

UK Project on Nuclear Issues 2020 Annual Conference

9–11 June 2020

Royal United Services Institute



PROLIFERATION AND NUCLEAR POLICY AT THE ROYAL UNITED SERVICES INSTITUTE

RUSI's Proliferation and Nuclear Policy Programme supports an informed and balanced debate on nuclear arms control, non-proliferation, and disarmament.

The programme produces detailed analysis and in-depth research on contemporary issues of international nuclear policy. It also brings together members of the global nuclear policy community for official dialogues and expert exchanges.

www.rusi.org/nuclear | nuclearreactions.rusi.org

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About the UK PONI Annual Conference

The UK PONI Annual Conference is the premier UK forum for supporting the emergence of new nuclear expertise from academia, industry, government, and the military. It provides participants with:

- A platform from which to discuss and debate new nuclear thinking
- A forum in which to meet nuclear specialists from a variety of fields
- A knowledge exchange between established and emerging nuclear thinkers

Please feel free to comment or debate today's proceedings on Twitter with the hashtag:



#UKPONI2020 @UKPONI





The UK PONI team is pretty much always doing something involving an Annual Conference. We start planning in the summer, as we work with that year's presenters on the conference papers; in the autumn we outline the programme, before managing the call for proposals and selection process through to the spring. All the pieces come together in the last two months, and the cycle begins again. We don't generally plan on contending with a global pandemic though, so I'm really happy that we've been able to quickly re-orient ourselves to put together what promises to be a great 10th Anniversary Conference.

We have some excellent talks from a range of emerging scholars and professionals lined up for you to enjoy, as well as contributions from more established members of the community. I'm particularly happy to welcome back three of our presenters from the first two UK PONI conferences, and you will see in your conference brochure that former UK PONI Directors have also provided some observations on the last decade. When circumstances allow, we will put together a proper celebration of the 10th Anniversary of UK PONI, to bring the community together to connect in person, but for now we are keeping the flame alive with probably our most ambitious conference programme yet.

As I trailed last year, I'm pleased to say that RUSI has now joined the Gender Champions in Nuclear Policy (GCNP) Initiative, under which we have committed to look at how we can improve our diversity and inclusion through the way we do our research and recruitment. Two of my team are also leading a new RUSI initiative, Rebalancing Expertise in Defence and Security (REDS), that will showcase the work of those groups underrepresented in defence and security, starting with those who identify as women.

For this conference, we have gender balance in our established expert speakers, and our emerging speakers came through an anonymised selection process designed to reduce unconscious bias. Further details on that can be found in this pack. We also aimed to have no single-gender panels, but unfortunately one emerging speaker has had to withdraw due to circumstances beyond their control and as a result we have fallen short. After some consultation, we felt it best to proceed as-is rather than artificially adjust the conference structure, but also wanted to reaffirm our commitment to improving balance in our programming. Further ideas from the UK PONI community are very welcome.

The last 10 years have seen UK PONI grow tremendously. Some may remember that its original scope was simply to run an annual conference; thanks to the generosity of our sponsors and the support of an increasingly engaged community, we have been able to do much more than that. We're unlikely to grow further in the next year or two, what with the economic impacts of the pandemic, but we will focus on making our programme more accessible by putting more of it online.

It's a difficult time for a lot of people right now, but the open and welcoming spirit of our community remains as vital as ever. That's down to all of you, and makes me really proud to be part of UK PONI. Here's to the next 10 years of connecting, learning and supporting – keep up the good work!

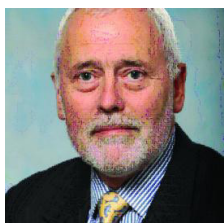


Tom Plant

UK PONI Director and Director of Proliferation and Nuclear Policy, RUSI

A Note From Our Past Directors

Commodore (ret'd) David Jarvis CBE (UK PONI Director 2010 – 2015)



In 2003 I snuck in the back of the first US PONI Capstone conference, run by the Center for Strategic and International Studies (CSIS). John Hamre, President and CEO of CSIS, had established PONI conscious of the fact that the peace dividend had resulted in a diminished focus on nuclear issues amongst the next generation, and that when the time came for big decisions, there was a danger that the leadership would have insufficient understanding to make informed choices.

I was so taken with the concept that I set up UK PONI. I initially sought sponsorship from the Ministry of Defence but that was not forthcoming so I turned to industry. It soon became clear that, while the idea had merit, it would not be fundable without a respectable independent body to give it a home. With the blessing of CSIS and the Ministry of Defence, RUSI agreed in October 2010 to be UK PONI's host, on the condition that all funding came from external sources.

My aim from the start was to provide a forum for young people to develop an understanding of the nuclear enterprise; to create opportunities for them to express and debate their views, and for those views to be discussed and challenged; for the community to develop lasting personal relationships, and most importantly, for people at all levels to continue their education in what is in reality a niche area.

After some gentle arm-twisting, industry coughed up enough for UK PONI to get started and the first conference was held in June 2011. Right from the outset, the principle was that all events were free at the point of entry, including the dinner after the annual conference, so that no one could be deterred from participating due to the cost; so sponsorship was vital, and still is, and I'm pleased to say that the list of sponsors continues to grow.

Now there are bilaterals, lunchtime seminars, roadshows, a blog, evening events and of course the annual conference. My fondest memories are of those; I remember the conference on HMS *President* when a good number of people felt seasick; I remember the MP who as the dinner speaker after a tad too much wine wouldn't stop talking or sit down; I remember Belinda Lang playing the Prime Minister in David Greig's play 'The Letter of Last Resort'; I remember when we played out a NATO summit considering a nuclear crisis with each table representing a country, and found that our Twitter feed took over and all debate was done through mobile phones – a foretaste?

I am immensely proud of what UK PONI has become and the role it has in the UK's nuclear enterprise. Many of our first young presenters are now in senior positions and beginning to shape our nation's future policy and direction – and I like to think PONI played a part in their advancements.

So, looking back over the first decade of UK PONI – did it make a difference? I think it did, I think it still does, and I think it will continue to do so for the next 10 years.

A Note From Our Past Directors

Andrea Berger, (UK PONI Director 2015 – 2017)



Dear participants,

It is hard to believe that it has been nearly a decade since I sat in on my first UK PONI conference. From the very start it was clear that this was a community that wanted a capable, informed and empowered cadre of specialists to guide its future. Participants cheered on young presenters, many stage-shy like myself. Experts who only moments earlier were complete strangers offered to be interviewed for my dissertation, share their own expertise and give career advice. One turned out to be my future boss.

