

14th CRA RISK & SAFETY FORUM 2023

Safety Leadership - Increasing the Pool of Professionals in Safety Critical Industries
20-21 September 2023, Birmingham (UK)

Day 1 Wednesday 20 September 2023

09:30 Registration Opens

10:00 Welcome, Introduction and Aims for this Year's Risk & Safety Forum

Jasbir Sidhu, BEng (Hons - Nuclear), MBA
Managing Director, CRA
President, Nuclear Institute

10:10 Keynote 1:
Shortage of Skilled Professionals in Safety Critical Industry

Dr Fiona Rayment OBE, FEng

Chief Science and Technology Officer
National Nuclear Laboratory Ltd. (NNL)

Fiona will share her thoughts on safety leadership and shortage of skilled professionals in the Safety Critical industries.

10:30 Keynote 2:
Human Resource – Risk or Issue?

Mark Neate
Environment, Safety & Security Director, Sellafield Ltd.
Chairman, Safety Director's Forum

Mark will develop a baseline of where our skills are taking into account the impact of COVID-19, the war in Ukraine, economic stagnation, Industrial Relations, Energy Security, and the realities of a dis-jointed approach to recruitment and retention. Mark will also explore disseminate information on the considerable work that the Safety Director's Forum on critical skills for the Nuclear Industry.

10:50 Keynote 3:
A Regulatory View

Mark Foy, BEng CEng FNucl
Chief Executive Officer
Office for Nuclear Regulation (ONR)

Mark will share his thoughts, from a regulatory point of view, on how the shortage of Skilled Professionals in Safety Critical Industries is impacting the work of ONR.

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10:50 Panel Session
What is the gap?

Chair: Jasbir Sidhu (CRA)
Fiona Rayment (NNL)
Mark Neate (Sellafield Ltd.)
Mark Foy (ONR)

11:30 BREAK

NEWCOMERS TO THE SAFETY WORLD

11:40 Identifying, Attracting and Retaining Early Years' Professionals

Jon Baggs
Head of Nuclear
Abbott Risk Consulting (ARC)

Chartered Engineer (CEng), Fellow of the Institution of Mechanical Engineers (FIMechE),
Member of the Safety and Reliability Society (MSaRS)

The presentation aims to discuss where we need to be looking for new talent, how we attract new talent, and how we train and retain that talent. This will be based upon professional experience/ knowledge.

12:00 Panel Session
What motivated/encouraged you to join the industry?

Chair: Hannah Thompson (CRA)
Jon Baggs (ARC)
Kate Smith (CRA)
Edmund Ireland (University of Manchester)
Holleigh Pearson (Sellafield Ltd.)

13:00 LUNCH

HUMAN FACTORS - CHASING UNICORNS

14:00 CRA Academy Launch

Amir Zar (CRA)
Adrian Wheatley (CRA)

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CRA will be launching its Training Academy. The initial focus of the Academy will be the development of Human Factors, Risk and Safety Case skills in the Nuclear Sector and in-time, other technical disciplines will be added.

14:10 Current Challenges facing HF Integration – Observations from the coalface

Hannah Wright
Human Factors Consultant
CRA

In this presentation, Hannah Wright will be sharing her recent experiences working on a number of high-profile projects requiring HF integration at a number of nuclear licensee sites. Like it or not, there is still a significant amount of ignorance with respect to HF and HFI within the industry. The proportionate and timely integration of HF is a perennial issue of concern, and CRA have been ‘at the coalface’ on a number of projects that have faced various degrees of challenge and challenges relating to HF integration. Hannah will highlight a number of these challenges, key areas of success, and Learning from Experience

14:30 Selling Water by the River: Giving away Human Factors Know-how

Dr Barry Kirwan
Safety Research Manager
EUROCONTROL

Barry will be speaking in detail about a web-based platform called HURID (Human Risk-Informed Design). HURID includes many human factors tools which are illustrated with factsheets, video tutorials and case studies. In addition, several digital tools are included to help carry out safety culture snap-assessments, analyse incidents from a Human Factors perspective, and evaluate an organisation’s Human Factors capability needs.

