Starting the **NTR-Net** activity with a programme for Doctoral Training

NTR-Net was officially announced at **NuFor 2023** as part of a major showcase of UK research and development to support **nuclear threat reduction (NTR)** efforts, nationally and internationally.

NuFor
Nuclear Forensics

1–3 October 2024
Core Technology Facility,
University of Manchester, Manchester, UK
and Online

University of BRISTOL

AWE

NTR network

- The UK Government has a strong desire to see enhanced academic work to address national security priorities including counter terrorism and non-proliferation.
- NTR Network and its **Centre for Doctoral Partnership (CDP)** will provide capabilities to solve key science and technical issues of national and international importance.
- **£5M** committed via the AWE from the MoD and Home Office covering the initial **5 years** of activity. First PhD cohort started in **September 2023**, with **annual summer school** with **training exercises** from 2024.
- Opportunity to **jointly fund** PhDs and for students from other Universities to be affiliated to the CDP

Professors Tom Scott, Simon Middleburgh and Paul Sellin

NTR-Net Academic Partners

And other
Universities will become partners……

The challenges regarding nuclear threat reduction.

- Ensuring the UK, as well as global partners, have **robust** and **reliable capabilities** and **expertise** to address future nuclear security challenges is essential, including from potential nuclear terrorism or non-compliance with current or future Treaty obligations.
- Key scientific challenges remain in areas of **nuclear arms control verification, nuclear detection** and **nuclear forensics.**
- Work on arms control verification also plays a central role in fulfilling the UK obligations to the N**uclear Non-Proliferation Treaty** and the desire to work towards a nuclear weapon free world.
- Science and engineering research activities also include **transmutation science**, **passive and active detection** systems, **data handling** and **isotope verification**, plus many others…

Nuclear Threat Reduction

Thematic Research areas:

Detection Science

R&D into standard and novel techniques to detect, locate, image, and identify radiological and nuclear materials.

Nuclear Forensics

The investigation, exploitation, and analysis of nuclear material incorporating the IAEA definition

Treaties

R&D in support of nuclear treaties monitoring and arms control verification research.

Legacy Materials

R&D supporting the security and protection of nuclear and radiological materials

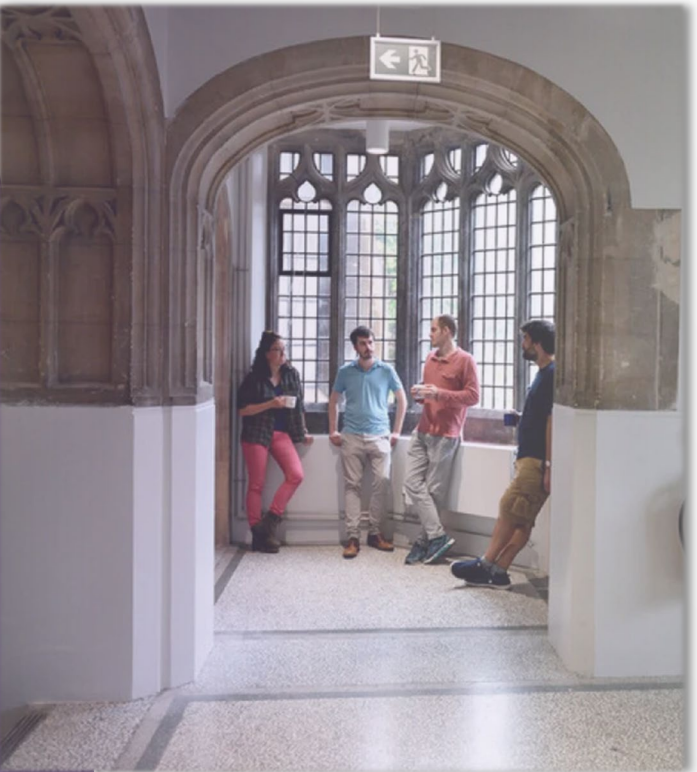
Policy

Investigation and discussion of policy for science and science for policy pertinent to NTR.

Creating a pipeline of skilled people to support our national capability and preparedness.