UK PONI never stopped making its mark on my career. Whether helping with programme coordination or later serving as Director, I was constantly learning from members across the field, including from our sister programme in the US. Even to this day, ideas I first heard in UK PONI conference presentations, on subjects like the Indian submarine programme or muon scattering tomography, still inform my own work.

I learnt two other important things about UK PONI while involved in its organisation. First, so many of its members have reflections similar to my own stories about how UK PONI shaped their career or informed their thinking in one way or another. There is surely no better testament to the initiative's success than that.

Second, the UK PONI organising team never shies away from new and challenging formats. They held a conference on a boat on the Thames. They persuaded the Tricycle Theatre in Kilburn to stage a play on British nuclear decision-making. They introduced a blog, which briefly unleashed havoc on RUSI's web and editorial procedures. And they convinced 30 emerging specialists to be bussed around the UK nuclear complex, from Aldermaston to Barrow-in-Furness and onwards to Faslane. So while the circumstances driving the move to an online event this year are unfortunate, it is no surprise that the UK PONI team has adapted admirably.

The next 10 years will require further innovation. Some trend lines are already clear – from the emergence of new technologies, to shifting relations between nuclear-armed states and ailments in formal arms control. Others will be less expected. We will need new ideas and strong relationships across the nuclear community to understand, assess and overcome all of them. And we will need to devote renewed attention to the health and diversity of our field: the source of those ideas.

I know UK PONI will make important contributions to all of these efforts, and I am certain that the best is yet to come for the initiative.

Sincerely,

Andrea Berger

A Note From Our Past Directors

Professor Malcolm Chalmers (UK PONI Director 2017)



The original idea for UK PONI came from David Jarvis, inspired by the excellent example of CSIS PONI in the US. As Director of the RUSI Nuclear Programme at the time, I was delighted to offer RUSI as an institutional home for the new organisation, and subsequently to serve as its Director.

UK PONI has always had a unique identity and mission. We have sought participation from both the defence and civil sides of the UK nuclear establishment. We provide an important development opportunity for those working in our nation's nuclear industry as well as those in the earlier stages of government and academic careers. We are not afraid of vigorous – but always respectful – debate, believing that openness of thinking and a willingness to challenge conventional wisdom is more important than ever for those who will be taking on leadership positions in the years and decades ahead. We seek to demonstrate to all our members that they belong to a vigorous and growing national community of nuclear experts – playing a vital role in our nation's future, with all the responsibilities that this entails.

On its 10th anniversary, I would like to pay tribute to David Jarvis for both his inspiration and his sheer dogged determination in getting PONI up and running, and funded, through its critical early years. Without David, there would be no UK PONI today.

I would like to thank all our sponsors, both from the nuclear industry and from the UK government, for their continuing and reliable support over the years, and for their invaluable advice. RUSI has been lucky indeed to have such supportive partners in this venture.

Finally, can I thank Tom Plant, Sam Dudin, Lydia Wachs and Marike Woollard for their continued dedication and enthusiasm in supporting PONI. A particular thanks for their work in recent months in responding to the challenges – but also opportunities – posed by the pandemic.

Malcolm Chalmers

UK PONI and Diversity

RUSI and UK PONI are committed to advancing all dimensions of diversity. Accordingly, RUSI has [recently](#) become a member of the **Gender Champions in Nuclear Policy Initiative**. RUSI's commitment to the initiative involves taking substantive action to address some of the specific issues around gender equality in the nuclear policy field.

RUSI aims to:

- **Design and implement a hiring process that actively minimises gender bias in our recruitment practices**, taking an intersectional approach that aims to promote inclusion in the broadest sense across RUSI, led by our HR department. This will include measures around interview panel composition, approaches to shortlisting and interview scoring, and training of interviewers; language and targeting of job adverts; and increased emphasis on flexible working options. Process design and initial implementation is expected to have been completed within six months; further implementation, reinforcement and assessment of effectiveness is set to take place subsequently.
- **Improve our research methods and ensure diversity and inclusion in our research publications and outputs**. To do so, and with particular emphasis on RUSI's Proliferation and Nuclear Policy (PNP) programme, we will promote diversity and inclusion when partnering externally, adopt research methods that ensure the diversity of voices quoted, and where possible, ensure the diversity of authorship and peer review. Working with our Publications Research Editor, we will in our first six months collate best practice and develop realistic approaches to changing our existing practices. In the subsequent six months, we will focus on instituting and testing those measures with the aim of deploying them in all PNP projects within the year.
- **Set up Rebalancing Expertise In Defence and Security (REDS)**, an initiative to promote the work of women in the fields of security and defence, and to raise the profile of researchers and practitioners who identify as female in the security and defence space. We will aim to hold three events, physical or virtual, in our first calendar year; establish a dedicated webpage for REDS on the RUSI website within six months; and publish or otherwise feature on that website at least three articles by REDS participants in the following six months.

Conference Submissions for the UK PONI 2020 Annual Conference

In this context, UK PONI is determined to increase diversity of submissions and presentations at the UK PONI Annual Conference. This year, UK PONI received **41 proposal submissions for the Annual Conference**. These are more balanced in terms of gender and affiliation than last year:

Figure 1: Gender balance of conference submissions.

