Mo-1-2	Operator performance in digital control rooms: Insights from on-site observation of simulator training	Michael Hildebrandt, Robert McDonald, Daniel Odéen, IFE	HTOR-068
14:20-14:40	Mo-1-3	Experiences and Findings of human performance in digital control rooms	Fei Song, SNERDI	HTOR-025
14:40-15:00	Mo-1-4	Groupthink – A literature review	Magnhild Kaarstad, IFE	HTOR-049
15:00-15:30		Coffee Break		
15:30-15:50	Mo-1-5	Use Simulator Data to Assess Uncertainty of Time-Required for Human Reliability Analysis	James Chang, NRC	Paper Video pres.
15:50-16:10	Mo-1-6	Adaptive decision-making in control room emergencies: Results of a HAMMLAB study with the GPWR simulator	Salvatore Massaiu, IFE	HTOR-039
16:10-16:30	Mo-1-7	Learning from successful performance in failure events – a case-based study	Elizabeth Solberg, Rossella Bisio, Prosper Kwei-Narh, IFE	HTOR-031
16:30 – 18:30		Exhibitions and Demonstrations		
19:00-19:30		Refreshments		
19:30		Seated Dinner		

Tuesday 26 <sup>th</sup> September				
		<b>Topic 1: Human performance, continued</b>		
08:30-08:50	Tu-1-8	Including successful performance in the scope of the event analysis	<b>Elizabeth Solberg</b> , Rossella Bisio, Prosper Kwei-Narh, IFE	HTOR-046
08:50-09:10	Tu-1-9	Human Performance Repository: Lessons Learned and Experience in Publishing the site for Halden Reports search.	<b>Rossella Bisio</b> , IFE	HTOR-057
<b>09:10-12:10</b>		<b>Topic 2: Digital I&amp;C – Safety Assurance</b>	<b>Chair: Spencer Brown, FANR</b> <b>Secretaries: John E. Simensen, Xueli Gao</b>	<b>Ref.:</b>
<b>09:10-09:40</b>	<b>Tu-2-1</b>	<b>Keynote address: Addressing hazards from common causes in engineering DI&amp;C systems without diverse designs – State-of-the-Art</b>	<b>Sushil Birla</b> , U.S. NRC	Video pres.
09:40-10:00	Tu-2-2	Safety argumentation for a nuclear reactor protection system – an assessor’s view	Peter Karpati, <b>Xueli Gao</b> , IFE	HTOR-027
<b>10:00-10:25</b>		<b>Coffee break</b>		
10:25-10:45	Tu-2-3	Development of an Experimental Test Bed for analyzing Nuclear Systems Data, Data Manipulation and Data Protection	<b>Karthik Sankaranarayanan</b> , Ontario Tech University	Paper
10:45-11:05	Tu-2-4	STPA application on Halden Safety Fan	<b>Ankur Shukla</b> , Xueli Gao, IFE	HTOR-032
11:05-11:10	Tu-2-5	Proceedings of HTO Workshop series – Safety Assurance through Correct-by-Construction Techniques	<b>Sizarta Sarshar</b> et al., IFE	HTOR-033
11:10-11:33	Tu-2-6	HARDENS case explained	<b>Peter Karpati</b> et al., IFE	HTOR-064, HTOR-034
11:30-11:50	Tu-2-7	Structured argument for the HARDENS case	Xueli Gao, <b>Peter Karpati</b> , IFE	HTOR-064
11:50-12:10	Tu-2-8	Evidence for the HARDENS case	<b>Bjørn Axel Gran</b> et al., IFE	HTOR-034
<b>12:10-13:30</b>		<b>Lunch</b>		

