Institution:	University of Northumbria at Newcastle
Unit of Assessment:	3 - Allied Health Professions, Dentistry, Nursing and Pharmacy

a. Context

The Northumbria University staff returned in UoA3 conduct research in the areas of *Cellular and Molecular Sciences* and *Health and Lifestyle Research*. We place a high value on impact and engage with a wide range of external stakeholders and beneficiaries, in order to generate research-led change in two key areas.

Policy and practice in health and welfare:

We seek to translate our research into direct public health benefits, sometimes through policy change (e.g. adding a loneliness measure to the Adult Social Care Outcomes Framework or driving policy changes in Environmental Stewardship) and sometimes through service improvements or other healthcare innovations (e.g. strategies for patient safety and health behaviour screening; new procedures to optimise industrial food safety). Our partners and beneficiaries include international health agencies (e.g. Swiss Tropical and Public Health Institute; the Centro Medicina Legale; Scandinavian Parkinson's associations); UK agencies such as the National Screening Committee; NHS Trusts and Clinical Commissioning Groups across the UK; policy providers (e.g. Defra, Natural England); local authorities and housing associations (e.g. Derwentside Homes); charities and service users (e.g. Age UK, Big C Cancer, Parkinson's UK, Action on Smoking and Health, Equal Arts, Joseph Rowntree Foundation;Tiny Lives; Newcastle Elders Council).

Health industries:

Here we innovate, designing new vaccines, enzymes, processing techniques or technologies for more efficient and effective healthcare. Our commercial beneficiaries include (i) pharmaceutical and chemical companies such as Bayer Healthcare and Sanofi Aventis Pharmaceuticals; (ii) biotechnology companies such as bioMérieux; (iii) bio-control and safety organisations such as Phytolab GmbH, Leica biosystems, Integrated Effluent Systems; and (iv) food companies such as Marlow Foods, Nestle and PepsiCo.

b. Approach to impact

We have a three-pronged approach to accomplish impact which includes: (1) development and growth of partnerships with non-academic users and beneficiaries; (2) long-term strategic investment in impact; (3) public engagement and engaging with policy and practice, resulting in health improvements and benefits for public well-being.

(1) Non-academic partner relationships: A core feature of our research has been the development of long-standing collaborations with a wide range of non-academic users and beneficiaries. Staff are encouraged, supported and mentored, to ensure that partnerships outside the University are intrinsic to the research process and that opportunities for maximising the impact of research are recognised. An example of this kind of partnership is Professor **Cook's** engagement with North Tyneside Council through a Knowledge Transfer Partnership (KTP) that has resulted in new and improved services and better integrated care for older people.

Academic staff who do not have a prior history of working with external partners are mentored to enable them to increase the scope of their activities, while new academic staff are supported to leverage university HEIF funding to gain and improve relationships with commercial clients. Members of UoA3 who have an opportunity to develop business engagement are encouraged to establish an 'Innovation Unit'. Innovation Units allow the support provided by the University's Research and Business Services Department to foster knowledge exchange between academic research and business development. Examples of this are the creation of Nzomics Biocatalysis for the custom production of enzymes (led by Professor **Black**); the current development of the FoodTrac Analytical Innovation Centre, to provide consultancy work for the food industry (led by Dr **Koutsidis**); and Professor **Sparagano's** Knowledge Transfer Network Biosciences research project, in collaboration with the SMEs Böd Ayre Products Ltd and Higgins Consultancy Ltd, to improve the commercial value of essential oils extracted from seaweeds to develop anti-arthropod

repellent/toxic products following previous research funded by Defra in 2008. In addition, Dr Justin Perry is a member of the North East Process Industries Cluster (NEPIC) innovation thrust team, facilitating interactions with relevant STEM employers. The Faculty has threeBusiness Development Managers to further assist in developing relationships with external partners, including KTPs.

(2) Strategic investment in impact: HEIF funding continues to be invested to support engagement and develop capacity. Notably, Nzomics Biocatalysis used funding and internal support to extend business development, which has resulted in a Collaboration and Licence Agreement with Almac Sciences Ltd and research contracts with GlaxoSmithKline, Mondelēz International (previously Kraft Foods) and Procter & Gamble. HEIF funding has been used to develop capacity and knowledge exchange, and for strategic projects in areas prioritised for research development. Examples include: two grants to Professor **Todryk** and Dr **Dover** to support projects with a view to developing capacity for anti-microbial vaccine development, and the testing of a vaccine owned by Vaccinia Ltd, to support licencing; two grants to Professor **Black** & Dr **Dover** to work with Biosignatures to develop research services and infrastructure for clinical proteomics and novel enzyme-based medical and food test kits. Additional support has come from the University *Entrepreneur in Residence Scheme for Completing Postgraduate Research Students*, which provides seed funding for translational research.