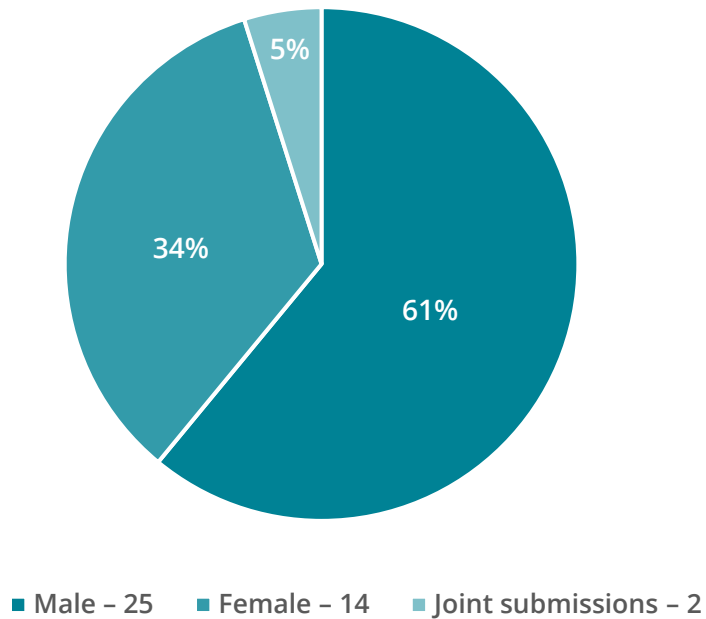
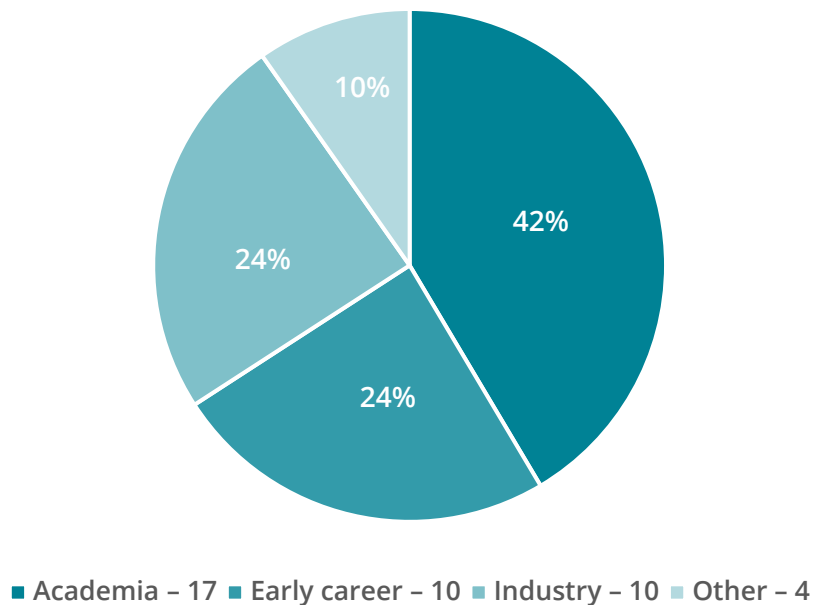


Figure 2: Affiliation of conference submissions.

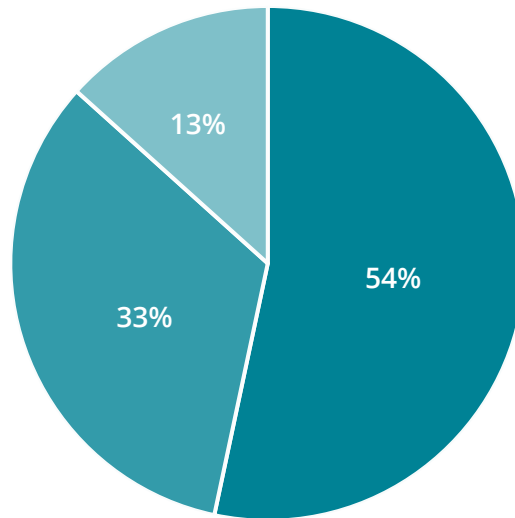


Selection of Presentations at the UK PONI 2020 Annual Conference

Conference presentations were selected using a blind process: the members of the selection panel (PONI team and the UK PONI Board of Advisors) did not know who had produced which proposal at the time that they made their recommendations. Each member of the panel allocated a fixed number of votes among the abstracts they felt worth putting through to the conference, and those abstracts that received six or more votes were accepted. This resulted in the acceptance of **15 proposals**, which maintained the balance of gender and affiliation we saw in submissions:

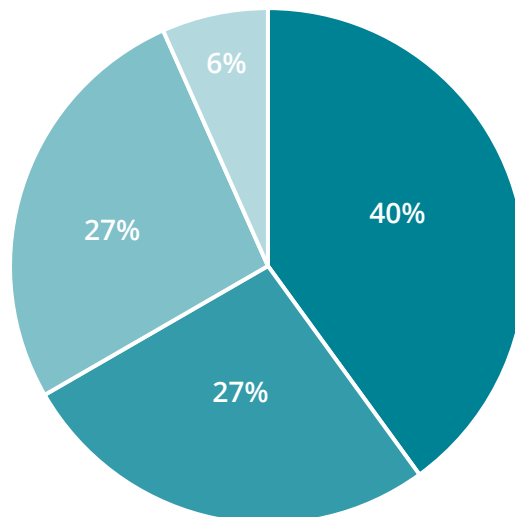
Figure 3: Gender balance at the UK PONI Annual Conference 2020.

*The decision on who would present joint proposals was left to the respective groups. In both cases, male presenters were selected to present.



■ Male – 8 ■ Female – 5 ■ Joint proposals* – 2

Figure 4: Affiliation of conference presentations.



■ Academia – 6 ■ Early career – 4 ■ Industry – 4 ■ Other – 1

Conference Programme

Tuesday 9 June 2020: Emerging Technology and Nuclear Proliferation

1300 – 1315

Introduction and Welcome

Tom Plant, UK PONI Director and Director of Proliferation and Nuclear Policy, RUSI

1315 – 1420

Panel One: AI, Cyber and Space

Chair:

Alexandra Stickings, Research Fellow, Space Policy and Security, RUSI

Speakers:

Jonathan Roberts, Graduate Systems Engineer, Lockheed Martin

Human vs. Machine: The Role of AI in Nuclear Weapons Systems

Contributors: Adam Tunbridge, Paul Neale, Jennifer Insley and Rebecca Desmond

Dr Charlotte Levy, Graduate Safety Engineer, Babcock
The Global AI Race and Strategic Balance: Which Race Are We Running?

Marina Favaro, Policy Analyst, BASIC

Cyber- and Space-Based Capabilities and Their Impact on Strategic Stability

Jaewoo Shin, Analyst, Open Nuclear Network One Earth Future

Implications of Real-Time Open Source Intelligence for Crisis Dynamics

1420 – 1430

Break

1440 – 1510

Panel One: Q&A

1510 – 1540

Break

1540 – 1700

Panel Two: Hypersonics and Technological Threats to Deterrence

Chair:

Tom Plant, UK PONI Director and Director of Proliferation and Nuclear Policy, RUSI

Speakers:

Alice Spilman, Researcher, BASIC and PhD Candidate, University of Birmingham

The Erosion of Traditional Nuclear Deterrence: How Technological Advancements Threaten the Managed System of Deterrence

Julia Balm, MA Candidate, King's College London,
Russian Hypersonic Boost Glide Vehicles: 'Boosting' Putin's National Security Strategy