There are seven ‘Guided Paths’ in HURID explaining the sequence of application of the 20+ techniques (including alternatives with expertise level from ‘none’ to ‘advanced’) given the user’s ambitions, e.g. “I am preparing a safety case”, or “I want to look at Human Factors in incidents and accidents.” In terms of leadership, the central theme of this year’s CRA Forum, HURID represents leadership by empowerment, and will help engender more effective working relationships between Human Factors professionals and their industrial partners.

Barry will be presenting HURID to all the members of the forum.

14:50 HFI Challenges: A Regulator’s View - Explaining the TAG 58 Update

Helen Jones
Nuclear Safety Inspector – Human Factors
Office for Nuclear Regulation (ONR)

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Helen has considerable experience in Human Factors Integration (HFI), and will share her thoughts from a regulatory perspective, on the challenges facing Human Factors professionals. She will then explain the ONR Technical Assessment Guide (TAG) 58 on Human Factors Integration and recent updates.

15:10 Panel Session

How Far do we go with Training Professionals from Other Disciplines to Undertake HF Tasks?

Chair: **Adrian Wheatley (CRA)**
Hannah Wright (CRA)
Barry Kirwan (EUROCONTROL)
Helen Jones (ONR)
Richard Baxendale (Rolls Royce)

15:40 BREAK

RISK & SAFETY CASE - FUTURE DEVELOPMENT

15:55 Technical and Managerial Challenges to Nuclear Safety Case

Paul Smith MSc., PhD
Safety Case Manager
BABCOCK Intl

Many organisations and the nuclear industry want safety and security to be “right first time”. In the future, designers and builders shall be asked to demonstrate the robustness, resilience, sustainability, and capability to cope with severe and extreme hazard events.

Past risk assessment methods must now be greatly enhanced to better ensure improved resilience and sustainability. The traditional paradigm used to account for accidents, hazards and risks is made up of three parts. The first is to assess the risk of occurrence, then to judge if the assessed risks are acceptable compared to society’s benefit, and ultimately to provide a generalised emergency service that will try to mitigate the consequential impact.

Taking a critical approach is to question and test if the preparedness, response, and recovery capability is adequate against accidents and disasters. A more holistic approach to severe event / hazard / threat risk assessment thereby accounts for the infrastructure’s damage, the scale and capability of preparedness, the success of response and final recovery actions, investigating the complete coping cycle for the socio-technical system of interest. This represents a new paradigm for accident management, involving the need to quantitatively question our accident and disaster coping strategies and capability. Such scaling analyses needs to account for a wider gamut of parameters including magnitude, time, rate, space - set against our resources. All these issues will be explored in Paul’s presentation.

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16:15 Safety Assessment for SMRs and AMRs: Approaches and Challenges

Vignesh Anandan
Senior Consultant
RELSAFE PRA Consulting

The aim of this presentation is to deliberate about the maturity level in current approaches to safety assessment for SMRs/AMRs, underlining the salient gaps and challenges. The talk will touch upon the ongoing developmental activities undertaken by international organisations (IAEA, USNRC, EPRI) for safety demonstration of advanced nuclear reactor designs and highlight the important areas requiring training and skills development

16:35 Seismic PSA Modelling for New Build (HPC)

Alefiyah Jafferji, MSc
Probabilistic Safety Analysis Engineer
EDF

During this speech, Alefiyah will share professional and personal learnings and reflections from her past several years working at EDF's Direction Technique in Lyon, France. Her professional learnings centre around working on a state-of-the-art seismic PSA, comprising all reactor states and both reactor building and spent fuel pool, for Hinkley Point C, whilst her personal reflections focus on the value of perspective, variety, and community in retaining professionals in safety critical industries.

16:55 Panel Session **Where is Risk & Safety Development Heading?**

Chair: Michael Zammett (CRA)
Paul Smith (BABCOCK Intl)
Vignesh Anandan (RELSAFE PRA Consulting)
Alefiyah Jafferji (EDF)

17:25 Jasbir Sidhu

Reflections of the day.