- NTR-Net PhD students will have access to modules from the **TITAN training programme.**
- Annual NTR-Net Summer School and other ad-hoc sessions will include:
  - Thematic teaching for widening cohort expertise outside of their immediate project areas
  - Technical NTR training & field exercise using the SIM source
  - Media & engagement training
  - Policy primer – engaging politicians, elevator pitch
  - Science communication, including making a podcast
  - Working in teams, and team roles
  - Cohort building activities
  - Table-top simulated JAM exercises
- CDP students will be prepared to become advocates for NTR

Making links with international partners



- NTR–Net will need to link with relevant international partners in order to **coordinate training and research** as well as sharing important **information** and **capability**.
- NTR–Net will link with recently established equivalent networks in the **USA** (x3) and **Canada** (x1), with similar activities being established in **Australia**.
- NTR–Net will also link with efforts coordinated by the **IAEA** and **JRC (EU),** to ensure we are regionally connected and strategically engaged.
- For example, at WMS 2025, there will be an NTR side meeting with US Universities, and a joint training activity in the following week in Nevada.

We want staff and students from universities, industry, national laboratories and government departments to collaborate and get involved.

Join the NTR-Net mailing list and receive:

- Funding calls
- Technical updates
- News, upcoming events and other opportunities

ntr-net.uk

info@ntr-net.uk

Questions?

t.b.scott@bristol.ac.uk
Peter.martin@bristol.ac.uk

What will NTR-Net do?

Research

- Pilot Projects Low cost ideas generation
- PhD level research grants
- Rapid-access grants High impact opportunism

Skills & Training

- Undergraduate placements - YII
- PhD Training CDT
- Post-grad placement
- Post-doc Knowledge Transfer grants

Communications

- Thematic Conferences
- Focussed Workshops and training exercises
- Special Publications
- Media Slack, Website, Training series, YouTube channel

NTR-Net Partners

As a partner, you will enjoy

- Access to HMG funded studentships
- Access funds
- Enhanced training for your students
- Recognition
- Tailored activities
- Work with other partners

19 CDP PhDs

Small projects

Training

National Impact Network

Conferences and workshops

Networking

As a partner, we ask of you

- Contribute matched funding
- Sign up to T&Cs
- Contribute to
- Support network and research grants
- Steer and shape

What, specifically, is nuclear forensics?

- Following a nuclear security incident, the UK Government and investigating authorities need to know **what** the material in question is, and an assessment of its **provenance**.
- The **collection**, **analysis** and **assessment** of nuclear materials following such an incident is commonly referred to as nuclear forensics.
- Nuclear forensics may include **comparative analysis** from multiple potential crime scenes, as well as an understanding of the use of nuclear materials in various processes.
- This requires a wide range of **analytical** and **material science capability**, and **knowledge**, relevant to nuclear materials.
- A key question is whether the material is consistent or inconsistent with UK holdings, past and present.

What, specifically, is detection science?

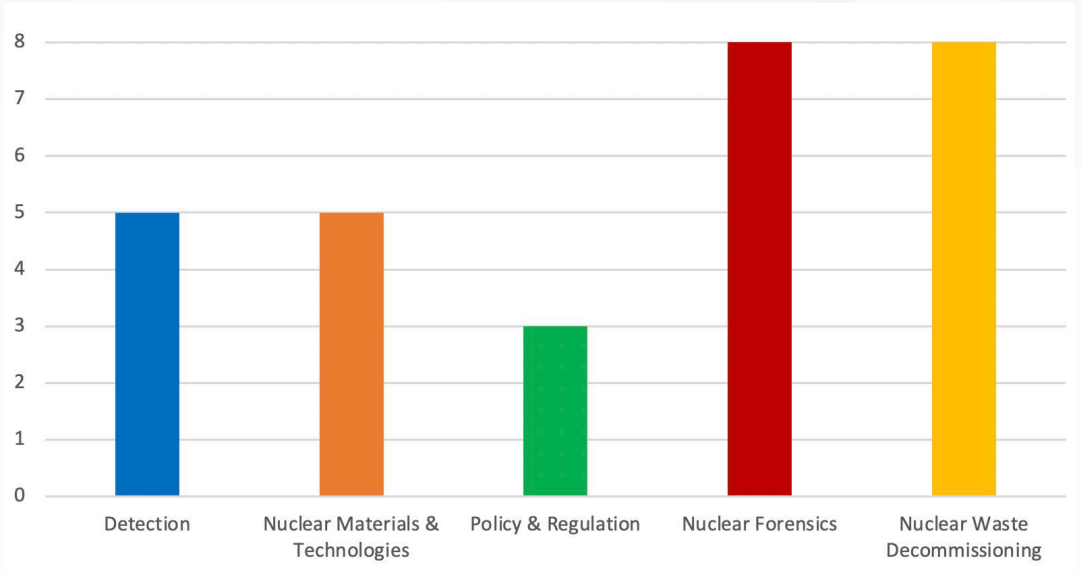
- Nuclear detection and readout techniques are the foundation of **particle physics**, **nuclear physics**, and **particle astrophysics**, but 'detection science' is also important for **nuclear security** and **safety** applications, for the detection and alerting of **threat objects** which emit radiation.
- Evolving/continuing from the STFC-funded NuSec activity, the NTR-Net activity in detection science will seek to **optimise** and **extend the capability** of existing nuclear detection technologies.
- It will also seek to **develop and validate** next generation detection systems to provide **enhanced capability** for the UK and its partners.
- This is a **broad church** of activity, from detection materials through to the use of AI for anomaly detection and rapid data interrogation