Aaron Kennedy, Graduate Systems Engineer, Lockheed Martin

Hypersonic Missile Defence: Stopping the Unstoppable

Contributors: Jonathan Balakumar, Jacob Allen, Mark Hutchings and Daniel Cook

1700 – 1800

Keynote Speech and Q&A

Chair:

Tom Plant, UK PONI Director and Director of Proliferation and Nuclear Policy, RUSI

Speaker:

Dr Pippa Malmgren, Founder of H Robotics

Wednesday 10 June 2020:

Challenges and Solutions for Sustaining Nuclear Expertise in the Next Generation

1300 – 1445

Panel Three: Challenges and Solutions for Sustaining Nuclear Expertise in the Next Generation

Chair:

Cristina Varriale, Research Fellow, RUSI

Speakers:

Geoffrey Chapman, PhD Candidate, Centre for Science and Security Studies, King's College London

Back to the Future: Past Lessons on Sustaining Skills

Lorne Dryer, final year A-level student and incoming Politics and International Relations undergraduate

Setting the Perception, how do Policy and Media Affect the UK Nuclear Skills Pipeline?

Emily Enright, MA Candidate in International Conflict Studies, King's College London

Addressing the 'Leaky Pipeline': Taking the Temperature of the UK's Early-Career Nuclear Policy Cohort

Matt Korda, Research Associate, Federation of American Scientists

How Do We Get Young People to Care About Nukes?

1445 – 1545

Break

1545 – 1700

Panel Four: UK PONI Alumni Panel: Making Your Way in the Nuclear Field

Chair:

Professor Malcolm Chalmers, Deputy-Director General, RUSI

Speakers:

Fiona Barton, Engineering Manager – Core & CRDMs, Rolls Royce Submarines

Dr Matthew Harries, Senior Research Fellow, RUSI

Dr Heather Williams, Defence Studies Department and Centre for Science and Security Studies (CSSS), King's College London

1700 – 1800

Keynote speech and Q&A

Chair:

Tom Plant, UK PONI Director and Director of Proliferation and Nuclear Policy, RUSI

Speaker:

Izumi Nakamitsu, United Nations Under-Secretary-General and High Representative for Disarmament Affairs

Thursday 11 June 2020:

UK Nuclear Weapons and Euro-Atlantic Security

1300 – 1445

Panel Five: Nuclear Weapons, Nuclear Power, and UK National Strategy

Chair:

Sam Dudin, UK Nuclear Policy Research Fellow, RUSI

Speakers:

Artúr Hoñich, Dual MA Candidate, Sciences Po Paris and King's College London

Deployment of the W76-2: Strengthening Deterrence or Lowering the Threshold?

Ramesh Balakrishnan, MA Candidate, Carleton University, Ottawa

Euro-Atlantic Security and the UK's Nuclear Strategy in 2040: The Case for a Robust UK Missile Defence System

Dr Lyndon Burford, Postdoctoral Research Associate, Centre for Science and Security Studies, King's College London

Nuclear Deterrence – The Ghost Pillar of the NPT

Thomas P Davis, Director, Davis & Musgrove Ltd and PhD Researcher, University of Oxford

Playing the 'China Card': National Security Implications of the UK Hualong One Nuclear Power Station

Note: Unfortunately, this panel (which was originally mixed-gender) is now a single-gender panel due to participant withdrawals for unrelated reasons. We would not normally run a single-gender panel, but in this case we felt it would be more unfair to our emerging speakers to remove it from the programme than than it would be to proceed in reduced form. For more information on how UK PONI has sought to ensure diversity and inclusion in our conference planning, please see page 8.

1445 – 1515

Break

1515 – 1715

Yes...or No, Minister: A Disarmament and Security Policy Exercise

Exercise lead:

Dr Beyza Unal, Senior Research Fellow, International Security Policy, Chatham House

1715 – 1730

Break

1730 – 1740

Observations on proceedings

Tom Plant, UK PONI Director and Director of Proliferation and Nuclear Policy, RUSI

1740 – 1830

Closing Keynote Speech and Q&A

Chair:

Tom Plant, UK PONI Director and Director of Proliferation and Nuclear Policy, RUSI

Speaker:

Angus Lapsley, Director General Strategy and International, UK Ministry of Defence.

Biographies

Jacob Allen



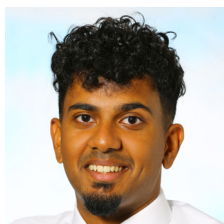
Jacob Allen is a Graduate Materials Engineer at Lockheed Martin. He is thoroughly enjoying the introduction to complex systems engineering and tackling multi-domain objectives across Civil Space and Vehicles programmes. His academic background is in Materials Science and he has an MSc from the University of Cambridge, where he investigated electro-thermal mechanical fatigue of nickel-based superalloys. His research interests include fatigue, fracture mechanics and the development of new materials for the increasingly harsh demands of aerospace.

Ramesh Balakrishnan



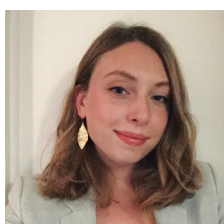
Ramesh Balakrishnan is an MA Candidate (International Affairs) at the Norman Paterson School of International Affairs (NPSIA), Carleton University, Ottawa, Canada. He was a Graduate Research Fellow at the Centre for Security, Intelligence and Defence Studies (CSIDS) at NPSIA for 2019–20. He is the recipient of the Baillie Gifford Fellowship (2014–15), the Lee Foundation Scholarship (2016–17) and the Joubin-Selig Scholarship (2019–20), and the Global Affairs Canada/Simons Foundation Canada Graduate Research Award (GRA) for Disarmament, Arms Control and Nonproliferation (2018–19). In summer 2019, he was a Research Fellow at the Rideau Institute, Ottawa and worked on a comparative study of the nuclear disarmament strategies of Canada, Ireland and Norway.

Jonathan Balakumar



Jonathan Balakumar holds a Masters in Systems Engineering from Loughborough University and completed an industrial placement year at Ransomes Jacobsen as a manufacturing intern, before joining Lockheed Martin as a Graduate Engineer. He has gained a wide range of experience and knowledge in various fields of study, including Civil and Military Space, Armoured Fight Vehicles, Mission Support and Internal Research and Design. The exposure he had to military space has sparked his interest in hypersonic vehicles and he is keen to broaden my knowledge and skills in this area.

Julia Balm



Julia Balm is an MA student at King's College London studying Non-Proliferation and International Security.

