Knowledge Mobilisation for the NIHR Health Protection Unit in Chemical and Radiation Threats and Hazards

1. Background

The Health Protection Unit (HPRU) in Chemical and Radiation Threats and Hazards (CRTH) is led by Imperial College London in partnership with Public Health England, King's College London and MRC Toxicology Unit, Cambridge. The four research Themes integrate basic science, molecular and cell biology and large-scale population studies.

Theme 1 "Adverse outcome pathways and exposure-response relationships for ionising and non-ionising radiation" will improve understanding of the health impact of exposures to natural and man-made sources of radiation, including cancer risks near nuclear installations, from using telecommunications (mobile phones and police radios) and the role of ionising radiation and ultraviolet light in cardiovascular disease.

Theme 2 "Biomarkers of exposure, effects and susceptibility to chemicals and radiation" will enhance understanding of how chemical and radiation exposures cause disease by studying molecules found in blood or urine (biomarkers) that tell us about contact with specific agents. We will study exposure biomarkers of ionising radiation used in healthcare (e.g. CT scans), common man-made chemicals (e.g., flame retardants, organophosphates, persistent organic pollutants) and chemical exposures near landfill sites.

Theme 3 "*In vitro* testing and integration with epidemiological data" will deliver new knowledge on how chemicals damage cells (human or the micro-organisms that live within us) to cause disease. We will apply this learning in two real-world settings: reproductive health near landfill sites and long-term health among workers exposed to radiation.

Theme 4 "Neurotoxins and high toxicity agents" will investigate novel highly toxic chemicals, how best to protect people from the effects of these agents (including decontamination after contact) and how to remove them from the environment. This will include study of household mould, chemicals in drinking water and chemical warfare agents.

A key function of the Knowledge Mobilisation Team will be to take these new data to application. This strategy outlines our approach to mobilise knowledge generated by the HPRUs, and to developing expertise and establishing a culture in partner organisations to improve their capacity to draw on research evidence.

2. Knowledge Mobilisation Definition

Knowledge mobilisation brings together different communities to share knowledge to catalyse change. Knowledge mobilisation is a two-way process which enables advances in health protection research to create benefits for patients and the public by supporting research informed decision-making by policy makers, public health practitioners, the public, and other stakeholders.

Effective knowledge mobilisation involves:

- Facilitation of engagement of researchers with the policy, practice, research and public communities where their research can make a difference.

- Enabling policy, practice, research and communities to have a role in the devising of research questions, to ensure they address important questions in a useful way.
- Enabling researchers to influence decision-making processes in policy, practice and elsewhere through having a 'seat at the table' alongside other approaches to dissemination
- Increasing understanding of research limitations and uncertainties, among those who can use research findings.
- Transferring useful knowledge from other sources to the HPRU.

This strategy outlines our approach to mobilising knowledge generated by the HPRU, and to developing expertise and establishing a culture in partner organisations to improve their capacity to draw on research evidence.

An introduction to the evidence base for knowledge mobilisation is given in Appendix 1.

3. Knowledge Mobilisation Aims

This tailored strategy for the HPRU has evolved from the pan-HPRU KM strategy. It has drawn on:

- research and experiential knowledge of effective knowledge mobilisation strategies

- discussions with HPRU-CRTH affiliated academic and PHE colleagues

- discussions with KM leads from other HPRUs

- the HPRU-CRTH Forward Business Plans

Accordingly, the three aims agreed with the HPRU directors are:

1. Undertake effective knowledge mobilisation activity appropriate to the area of research;

2. Increase knowledge mobilisation skills and capacity;

3. Contribute to the evidence base for effective knowledge mobilisation.

These will be achieved by integrating knowledge mobilisation in the HPRU. Specifically, it will be built into research training for students also engaging their supervisors, management of post-doctoral research activity, in projects led by senior staff, and in HPRU-CRTH management and monitoring processes through management meetings.

4. Capacity building and training for knowledge mobilisation
Internal HPRU knowledge mobilisation

The HPRU Knowledge Mobilisation Team will work with Theme leads and/or designated researchers within each Theme to support the effective planning, implementation and documentation of knowledge mobilisation activities.

Most learning across students, post-doctoral researchers and senior staff will come from undertaking supported knowledge mobilisation activity. This will include placements to work within partner institutions and settings where appropriate, to achieve mobilisation of our research findings and develop capacity in knowledge mobilisation for the HPRU-CRTH researchers and staff in that setting.

Additionally, specific learning needs related to knowledge mobilisation will be elicited at induction and subsequently, and supported on an individual basis and as a group as appropriate. It is expected that many learning needs requiring specific training will be shared across HPRUs and delivered collaboratively through developing resources in the knowledge mobilisation network.