NTR Demographics

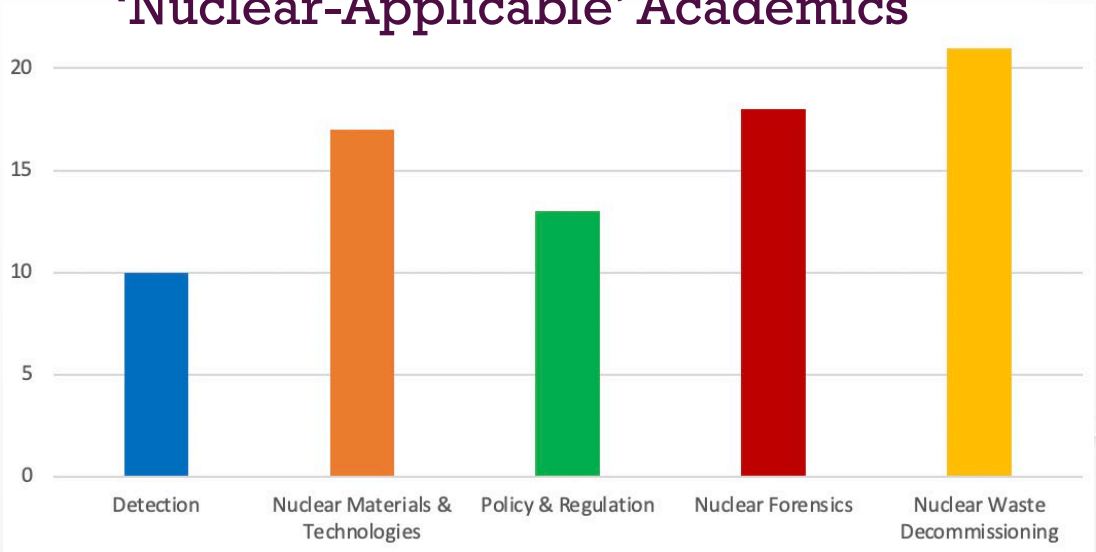
We asked the community where their NTR research interests reside:

- Radiation Detection
- Nuclear Materials and Technologies
- Policy and Regulation
- Nuclear Forensics
- Nuclear Waste & Decommissioning