Biographies

Fiona Barton



Fiona Barton graduated from the University of Cambridge with a Masters in Engineering in 2008, before joining Rolls-Royce on an 18-month engineering graduate programme. Fiona then joined the Rolls-Royce Submarines business and spent six years in the Reactor Electrical Controls and Instrumentation (EC&I) department. Her first position was as an engineer providing support for in-service reactor sensors. Fiona then took up a Team Leader role responsible for the design of the EC&I system for the *Dreadnought*-class submarines. Between these roles, Fiona worked as a Technical Assistant to the President of the Submarines business for a year and represented Rolls-Royce and the UK at the World Nuclear University Summer Institute (2011, University of Oxford). Wanting to broaden her experience further, Fiona then moved to the Reactor Core Design and Manufacture department and worked in the Core Materials team for four years. During that time, Fiona worked on fleet safety justifications, materials research and manufacturing capability development. In May 2020, Fiona took up the position of Engineering Manager, responsible for the design and safety justification of reactor core components and CRDMs across the CADMID lifecycle. Fiona's involvement with UK PONI commenced with a presentation at the 2012 Annual Conference and has recently developed into heading up the RR UK PONI network and sitting on the UK PONI Board of Advisors.

Dr Lyndon Burford



Dr Lyndon Burford is a Research Associate at the Centre for Science and Security Studies, King's College London. He was an advisor to the New Zealand delegation at the 2015 NPT Review Conference and received the McElvany Nonproliferation Prize from the Center for Nonproliferation Studies, Monterey, for his essay on a user-pays model to fund international nuclear risk reduction. His research interests include the relationships between nuclear deterrence and disarmament and between the NPT and the TPNW. He has a PhD in International Relations, an MA in Political Science and a BA in Russian Studies.

Geoffrey Chapman



Geoffrey Chapman is a PhD student at King's College London and a Research Assistant at the Centre for Science and Security Studies. His thesis examines the role of tacit knowledge within Britain's nuclear weapons programme. His other research projects include examining the future of arms control and chemical weapons use in the Syrian Civil War.

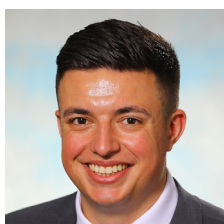
Biographies

Professor Malcolm Chalmers



Professor Malcolm Chalmers is Deputy Director-General of RUSI. His research is focused on UK defence, foreign and security policy. His recent publications have included studies on: Brexit and European security; the UK's Modernising Defence Programme review; prospects for, and implications of, a war in Korea; the UK and the North Atlantic; implications of Brexit for UK foreign and security policy; future nuclear threats to the UK; the 2015 Spending Review outcome for the MoD, FCO, Home Office, DFID and cross-government funds. In recent months, he led RUSI 'track 2' delegations to Taiwan and Russia; led the UK delegation to the Trilateral Nuclear Dialogue in Washington, DC; and was the only UK expert to participate in the consultation conference for France's Defence Review. Chalmers was a member of the consultative panel for both the 2010 and 2015 Strategic Defence and Security Reviews, and a member of the external advisory group for DFID's Building Stability Strategy. He also has been an Adviser to Parliament's Joint Committee on the National Security Strategy since 2012. He was a Visiting Professor in the Department of War Studies at Kings College London (2008–11). During 2006–2007, he was a Senior Special Adviser in the FCO to Foreign Secretaries Jack Straw MP and Margaret Beckett MP.

Daniel Cook



Daniel Cook is a Graduate Engineer at Lockheed Martin currently working on Armoured Fighting Vehicles. Prior to this, he has worked in a different department focusing on modelling and simulation which he first came to enjoy whilst studying for his Mathematics degree at the University of Hertfordshire. He developed a passion for this type of work during his time at university and has always wanted to explore areas of industry that are not well defined. Hypersonics provides the perfect opportunity to apply these traits and develop his ability.

Thomas P Davis



Thomas P Davis is the Director and Nuclear Engineering Consultant at Davis & Musgrove Ltd and a final-year PhD Researcher and Clarendon Scholar at the University of Oxford. He is also a Midshipman/Officer Cadet in the Oxford University Royal Naval Unit, Royal Naval Reserves.

Rebecca Desmond



Rebecca Desmond has been a Graduate Engineer at Lockheed Martin since 2018. She has an MEng in Aeronautical Engineering from the University of Brighton.

Biographies

Sam Dudin



Sam Dudin joined RUSI in February 2019 as their UK Nuclear Policy Research Fellow. His portfolio includes leading on UK PONI, the Trilateral Nuclear Dialogues, deterrence and UK nuclear weapons policy issues. Sam spent 10 years as a strategic analyst at Dstl working on a wide range of issues, including nuclear and conventional deterrence, ballistic missile defence, containment, sanctions, soft power, hybrid warfare, grand strategy, counter-piracy and non-combatant evacuation operations. He was also seconded to Defence Economics to lead the analysis for the Hutton review of analysis in Defence. His academic background consists of a BA in Philosophy, Politics and Economics from York, and an MA in War Studies from King's College London.

Lorne Dryer



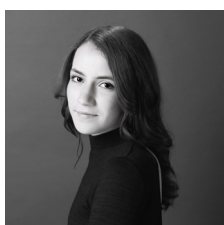
Lorne Dryer is a final-year A-level student, soon to begin a Politics and International Relations degree. He is also a recipient of the Arkwright Scholarship from the Nuclear Decommissioning Agency.

Emily Enright



Emily Enright is an MA Candidate in International Conflict Studies at King's College London. She is a Research and Administrative Assistant with the Centre for Science and Security Studies at KCL, and works on NPT and nuclear leadership issues. A former Australian civil servant, Emily completed her BA (Hons) at the University of Melbourne in 2018, and holds a Certificate in International Affairs and Strategy from Sciences Po, Reims. Emily's research interests include nuclear diplomacy and discursive practices; nuclear ethics; critical approaches to violence and security; and the politics of non-proliferation and disarmament.

Marina Favaro



Marina Favaro is a Policy Analyst at BASIC, where she manages the strategic risk reduction portfolio. Prior to joining the team at BASIC, Marina worked as a Security and Defence Analyst at RAND Europe. At RAND, Marina's research focused on space governance and technologies, cybersecurity and the impact of emerging technologies on society. Marina is experienced in futures and foresight methods including horizon scanning, scenario development and wargaming.