<b>13:30-16:10</b>		<b>Topic 3: Control Room Design &amp; Evaluation</b>	<b>Chair: Eva Simonsen, Vattenfall</b> <b>Secretaries: Linda Lunde-Hanssen, Hanne Rødsethol</b>	<b>Ref.:</b>
<b>13:30-14:00</b>	<b>Tu-3-1</b>	<b>Keynote address: What's Next for the Future of Control Rooms? Do Microreactors Change Everything?</b>	<b>Ron Boring, INL</b>	
14:00-14:20	Tu-3-2	Review of Situation Awareness Measures applied in the Halden Human Machine Laboratory	<b>Per Øivind Braarud, Giovanni Pignoni, IFE</b>	HTOR-035
14:20-14:40	Tu-3-3	Perceived Digital Control Room Usability and the Role of Individual Affinity for Technology	<b>Kelly Dickerson, NRC</b>	Paper
14:40-15:00	Tu-3-4	Perceived usefulness and usability of overview displays in nuclear control rooms	<b>Alexandra Fernandes, Marten Bloch, Alf Ove Braseth, and Robert McDonald, IFE</b>	HTOR-042
Tabled	Tu-3-5	A Framework for Studying Overview Displays Best Practice	Alf Ove Braseth, Alexandra Fernandes and Marten Bloch, IFE	HTOR-001 Rev.1
<b>15:00-15:30</b>		<b>Coffee Break</b>		
15:30-15:50	Tu-3-6	Impact of overview displays on response accuracy and response time	<b>Alexandra Fernandes, Marten Bloch, Robert McDonald, and Alf Ove Braseth, IFE</b>	HTOR-041
15:50-16:10	Tu-3-7	Augmented Reality for On-Site Human Factors Control Room Assessment	<b>Morten Gustavsen, Michael N. Louka and Peter Christopher Bach, IFE</b>	HTOR-040
<b>16:10-18:30</b>		<b>Exhibitions and Demonstrations</b>		
<b>19:00-21:00</b>		<b>Buffet Dinner</b>		

<b>Wednesday 27<sup>th</sup> September</b>				
<b>08:30-10:50</b>		<b>Topic 4: Human-Automation Collaboration</b>	<b>Chair: Céline Poret, IRSN</b> <b>Secretaries: Awwal Arigi, Alexandra Fernandes</b>	<b>Ref.:</b>
08:30-09:00	<b>We-4-1</b>	<b>Keynote address: Should Automation Be Transparent? The Answer Isn't Clear</b>	<b>Greg Jamieson</b> , University of Toronto	
09:00-09:20	We-4-2	Results from 2022 and 2023 phased study in the new Halden SMR Simulator	<b>Claire Blackett</b> , Awwal Arigi, Maren Eitrheim, Alexandra Fernandes, IFE	HTOR-029
09:20-09:40	We-4-3	Failure modes in human-automation integration	<b>Jing Xing</b> , Niav H. Green, NRC	Paper
09:40-10:00	We-4-4	Operator Responses to Systemic Automation Failure	<b>Gyrd Skraaning Jr.</b> , Daniel Odéen, IFE, Greg A. Jamieson, University of Toronto	HTOR-052
<b>10:00-10:30</b>		Coffee break		
10:30-10:50	We-4-5	Controlling a plant with the support of adaptive automation: empirical studies results	<b>Rossella Bisio</b> , IFE	HTOR-051
<b>10:50-14:30</b>		<b>Topic 5: Digital Systems for Operations and Maintenance</b>	<b>Chair: Sarah Lawrie, NNL</b> <b>Secretaries: Hoa Thi Nguyen, Jens-Patrick Langstrand</b>	<b>Ref.:</b>
<b>10:50-11:20</b>	<b>We-5-1</b>	<b>Keynote address: Opportunities and Challenges in Applying New and Emerging Digital Technologies to NPP Operations and Maintenance</b>	<b>John de Grosbois</b> , COG	Video pres.
11:20-11:40	We-5-2	Advanced Condition-based Maintenance using Digital Twins	<b>Harald P-J Thunem, Sanjay Misra</b> , IFE	HTOR-058
11:40-12:00	We-5-3	Advanced Condition Monitoring for Decision Support	<b>Mario Hoffmann</b> , Chau Tran, IFE	HTOR-059