Public Health England (UK Health Security Agency) front line staff and other local staff

We will engage with potential users and front line staff to disseminate knowledge generated through workshops and iterative development of tools and interfaces to increase their capacity to guide and use our work. This will include active collaboration with other HPRUs where our approaches apply, and with groups and individual staff in Public Health England. We will also engage with other researchers and research users nationally and internationally given the general relevance of the intended research. This will include an open approach to HPRU-CRTH membership allowing supported use of tools and participation in workshops.

Participation in the pan-HPRU Knowledge Mobilisation network will iteratively develop a knowledge mobilisation framework for health protection incorporating learning across the area. Use of online-training resources in knowledge mobilisation accessible across the HPRU network.

This will include (i) sharing our learning of what works and what are the challenges in knowledge mobilisation, (ii) learning from knowledge mobilisation approaches, experience, and evaluation of other HPRUs, (iii) jointly identifying learning needs and developing training materials and events, and (iv) participating in joint knowledge mobilisation initiatives as appropriate.

Knowledge mobilisation across HPRUs

The Knowledge Mobilisation Team will facilitate the transfer of knowledge between the HPRUs to further research. This may include activities such as arranging and chairing meetings in areas where the Knowledge Mobilisation Team considers there may be benefits from collaboration. The Knowledge Mobilisation Team will continue to monitor calls for research and make members of the HPRU aware.

The Knowledge Mobilisation Team will liaise with other Knowledge Mobilisation Teams to similarly share knowledge and identify opportunities for collaboration across the HPRUs.

Knowledge mobilisation collaborations among wider Public Health England/UK Heath Security Agency staff and academic researchers is critical. This will include: development of relationships to support joint working in the area, engaging PHE/UKHSA stakeholders in framing the research questions addressed so that results will fit to policy and practice needs, and researcher input into policy and practice innovation and planning informed by research findings and expertise. PHE/UKHSA Knowledge and Evidence teams (e.g. Library Services, Evidence & Evaluation team etc.) have committed to collaboration with HPRUs to mobilise HPRU generated knowledge across PHE and a similar relationship is planned with these functions evolving in the National Institute of Health Protection.

Effectiveness in this area of strategy will be evidenced by new collaborations and projects that otherwise might not have been recognised and the application of knowledge without regard for boundaries.

5. Engagement with wider policy-makers, professionals, industry and the public

This will include identification of end users and stakeholders for whom the research of each HPRU has potential impact. It also involves developing relationships with these stakeholders to allow their engagement with the research from planning to dissemination. We will also work with our HPRU Patient and Public Involvement and Engagement leads when considering knowledge mobilisation with the public.

When identifying new stakeholders the following will be taken into account:

- The level of stakeholders' interest in the project

- Aspects of the research they are interested in

- The level of influence to generate impact.

Stakeholder mapping can be conducted to steer knowledge mobilisation activities. By identifying end-users and other stakeholders at the project and theme level, the HPRU-CRTH can map and reach out to these groups to facilitate knowledge transfer and identify area for new work where there are evidence gaps. This may include stakeholder virtual or in-person workshops. Stakeholders already identified include the Department of Health and Social Care, the Department for Business, Energy & Industrial Strategy and the Department for Environment, Food and Rural Affairs.

Planning, implementing and reflections on this activity will provide a record for reporting and material to allow improvement in these approaches.

Technologies for knowledge mobilisation

The knowledge mobilisation partnerships within and across HPRUs will use the full range of relevant technologies to support knowledge mobilisation. As noted above, collaborative relationships across research, practice and policy process are at the centre of this. However more specific tools including accessible data sets, data visualisation interfaces, easily usable software implementations of methods, policy papers, and briefing documents including lay summaries, and social media communication will be co-produced in support of mobilising knowledge generated by the HPRUs.

Contributing to the knowledge mobilisation evidence base

As an expanding area of practice, knowledge mobilisation needs a developing underpinning evidence base. Knowledge mobilisation in health protection may also have some specific aspects. HPRUs will therefore evaluate the effectiveness of their knowledge mobilisation approaches.

Recording of activities and capacity development is integrated, including PhD supervision, post-doctoral research activity management, and project development. It will be captured in parallel, ideally within the HPRU intranet to facilitate collation and review.

Proposals for this include evaluation of the changes in the culture and expertise in mobilising knowledge across researchers and other partners, prospective studies of approaches employed and their effects, and observational studies including case studies.

Measuring impacts and the role of knowledge mobilisation

HPRUs will evaluate their knowledge mobilisation activity annually, using a reporting form (Appendix 2).

Knowledge mobilisation outcomes in the HPRU-CRTH are reported continuously and systematically. Researchers are required to report all knowledge engagement and mobilisation activities

undertaken. Where available, supporting evidence will be submitted by researchers to strengthen case studies and to enable follow-up actions where required.

Examples include but are not limited to:

• use of research to inform national guidelines

• membership of and contribution to UK Government advisory groups (e.g. SAGE) international advisory groups (e.g., ICRP) or local Government advisory groups (e.g. outbreak management group)

• submissions to Parliamentary Select Committees (written or oral), or other parliamentary knowledge exchange activities

• advising organisations or governing bodies on Covid-19 strategies (e.g. national governing bodies and businesses).