Biographies

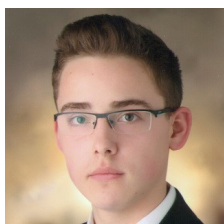
Dr Matthew Harries



Dr Matthew Harries is a Senior Research Fellow in RUSI's Proliferation and Nuclear Policy programme. He previously worked on the staff of the House of Commons Foreign Affairs Committee, managing inquiries on China and on skills development at the FCO, and later served as a Specialist Adviser to the Committee for its inquiry on 'Global Britain'. Before working in Parliament, he was Managing Editor of Survival and Senior Fellow for Transatlantic Affairs and Nuclear Policy at the International Institute for Strategic Studies (IISS).

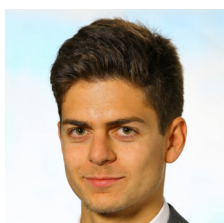
Matthew has worked as a Research Associate at the Centre for Science and Security Studies (CSSS) in the Department of War Studies at King's College London, and as an Adjunct Professor of Strategic Studies at the Johns Hopkins School of Advanced International Studies in Bologna (SAIS Europe). He has served as a Trustee of the Verification Research, Training and Information Centre (VERTIC) and as a member of the Board of Advisors to the UK Project on Nuclear Issues (UK PONI) at RUSI. He holds a PhD in War Studies from King's College London, and a First in Modern History and Politics from Christ Church, Oxford.

Artúr Hoňich



Artúr Hoňich is pursuing a Dual Master's Degree in International Security at Sciences Po Paris and King's College London.

Mark Hutchings



Mark Hutchings is a Graduate Engineer at Lockheed Martin and has previously worked the Ground Based Air Defence and Armoured Fighting Vehicle and Civil Space programmes. After graduating from Loughborough University in 2018 with a Master's Degree in Materials Engineering, he has been passionate about materials ever since. Hypersonic travel presents an extraordinary challenge, as the environmental conditions would destroy most materials in seconds. It is this exciting engineering challenge which has led him to this project, and he is looking forward to continuing to develop as a professional engineer at Lockheed Martin.

Jennifer Insley



Jennifer Insley is a Graduate Safety Engineer, working at Lockheed Martin since 2018. She has an MSc in Safety and Human Factors in Aviation from Cranfield University, and a BEng (Hons) in Aircraft Engineering from the University of the Highlands and Islands.

Biographies

Aaron Kennedy



Aaron Kennedy is a Graduate Engineer at Lockheed Martin. He has worked in numerous fields in the industry, such as Civil Space, Ground Based Air Defence and Armoured Fighting Vehicle's as well automotive vehicle testing during a placement year at Millbrook Proving Ground. He holds a Master's degree in Mechanical Engineering from Loughborough University, where he developed an interest in modelling and simulation projects. This led him to his current area of focus, modelling scenarios in the hypersonic regime, which he is keen to develop further skills in.

Matt Korda



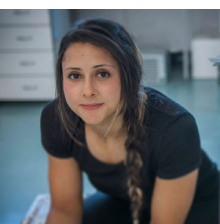
Matt Korda is a Research Associate for the Nuclear Information Project at the Federation of American Scientists, where he co-authors the Nuclear Notebook with Hans Kristensen. Previously, he worked for the Arms Control, Disarmament, and WMD Non-Proliferation Centre at NATO headquarters in Brussels. He received his MA in International Peace and Security from the Department of War Studies at King's College London, where he subsequently worked as a Research Assistant on nuclear deterrence and strategic stability. Matt's research interests and recent publications focus on nuclear deterrence and disarmament, progressive foreign policy, and the nexus between nuclear weapons, climate change and injustice.

Angus Lapsley



Angus Lapsley joined the UK civil service in 1991, working in the Department of Health and then the UK Representation to the EU, before serving John Major and then Tony Blair as Home Affairs Private Secretary. In 2017 he became the Director, Defence and International Security, leading on a broad range of areas including NATO, European defence and security, global security partnerships, counter-proliferation, arms control and arms exports. He also oversaw relations with the Western Balkans, Greece, Cyprus, Turkey and UK's positioning on EU foreign policy and defence. In 2018, Angus joined the Ministry of Defence as Director General Strategy & International. He is responsible for advising the Defence Secretary on Euro-Atlantic security policy, including the Defence implications of exiting the EU, multilateral and bilateral defence relations with the United States, NATO and European Allies and partners; leading the Department's strategic planning process; and leading MOD's contribution to the Government's prosperity agenda, including exports and industrial policy.

Dr Charlotte Levy



After completing an undergraduate degree in Applied Chemistry and a PhD in Physical Chemistry, Charlotte is now nearing the end of the Safety Engineering Graduate Scheme with Babcock International to see a transition into the industrial sector. Currently, she is working with the Test Team by assisting in the writing of automated software tests in Python. Previous placements over the past one and a half years have seen her work with various submarine projects based in Devonport, and a three-month secondment to work with the Submarine Portfolio Office in Abbeywood. Charlotte hopes to undertake a Probabilistic Safety Assessment role in the near future.

Biographies

Dr Pippa Malmgren



Dr Pippa Malmgren is founder of H Robotics and a RUSI Senior Associate Fellow. She founded the DRPM Group, which advises institutional investors worldwide on geopolitics and investments trends. She served President George W. Bush in the White House as Special Assistant to the President and had responsibility for financial market issues and terrorism risks to the economy after 9/11. She is currently a Non-Executive Board Member of the Department of International Trade in the UK and serves on the Drone/UAV Committee of The British Standards Institute. Dr Malmgren is ranked in the top 30 Most Influential Economists in the World and in the top 10 “Most Influential in Geopolitics”. She is the author of *Signals: How Everyday Signs Help Us Navigate the World’s Turbulent Economy* (2017), *Geopolitics for Investors* (2016), and *The Leadership LAB: Understanding Leadership in the 21st Century* in (2018). She often participates in the Pentagon’s scenario sessions with the Office of Net Assessment and regularly lectures at Sandhurst.

Izumi Nakamitsu



Izumi Nakamitsu assumed her position as the UN’s Under-Secretary-General and High Representative for Disarmament Affairs on 1 May 2017. Prior to taking on this post, she served as Assistant Administrator of the Crisis Response Unit at the UN Development Programme since 2014. She has many years of experience within and outside the UN system, most recently as Special Adviser Ad Interim on Follow-up to the Summit on Addressing Large Movements of Refugees and Migrants between 2016 and 2017. She was previously Director of the Asia and the Middle East Division of the UN Department of Peacekeeping Operations between 2012 and 2014, and Director of the Department’s Division of Policy, Evaluation and Training from 2008 to 2012. Born in 1963, Izumi holds a Master of Science degree in Foreign Service from Georgetown University in Washington, DC, and a Bachelor of Law degree from Waseda University in Tokyo. She is married and has two daughters.