<b>12:00-13:30</b>		<b>Lunch</b>		
13:30-13:50	We-5-4	Situation awareness (SA) in outage work: an agentic perspective on SA errors, recognition, and mitigation	Prosper Kwei-Narh, <b>Espen Nystad</b> , IFE	HTOR-037
13:50-14:10	We-5-5	Human performance improvement tools and situation awareness in outage work	<b>Elizabeth Solberg</b> , Prosper Kwei-Narh, IFE	HTOR-036
14:10-14:30	We-5-6	Comparing Nuclear and Offshore Petroleum Organizations	<b>Asgeir Drøivoldsmo</b> , IFE	HTOR-038
<b>15:00-18.30</b>		<b>Social activity: Hunderfossen</b>		
<b>19.00 – 21:00</b>		<b>Buffet Dinner</b>		
<b>Thursday 28<sup>th</sup> September</b>				
<b>08:30-11:10</b>		<b>Topic 6: Digital Transformation of Decommissioning</b>	<b>Chair: Fei Song, SNERDI</b> <b>Secretaries: Réka Szöke, Jonas Aamodt Moræus</b>	<b>Ref.:</b>
<b>08:30-09:00</b>	<b>Th-6-1</b>	<b>Keynote address: AMORAC – Autonomous Mobile Robot for Automated Clearance</b>	<b>Frank Querfurth</b> , Framatome GmbH	
09:00-09:20	Th-6-2	Radiological risk visualisation and perception using wearable augmented reality	Michael N. Louka, <b>Mikel Salazar</b> , IFE	HTOR-060
09:20-09:40	Th-6-3	Lessons learned from using and developing open standards to enable safety-oriented decision-support for field workers	<b>Mikel Salazar</b> , Michael N. Louka, IFE	HTOR-061
09:40-10:00	Th-6-4	Automated Assessment of Field Worker Performance: Theoretical Framework, Performance Indicators in XR Training Simulators and User tests results	<b>Lucas Stephane</b> , Peter Christopher Bach, Edward Langstrand, Sathiya Kumar Renganayagalu, IFE	HTOR-026, HTOR-062
<b>10:00-10:30</b>		<b>Coffee Break</b>		

10:30-10:50	Th-6-5	Enabling Robotic and Remote Operations in Decommissioning: Safety Centered Framework	<b>Lucas Stephane</b> , Svein Tore Edvardsen, Abdenour Benkrid, Levente Nyusti, IFE	HTOR-063
10:50-11:10	Th-6-6	Holistic approach to digitalisation and robotics for sustainable nuclear decommissioning	<b>István Szőke</b> , Réka Szőke, Mustafa A.H. Jarallah, Omar Zahra, IFE	Paper
<b>11:10-14:45</b>		<b>Topic 7: Cyber Security for Main Control Rooms</b>	<b>Chair: Michael Passens, GRS</b> <b>Secretaries: Ankur Shukla, Sizarta Sarshar</b>	<b>Ref.:</b>
<b>11:10-11:40</b>	<b>Th-7-1</b>	<b>Keynote address: Normalization of Cyber Security: A Nuclear Industry Imperative</b>	<b>Matt Gibson</b> , EPRI	
11:40-12:00	Th-7-2	Systematic Literature Review – Cyber security threat landscape for nuclear.	<b>John E Simensen</b> , Hans Olav Randem, Stine A. Mikkelsplass, Per-Arne Jørgensen, IFE	HTOR-054
Tabled	Th-7-3	Workshop summary: Operationalizing threats and vulnerabilities in relations to system specific effects.	John E Simensen, IFE	HTOR-043
<b>12:00-13:15</b>		<b>Lunch</b>		
13:15-13:35	Th-7-4	System modelling for security – appending cyber security threat and vulnerability information to existing system models.	<b>Ankur Shukla</b> , John E Simensen, Fabien Sechi, Stine A. Mikkelsplass, IFE	HTOR-055
13:35-13:55	Th-7-5	Testbeds for Cyber Security of Nuclear Power Plants (NPPs): Key Characteristics and Architecture Design	<b>Sabarathinam Chockalingam</b> , Ankur Shukla, Fabien Sechi, IFE	HTOR-044
13:55-14:15	Th-7-6	A Comparative Analysis of State-of-the-Practice Intrusion Detection Systems	<b>Aleksander Lygren Toppe</b> , <b>Stine Aurora Mikkelsplass</b> , Sabarathinam Chockalingam, IFE	HTOR-045

14:15-14:45	Th-7-7	The role of control room operators during a cybersecurity incident	<b>Espen Nystad</b> , Prosper Kwei-Narh, Coralie Esnoul, Levente Nyusti, IFE	HTOR-048
<b>14:45-15:05</b>		<b>Coffee break</b>		
<b>15:05-16:30</b>		<b>Panel session with Main take-aways</b>	<b>Chair: Bruce P. Hallbert, INL</b> <b>Secretary: Andreas Bye</b> <b>Panel: Topic chairs</b>	
<b>19:00</b>		<b>Aperitif</b>		
<b>19:30</b>		<b>Banquet dinner</b>		