NTR Academics



'Nuclear-Applicable' Academics

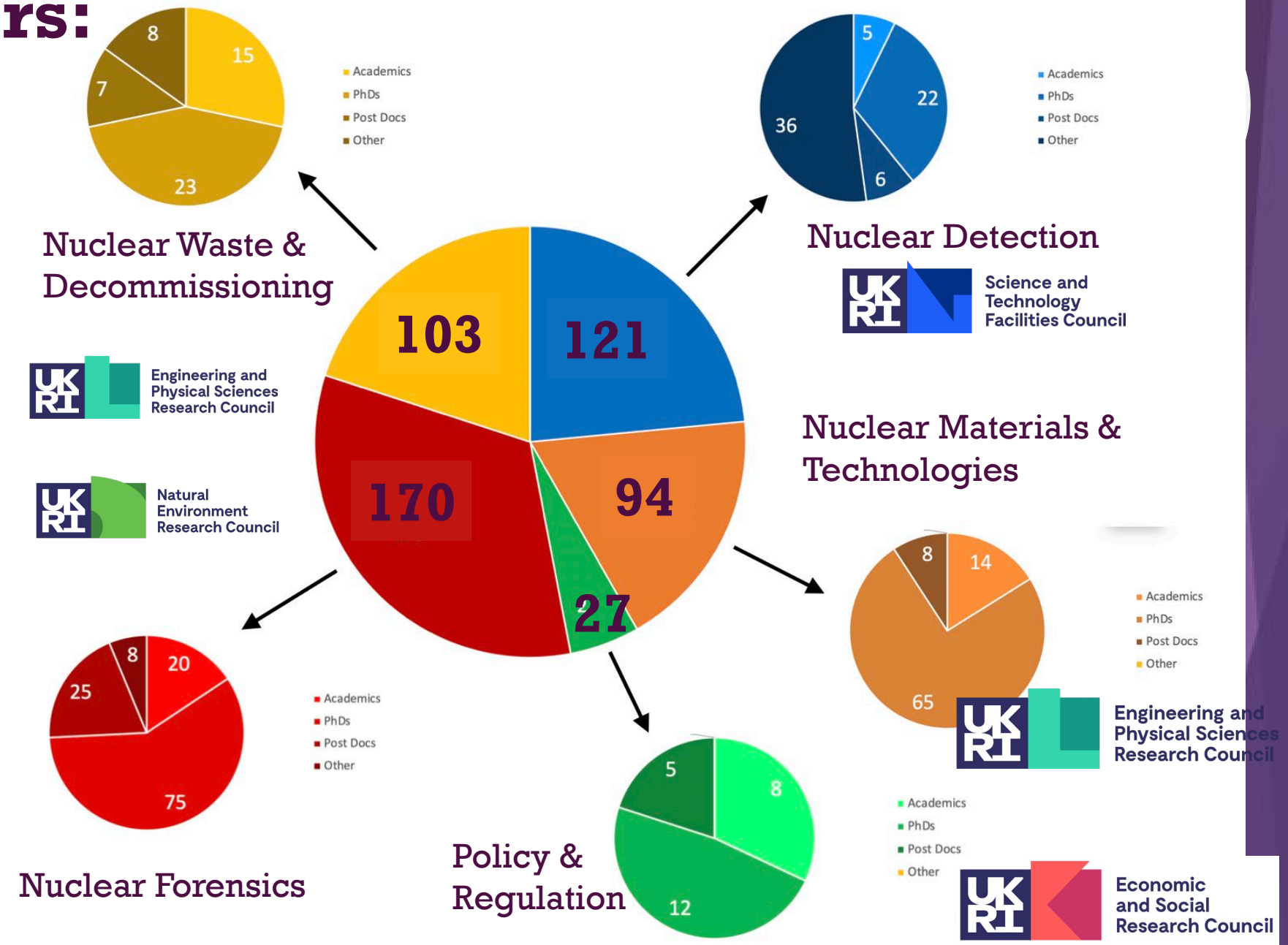


NTR Researchers:

- Out of those who said one or more of the following NTR themes formed part of their research group, the total combined researchers for these themes is given in no. people, with a breakdown of no. Academics, PhDs, Post Docs and Other given.

- 'Other' includes general scientists and software engineers.

NB - Total number in breakdown may not equal the total number for the theme as not all respondents gave a breakdown



Preparing for NTR Net

We have an existing UK community with the capability for further growth.

- NTR landscaping report prepared with the AWE, with input from DNO. Sign-off in early 2022 and shared with **CSA Nuclear**, MoD, the Royal Society and BEIS.
- Prior landscape verification work formed part of the case and evidence base for funding the NTR network, via UKRI and MoD.
- The aims and objectives of the network, including its research and priorities, have been **shaped and agreed** by the AWE/DNO with the academic grouping.
- **Timing** – This network is **urgently wanted and needed** by DNO/MoD and will nicely build from the end of the STFC's NuSec Network (which is more limited in scope).

Science and Technology Facilities Council