Engagement events have proved effective in building collaborations with external partners, and HEIF funding has been used successfully in this way by UoA members. Professor **Cook's** HEIF-funded engagement events with members of the Hadrian Primary Care Alliance (a social enterprise comprised of 14 GP practices in West Northumberland) culminated in a successful application for a second KTP (the first having led to a transformed delivery model of sheltered housing in North Tyneside). This new KTP seeks to develop a new General Practice service delivery model, informed by data mining to predict population need and consequently redesign processes and workforce focus. In addition, discussion with representatives from the Food and Environment Research Agency (FERA) led to a successful bid by staff in the Applied Chemistry and Health Interventions and Wellbeing research groups for HEIF funding to develop diagnostic methods for the food industry, which involves knowledge exchange between academics, members of the food industry (e.g. Premier Foods) and FERA.

A series of successful HEIF-funded seminars were held in 2012/13 to bring together academic research teams with non-academic user groups and beneficiaries around specific case studies. The aim was to develop capacity for our research to achieve impact on policy and practice. Resulting activities include raising awareness among service users, clinicians and officials from Parkinson's UK and Fibromyalgia Association UK of the benefits from our research into managing Parkinson's disease and pain, and engaging with arts projects and older people on questions of ageing, public health and dementia.

Staff are also supported in applications to patent commercially exploitable research and staff in the UoA hold a number of patents, including Professor **Stanforth's** work with bioMérieux (six published in 2011), Dr Finn's research on cytochrome P450; Dr Smith's research on antiretroviral therapy drugs, Dr Graham's work on the "Universal Biopsy Tool" (patent applied for) and Dr Mavroudis's work on functional foods.

(3) Public engagement and engaging with policy and practice: Due to the breadth of research in the UoA, raising awareness of our research is relevant to service delivery, policy and practice in the commercial, public and third sectors. Our participatory research is a particular strength in this respect. Staff are encouraged to engage in a wide variety of engagement and dissemination opportunities to maximise the impact of research.

Professors **Carr** and **Cattan** are members of the senior management group of Fuse (the Centre for Translational Research in Public Health, consisting of the five universities in the North East). Fuse works in partnership with the public, the NHS, local government and other public, private and voluntary organisations in North East England. One of the Centre's main aims is to research and implement ways in which public health research knowledge can be translated effectively into policy and practice.

Examples of community engagement initiatives include Geddes and Reynolds' evaluation of an innovative theatre in education programme on the influence of the tobacco industry on young

people. This was funded by FRESH Smoke Free North East and involved collaborative dissemination of the evaluation findings and the production of a reference guide for practitioners available on the FRESH NE website. **Heffernan's** work on improvement in everyday memory on smoking cessation has been used by Action on Smoking and Health, and his alcohol research on the drinkaware website. Lhussier's formative evaluation with 12 GP Practices in a 'learning collaborative' in the North East helped to inform the management of care planning for people with long term conditions and re-design systems for partnership working.

In some fields, our research informs policy and we engage directly with policymakers via consultations, parliamentary committees and Whitehall Departments. Professor **Evison**, of Northumbria University Centre for Forensic Sciences, was invited to contribute to the House of Commons Science and Technology Committee Inquiry into Forensic Science (July 2013). Professor **Cattan**, through her research and as Co-Chair of the Campaign to End Loneliness Research Hub, has helped to inform the Department of Health's criteria for a loneliness measure in the Adult Social Care and Public Health Outcomes Frameworks. Dr **Heffernan** was a member of The British Psychological Society Consultation Response Team whose review of the UK National Screening Committee (UK NSC) policy on Alcohol Problems Screening in Adults led to widespread screening not being offered. Dr George's research on flowering field margins has informed policy changes to Environmental Stewardship options in the UK.

c. Strategy and plans

Our strategy for developing capacity to achieve impact will be framed by the development of the specific research areas in *Cellular and Molecular Sciences* and *Health and Lifestyle Research* as outlined in REF5. The Faculty Innovation Working Group will help to promote and coordinate impact activities, improving their significance and reach. Examples of areas of UoA specific work of increased significance include: dementia care management (Bailey, **Cook**); food and nutrition activities (**George**, **Koutsidis**, Lodge, Young); forensics (**Evison**, Palmer, Sheridan); molecular diagnostics (**Cummings**, **Dover**, **Lanyon**, **Smith**, **Todryk**); knowledge translation and patient safety (Pearson, Stevens); evidence-based stress-reduction training in parent carers of children with autism (**Wetherell**). Additional cross-faculty developments will include collaborations with the *Clinical Exercise Physiology and Wellness* centre (UoA 26) and the *Health in Action* group, including the Northumbria Centre for Sleep Research (UoA 4). Moreover, each Department has a Business and Engagement lead whose role is to help to identify opportunities for external collaborations relevant to our research and to help mentor academic staff in dealing with commercial partners and with the public for outreach purposes.