All data will be collated annually to report to NIHR and a case study selected to highlight substantial added value or impact within the Unit. Reporting will include the following areas:

• Reflections on knowledge mobilisation and monitoring of activity

• Collaboration with PHE/UKHSA

• Engagement with stakeholders

• Dissemination and communication of research activity

• Capacity building and training on knowledge mobilisation.

Knowledge mobilisation examples

Examples of knowledge mobilisation opportunities that are likely to be successful in the HPRU-CRTH include in Theme 2 –project 1 'Exposure and risk markers in medical uses of Ionising radiation', research on biomarkers of ionising radiation relevant to healthcare. Studies are being undertaken to characterise biomarkers in the context of radiotherapy patients (in collaboration with the Institute for Cancer Research), vascular operators, nuclear medicine patients and practitioners using human cell model systems and a range of therapeutic and diagnostic radionuclides and radiopharmaceuticals to develop new treatment protocols with lower toxicity. Ultimately, this knowledge will be used to support health decisions by the public and policy-makers and will allow individual differences in sensitivity to be considered to better protect those at higher risk by regularly monitoring them, to decrease the risk and intervene to treat cancer earlier. Samples will be obtained from practitioners delivering X-ray guided procedures and their patients. This will contribute to a better understanding of the radiation doses.

Another example is in Theme 4 project 3 'Detection of HTAs in water'. Water from various sources (bottled, reservoir, well and municipal) is being monitored for highly toxic agents (HTAs) arising from chemical treatment processes and contamination with chemical substances. Expertise and techniques and used in this work is being applied to other studies, such as assessing and monitoring COVID rates in waste water or local situations of chemical leachate in Northern Ireland. These examples can lead to the assessment of individual-level exposure from the corresponding city to extrapolate to both human population and environmental exposure.

Appendix 1: Theory and Evidence informed approaches

NIHR HPRUs aim to apply evidence or theory-based approaches to knowledge mobilisation, building evidence in the process.

One framework within which evidence-based approaches to knowledge mobilisation is presented in *Using Evidence: What Works.* This is a "discussion document" which summarises a project called The Science of Using Science, funded by the Wellcome Trust and the What Works Centre for Wellbeing (Breckon and Dodson, 2016; Langer et al, 2016). The aim of The Science of Using Science project was to review which interventions are most effective at increasing decision-makers' use of research evidence in various decision arenas. The project involved two "review of reviews".

1. A systematic review of systematic reviews of the evidence-informed decision making literature, which included 36 reviews of 91 interventions;
2. A scoping review of other social science interventions that might be relevant to knowledge mobilisation which identified more than 100 interventions.

Identified interventions were grouped within six underlying mechanisms of enabling research-informed decision-making. These are:

1. **Awareness:** building awareness and positive attitudes towards evidence use
2. **Agree:** building mutual understanding and agreement on policy-relevant questions and the kind of evidence needed to answer them
3. **Access and communication:** providing communication of and access to evidence
4. **Interact:** facilitating interactions between decision-makers and researchers
5. **Skills:** supporting decision-makers to develop skills in accessing and making sense of evidence
6. **Structures and processes:** influencing decision-making structures and their processes.

We will identify evidence-based approaches within this and other frameworks to promote knowledge mobilisation of the findings of our HPRUs.

The NIHR website https://www.nihr.ac.uk/documents/knowledge-mobilisation-research/22598 has an extensive reading list organised by topic area.

APPENDIX 2

HRPU KM – Interim Reporting requirements – Year 20/21

1. Understanding the KM capacity and capability within the HPRU	
1. KM lead	
• Working Time Equivalent	
• Relevant expertise (training or direct experience in KM)	
• Role within HPRU governance structure	
• Contact details	
Communications team	
• WTE	
• Budget for dissemination and KM activities	
Other support for KM	
• WTE	
• Description (e.g. other staff/students)	
2. Strategy (up to 500 words)	
Please summarise your strategy for developing your dissemination and knowledge mobilisation capacity across the *duration of the HPRU contract.* Attach your full strategy (if available) as an appendix	
3. Release of findings (up to 200 words)	

- Overview of 20/21 activity and approach - Key achievements - Key challenges	
4. Dissemination (up to 200 words)	
- Overview of 20/21 activity and approach - Key achievements - Key challenges	
5. Knowledge mobilisation (up to 300 words)	
- Overview of 20/21 activity and approach - Key achievements - Key challenges	
6. Collaborations (up to 200 words)	
These include partnerships that are supporting your knowledge mobilisation activity including other HPRUs, PHE, local authorities etc - Overview of 20/21 activity and approach - Key achievements - Key challenges	
7. Researcher development (up to 200 words)	
- Overview of 20/21 activity and approach - Key achievements - Key challenges	
8. What learning from your KM activities would you	

want to share with other HPRUs?	