Paul Neale



Paul Neale has a BSc in Physics from the University of Surrey with an Industrial Placement Year carried out at Dstl. Paul is currently on the Lockheed Martin UK Graduate Scheme as a second-year Graduate Systems Engineer.

Biographies

Tom Plant



Tom Plant joined RUSI in June 2017 as the Director of its Proliferation and Nuclear Policy programme and Director of UK PONI. Before joining RUSI, he was a Principal Specialist at the Atomic Weapons Establishment (AWE), where he was responsible for technical oversight of arms control verification research programmes, including collaborations and exchanges with counterparts in China, Norway, Sweden and the US. Prior to that, he held various posts at the Ministry of Defence and Foreign and Commonwealth Office, mostly focused on non- and counter-proliferation issues in East Asia and the Middle East. During this time, he spent a year seconded to King's College London as a Research Fellow, working on a UK-funded project in support of the International Atomic Energy Agency, and remains a Visiting Senior Research Fellow with the Policy Institute at King's. He holds a Master's in Natural Sciences from the University of Cambridge and a Postgraduate Certificate in Systems Engineering from Cranfield University.

Jonathan Roberts



Jonathan Roberts has a Master's degree in Physics from the University of Warwick. He is currently on the Lockheed Martin Graduate Scheme, working as a Graduate Systems Engineer since 2018.

Jaewoo Shin



Jaewoo Shin is an Analyst for Open Nuclear Network (ONN), a programme of One Earth Future, based in Vienna, Austria, where he focuses on developments on the Korean Peninsula and Northeast Asia, with particular attention to nuclear risk reduction and regional nuclear and missile programmes.

Alice Spilman



Alice Spilman is a first-year PhD Candidate at the University of Birmingham looking at the concept of responsibility in the nuclear sphere. Alice is also a Researcher at the British American Security Information Council (BASIC), working on the Programme on Nuclear Responsibilities. Other research interests include security dilemmas and the role of perception, trust and empathy in managing security dilemmas and nuclear diplomacy.

Biographies

Alexandra Stickings



Alexandra Stickings is Research Fellow for Space Policy and Security within the Military Sciences team at RUSI. Her research interests include military space, space warfare, counterspace capabilities and international space programmes. She has published on space topics for RUSI Newsbrief, RUSI Defence Systems and RUSI Commentary, and regularly contributes to the media, including the BBC, Channel 4, ITV and Deutsche Welle. Alexandra holds an MSc in International Security and Global Governance from Birkbeck College, University of London, a BA (Hons) in International Studies from the Open University, and a BSc (Hons) in Physics with Astronomy from the University of Nottingham. Prior to joining RUSI, she worked in a variety of fields including central and local government, as well as the private sector.

Adam Tunbridge



Adam Tunbridge is an Engineering Graduate working for Lockheed Martin since 2018, currently in an Integration and Test role. He has an MEng in Mechanical Engineering from the University of Portsmouth.

Dr Beyza Unal



Dr Beyza Unal is a Senior Research Fellow with the International Security programme at Chatham House. She specialises in nuclear policy, cyber security, space security, and NATO's defence and security policy. She formerly worked in the Strategic Analysis Branch at NATO Allied Command and Transformation, taught International Relations, transcribed interviews on Turkish political history, and served as an international election observer during the 2010 Iraqi parliamentary elections. Dr Unal's current research interest is in emerging technology applications and security in the Middle East. Dr Unal also conducts research on urban preparedness and city resilience against CBRN threats. She has been given various fellowships for her achievements – most notably, she is a J William Fulbright Alumni. She has also received funding from the US Department of Energy to participate in workshops in Brookhaven National Laboratory, the James Martin for Nonproliferation Studies, and Sandia National Laboratories.

Biographies

Cristina Varriale



Cristina Varriale is a Research Fellow in Proliferation and Nuclear Policy at RUSI, where she focuses on North Korea's WMD programmes, North/South Korea relations, US extended deterrence in East Asia and disarmament diplomacy in the NPT. Prior to joining RUSI 2016, she worked in nuclear policy and research with the International Centre for Security Analysis (ICSA) and with the British American Security Information Council (BASIC). She has also been a contributor at IHS Jane's, producing open-source research on historical and current nuclear programmes. Cristina holds an MA in Non-Proliferation and International Security from King's College London. She was also part of the 2018 Nuclear Scholars Initiative at the Center for Strategic Studies in Washington, DC, and regularly contributes to prominent media outlets such as BBC World News and Sky News.

Dr Heather Williams



Dr Heather Williams is a Lecturer in the Defence Studies Department and Centre for Science and Security Studies at King's College London, and an Associate Fellow at the RUSI. Dr Williams served as a Specialist Advisor to the House of Lords International Relations Committee inquiry into the Nuclear Non-Proliferation Treaty and Disarmament. She is also an adjunct Research Staff Member at the Institute for Defense Analyses in Virginia, where she has worked since 2008 on US nuclear policy for the US Department of Defense. She currently leads projects on the impact of emerging technology on deterrence, the future of arms control, risks of social media to conflict escalation, and the Nuclear Non-Proliferation Treaty. Her most recent publication is 'Asymmetric Arms Control and Strategic Stability: Scenarios for Limiting Hypersonic Glide Vehicles', *Journal of Strategic Studies* (Vol. 42, No. 6, 2019).

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For almost 70 years, AWE has supported the UK government’s nuclear defence strategy and the Continuous At Sea Deterrent by researching, designing, manufacturing and assuring the nation’s nuclear warheads. AWE also uses its nuclear know-how and technical expertise to provide innovative solutions that support the UK’s counter terrorism and nuclear threat reduction activities. AWE’s mission is unique and so are its people. AWE works to attract, motivate, develop and retain the best talent and equip its people with the right skills for the future. AWE is a team of more than 5,000 people – proud to be part of such an important mission and proud of their responsibilities to their customer, the Ministry of Defence, and their shareholders. AWE aims to build enduring relationships with their government customers, international partners, suppliers and communities in the locations where they operate. AWE was named as one of the top Best Big Companies to work for at the Sunday Times Best Companies Awards in 2019.



Lockheed Martin UK, headquartered in London, is the UK-based arm of Lockheed Martin Corporation. Lockheed Martin UK specialises in the development, integration and sustainment of advanced technology systems, products and services. The company employs approximately 2,000 people in the UK across more than 20 sites, working on a wide range of major programmes spanning the aerospace, defence and civil sectors.