17:30 Forum Day 1 Close

18:30 Drinks Reception

19:30 Dinner

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Day 2 Thursday 21 September 2023

09:30 Welcome & Introduction

Jasbir Sidhu (BEng (Hons - Nuclear), MBA)
Managing Director, CRA
President, Nuclear Institute

CHALLENGES ON DEVELOPING SAFETY & RISK PROFESSIONALS IN EMERGING TECHNOLOGIES

09:40 Design As Democracy – Collective Creativity for Addressing Human Factors Issues in Nuclear Facility Design

John Lovegrove, BSc C.ErgHf Eur.Erg
Managing Director
Canary Designs Ltd.

The talk is made up of two parts, firstly to explore the current limitations of practicing human factors / ergonomics in the UK nuclear industry, such as working within organisational / discipline silos, use of inefficient and unimaginative software tools (i.e. excel or word, visio), rigid (standardised) HF processes and guidance that are either outdated or out of step with modern software tools, design practice and methodologies. The second part of the talk will draw on past and current work that showcases the benefits of participatory design methods and the encouragement of all disciplines to take part (Collective) in addressing the questions that human centered design often pose (Creativity).

10:00 Elevating Fusion Safety through Effective Collaboration between Academia and Industry

Nour Hammoud
Postgraduate Researcher
The University of Manchester

This presentation provides insights into collaborative project within the Fusion Centre for Doctoral Training (Fusion CDT), focusing on regulating tritium in fusion, addressing hazards, proliferation risks, accountancy, safeguard and export control. The presentation is divided into two parts. Part One offers an overview on the collaboration, emphasising the Importance of collaboration among academia, industries, government, and intergovernmental organisations. Part Two addresses challenges in skills and technology faced by the industry, highlighting ongoing activities aimed at resolving the issue and presenting recommendations.

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10:20 How Waste Management and the Development of Solutions needs Safety Case Input and the Benefits to Working Together using the Same Language

Dr Jane Caborn
Head of Waste
Westinghouse Electric Company

The presentation aims to discuss how waste management and the development of solutions needs safety case input and the benefits to working together using the same language. It is a case study for the development of SMART.

10:40 Panel Session Emerging Technologies need a New Approach to Safety - True/False?

Chair: Heather Phillips (CRA)
John Lovegrove (Canary Designs Ltd.)
Nour Hammoud (The University of Manchester)
Jane Caborn (Westinghouse Electric Company)

11:00 BREAK

DATA & DIGITAL IN THE RISK & SAFETY WORLD

11:15 Data-driven Multidisciplinary Safety aiming at Zero Fatalities in Safety-critical Industries

Dr Henry Tan
School of Engineering
University of Aberdeen

In his presentation Henry will explore Data-driven Multidisciplinary Safety aiming at Zero Fatalities in Safety-critical Industries

11:35 Artificial Intelligence for Doc2Data: Opportunities and Challenges

Dr Nassara Elhadji
Digital Engineering Delivery Lead, Senior Data Scientist
Assystem

Artificial Intelligence (AI) plays an increasingly crucial role in converting documents into actionable data, a process known as Doc2Data. This transformation presents significant opportunities for enhancing operational efficiency, reducing human errors and effort, and accelerate access to information. However, it also faces challenges such as variable document quality, multilingual and handwriting recognition, and privacy and regulatory compliance concerns. To harness the full potential of AI in this domain, understanding key technologies like

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Optical Character Recognition (OCR) and Natural Language Processing (NLP), along with best implementation practices, is essential.

11:55 Human Factors Assessment of Future Aviation Intelligent Assistants (AI)

Dr Barry Kirwan
Safety Research Manager
EUROCONTROL

Most current Artificial Intelligence systems in industry utilise Machine Learning (ML) AI approaches. In terms of The European Union Aviation Safety Agency (EASA) taxonomy of AI systems, these are largely 1A or 1B, augmenting human monitoring and control while the human is still very much in charge. In the 2030+ timeframe this is anticipated to change, with more advanced AI systems serving as Intelligent Assistants that can interact with humans (e.g. flight crew, air traffic controllers, airport staff) and in some cases can do the tasks with little human supervision (Levels 2A and 2B). This may extend to some AI systems which will largely 'take over' aspects of human roles and operate with human oversight and ability to take back control in extreme situations (3A), to those systems where the AI is fully in charge and the human cannot take over (3B).