To help staff to extend the reach and significance of research, we will hold further training workshops on impact and related activities selected from a menu of tailored opportunities offered by the University's Research and Business Services Department. These will ensure staff have a good understanding of impact, its importance and methods of achieving/monitoring impact. Following appointment, new academic staff attend an introductory workshop on the importance of developing impact within six months of arrival. In addition, all staff complete annual Personal Research and Innovation Plans which allow them to highlight their ambitions for impact and public engagement alongside their record of and plans for research activities of all kinds, so that these can be nurtured. Further training sessions for all staff will be provided on commercialisation of research, with monthly surgeries on developing KTPs, public engagement training and writing a 'pathways to impact' statement.

Emphasis will be placed on continuing and expanding our engagement with partners in the healthcare and pharmaceutical industries and with national and international health agencies. Support will be provided centrally by the University Research and Business Services Department, which provide support throughout the research process. To develop knowledge exchange activities that help shape our research agenda and address user requirements, staff with experience of KTPs (**Black**, **Cook**, Perry) will work with the Faculty Business Development Managers to assist staff in developing KTP applications.

We will strengthen our public engagement around research by ensuring two-way exchange of knowledge and understanding between UoA staff and the public. Participatory research underpins much of our research in public health and health care. This strong knowledge base offers opportunities for exchange of best practice among staff in the UoA and for peer-to-peer training in

methods that facilitate public engagement in research and offer potential pathways to impact. Our partnership in the British Science Festival (Newcastle 2013) has generated skills and experience in public engagement that will be shared across the UoA.

d. Relationship to case studies

The case studies illustrate the breadth of approaches – partnerships, collaborations, service user engagement and influencing policy – that have been successfully employed to maximise the impact of research drawn across the research groups described in REF 5 as follows:

Applied Chemistry – Improving health care through the development of new protocols for the detection and identification of clinically important bacteria, led by Professor Stanforth. **Stanforth** and colleagues' successful partnership with the French company bioMérieux is a good example of our commitment to building long term multidisciplinary collaborations. This has allowed the group to translate its work into products that have had a global impact on the practice and performance of bacterial detection protocols in the health-care and food, cosmetic and pharmaceutical industries.

Applied Chemistry/Microbiology – Nzomics Biocatalysis: improving green chemistry for the pharmaceutical industry using enzyme biocatalysts, led by Professor **Black**. The work of **Black** and colleagues provides an example of the benefit of implementing the Innovation Unit model, which supported them to set up such unit to provide services to over 20 companies in the pharmaceutical, fine chemical, food and biofuels industries. Their work has led to the supply of bespoke enzymes needed for biotransformations of importance in the pharmaceutical and other industries.

Health Interventions and Wellbeing – Evaluating nutritional interventions for the improvement of brain function: validation of the efficacy of commercial psychotropic products, led by Professor **Kennedy**. This case study provides another example of our commitment to extensive collaboration with industry. **Kennedy** and colleagues in the Brain, Performance and Nutrition Research Centre have undertaken and published research on the impact of nutrition and dietary interventions on brain function which provides a strong evidence base to inform product development and to enhance the value and turnover of existing products, thus having considerable economic impact and influence on the nutritional and food supplement industries.

Nursing and Public Health – Older people transforming policy, planning and research, led by Professor **Cook**. Service user engagement is integral to much of our research and **Cook's** research with older people provides an example of how we translate such work. Her research has made a major contribution to a KTP in changing the way services are planned, managed and delivered, including joining up services between different types of service providers. **Cook's** research was cited by the Joseph Rowntree Foundation in their response to the Law Commission Consultation on Adult Social Care. Professor Cook's work also provides a good example of our use of HEIF-funding to support productive engagement events.

Clinical Biomechanics and Rehabilitation – Cueing people with Parkinson's to improve their walking: the RESCUE project, led by Dr Baker and Dr **Jones**. We seek to find applications of our research in clinical practice and the RESCUE project provides an example of how this can be achieved. Baker and **Jones**, together with colleagues in three countries, successfully tested explicit information on cueing to improve walking in Parkinson's Disease (PD). This has been incorporated into the European Guidelines for Physiotherapy in PD; used in care professionals' training programmes (e.g. University of British Columbia; Parkinson's UK); and adopted by Scandinavian Parkinson's associations. Through engagement with patients and clinicians, it has been possible to translate the knowledge from the trial to the management of mental health patients who develop parkinsonism as a result of medication.