For more than 50 years, the US and the UK have worked closely on submarine-based strategic deterrence. Lockheed Martin plays a key role, working through the US Navy to supply the Trident II D5 missile to both nations for this mission. Lockheed Martin UK supports this mission in a multitude of roles across sites in the UK including HMNB Clyde, Bristol, Plymouth and Ampthill, as well as through its shareholding of AWE Management Ltd and partnership in the ABL Alliance managing the Royal Naval Armament Depot (RNAD) at Coulport.

UK PONI is also supported by:



UK PONI Code of Conduct

UK PONI UK Project on Nuclear Issues

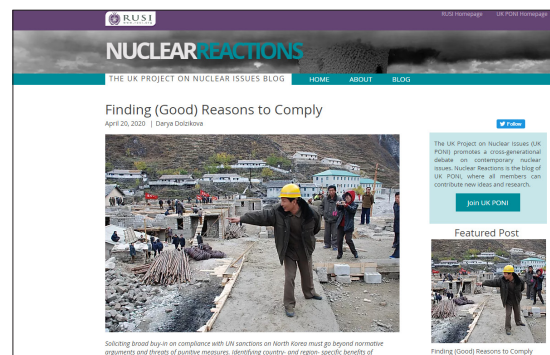
UK PONI serves to promote debate and discussion on a wide range of nuclear issues, some of which could be contentious. While the views of all members are welcome, it is vital that these are expressed in a courteous and considerate manner. This is especially true for UK PONI, whose objective is to encourage a next generation of nuclear experts to engage with these discussions, and whose events often feature young speakers.

Conduct not welcome at UK PONI events therefore includes, but is not limited to: repeated interruptions of the moderators or presenters; the use of derogatory language or personal comments; discrimination of any form; misrepresenting the original work of another as one's own; and the intimidation or harassment of UK PONI members or staff.

Should a member engage in any of these forms of conduct or others which undermine courteous dialogue and debate, then the Director of UK PONI – or in the event of his/her absence, a member of the organising team – shall be empowered to prevent admission to an event, seek the removal of a person(s) from an event, and prevent admission to future events.

In addition, the Director of UK PONI shall be permitted, in consultation with the UK PONI Board of Advisors, to withdraw the membership of any member should she/he feel that such a step is warranted. This decision can be appealed in writing to the UK PONI Board of Advisors, as is detailed in the UK PONI Operating Principles which are available at www.rusi.org/ukponi.

A copy of this code of conduct shall be available in print form at all UK PONI events.



The programme produces detailed analysis and in-depth research on contemporary issues of international nuclear policy. It also brings together members of the global nuclear policy community for official dialogues and expert exchanges

www.rusi.org/nuclear

nuclearreactions.rusi.org

Further Information

Please read this document carefully as it contains important information regarding the conference.

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REGISTRATION AND GENERAL INFORMATION

- As the conference will be taking place online this year using Zoom Webinars, please ensure you have registered via the RUSI website for the days of the conference you would like to attend.
- The links for the conference will be sent out to registered attendees the day before the conference.

CONFERENCE CRITIQUES

- A questionnaire through which delegates can provide feedback on the conference will be distributed after the event via email. We would be most grateful if you could take a few moments to complete the form. Your comments are invaluable, and are an excellent tool by which we can evaluate the quality and utility of our event.

QUESTIONS

- We are keen to encourage discussion in this event, and the chair will attempt to make the discussion sessions as vibrant as possible.
- To ask a question, write your question in the Q&A box on Zoom, stating your name, affiliation and which panellist your question is for. The moderator will approve or decline the question, and approved questions will then be visible for all attendees to view.
- Attendees will then be able to vote for the questions they would like answered. The chair will then decide which questions to ask the panellists, and how they should be framed.
- Please remember to keep your questions clear and concise.

DOCUMENTATION

- Presentations which we have the permission to release will be available on the RUSI website after the conference.

DISCLAIMER

- The information contained in the presentations for this conference is the opinion of the speakers. It is not that of RUSI, and RUSI does not accept responsibility for the content of the papers.
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About UK PONI

The UK Project on Nuclear Issues

The UK Project on Nuclear Issues (UK PONI) is a cross-generational network of over 1,000 members, which encourages young scholars and professionals to engage with established experts on contemporary nuclear issues.

UK PONI was established in order to address the growing shortage of nuclear skills in the UK. Over the coming decades, the UK is likely to maintain both military and civilian nuclear programmes. The issues surrounding nuclear weapons and nuclear energy are complex and multifaceted, and successive generations will be called upon to understand and manage them. Stakeholders from industry, the military, government and academia must therefore collectively foster the emergence of a next generation of nuclear experts and build a broad knowledge base, from technical intricacies to international security dynamics. The project aims to promote this next generation of nuclear expertise, by establishing a forum where emerging and established specialists can exchange knowledge and develop fresh thinking on a range of contemporary nuclear issues.

Membership of UK PONI:

- UK PONI promotes an informed and diverse dialogue among its members with an annual series of seminars, conferences and field trips across the UK and internationally, covering priority nuclear issues in the civil and military nuclear domains.
- Each year, it invites emerging experts to present their research and ideas to an audience of established members of the UK nuclear community at its Annual Conference, and convenes a bilateral conference together with US counterparts at the Center for Strategic and International Studies.
- As part of a network established by the Center for Strategic and International Studies in Washington, DC, UK PONI gives its members the opportunity to be part of a recognised international network of emerging nuclear specialists.
- To ensure the widest possible participation from young audiences, UK PONI relies upon the generous support of industry, government and academia to deliver these services free of charge at the point of delivery.

To join UK PONI and receive updates on the latest activities and events please sign up at:

www.rusi.org/UKPONI

For more information on the project, please contact:

Sam Dudin | SamD@rusi.org

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To join and find out more, visit www.rusi.org/ukponi | www.nuclearreactions.rusi.org

Featured Artwork



MM-W76-FTLP-012017, Michael Mulvihill, 2017

Bronze sculpture in two sections 4 x warheads made of ceramic (smoke glazed), wood, 3D printed in plastic coated with charcoal, lacquered waney edge ash base with brass legs. Dr Michael Mulvihill is a co-Investigator of the Arts and Humanities Research Council (AHRC)

funded Turning Fylingdales inside out: making practice visible at the UK's ballistic missile early warning and space monitoring station run by The School of Geography Politics and Sociology at Newcastle University, and in collaboration with RAF Fylingdales and English Heritage.