A European project called HAIKU is exploring Human-AI Teaming (HAT) in six prototype use cases in four operational contexts: cockpit, remote tower, drone, and airport, where the level of autonomy is between 1B and 3A. One of the research questions concerns how to examine the impact on human performance and system safety when operating in these HAT configurations. An early attempt is being made to explore this, via a landscape of the key Human, AI and System factors in play, and application of an adapted task analysis approach and an associated HAZOP format for hazard identification and mitigation. These three elements of the prototype methodology will be presented and illustrated via two of the HAIKU use cases.

12:15 Human Reliability Analysis with Limited Data and the Role of AI in Risk Assessment

Edoardo Patelli
Civil and environmental engineering
University of Strathclyde

Edoardo will be presenting a collection of Artificial Intelligence (AI) tools and methodologies developed to tackle different challenges within the field of human reliability. The aim is to automatize the process, learn from data and support the task of human reliability experts.

12:35 Panel Session **Let AI Champion the Course of Nuclear Safety?**

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Chair: Robert Plana (Assystem E&I)
Henry Tan (University of Aberdeen)
Nassara Elhadji (Assystem)
Edoardo Patelli (University of Strathclyde)

13:00 LUNCH

SMR/AMR AND THEIR REQUIREMENTS FOR PROFESSIONALS

14:00 The FLEX reactor - Building a Credible Organisation to Deliver a Fit-for-purpose Safety Case

Andrew Steer
Head of Safety Case
MoltexFLEX

Presentation will give an overview of the FLEX reactor concept, describing how adopting an inherent and passive safety approach informs our development of the safety case. It will show how this brings the benefit of eliminating hazards via design and integrating safety from first concept, with requirements identification and management via claims development. Also, focussing on our strategy for establishing and building a credible organisation for developing the reactor design, producing a fit-for-purpose safety case, and regulatory engagement for licensing and deployment of the FLEX reactor. Building a capable and sufficiently resourced organisation is fundamental to MoltexFLEX's ambitions to deliver. It will illustrate the challenges and opportunities in mapping out the organisation's development from start-up to project delivery. The competition for resources in the nuclear industry is significant, meaning we have to stand out, be a great place to work, and explore different approaches to growing our capability from outside the established resource pool.

14:20 Newcleo's LFR-200 Reactor and our Approach to Addressing the Challenges in Safety Case Development for Novel Technology

Sophie Whitehead
GDA/ Safety Case project manager
Newcleo Ltd.

newcleo was launched in 2021 and is a UK-based privately owned and financed company driving innovation in the nuclear energy sector through deployment of their lead-cooled fast reactor technology. newcleo's first step in the UK is to deploy a 200MWe LFR-AS-200 first commercial (FCU) unit by the early 2030s. In this session, Sophie will provide an overview of newcleo's LFR-AS-200 reactor and road to deployment in the UK, with a focus on the novel aspects of the technology and how newcleo's approach, and in particular their integrated multi-staged R&D programme aims to address the challenges in developing a safety case for novel technology.

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14:40 X-energy: Building a Global Nuclear Safety Culture

Stephen Coates

Head of Operational Support (UK)

X-energy

The presentation will provide an overview of X energy, the Xe-100 reactor technology and TRISO X fuel. It will also introduce the concept of nuclear safety culture and how the INPO traits provide a framework for building the culture. Leadership behaviours will also be discussed. This will all be covered under the umbrella of managing risk and safety.

15:00 Panel Session

SMR/AMR Development - More or Less Professionals needed?

Chair: Jasbir Sidhu (CRA)

Andrew Steer (MoltexFLEX)

Sophie Whitehead (Newcleo Ltd.)

Stephen Coates (X-energy)

15:20 Poster Competition Results & Closing Remarks

Jasbir Sidhu

Managing Director, CRA

President, Nuclear Institute