Institution: Plymouth University

Unit of Assessment: 1 (Clinical Medicine)

a. Context:

The Peninsula College of Medicine and Dentistry (a partnership between the Universities of Plymouth and Exeter) was one of the most successful of the new medical schools in RAE 2008. To further build on this success, in 2012, a joint decision was made to demerge the partnership to allow each University to take their own individual, evolving, and focused research approaches forward. Accordingly, Plymouth University has now developed the Plymouth University Peninsula Schools of Medicine and Dentistry (PUPSMD) and the present submission encompasses both phases of this development.

The main beneficiaries of the Unit's research activity are patients and carers accessing specific health services, charities, patient groups, and the public, clinician practitioners working in healthcare, governments determining and implementing evidence-based health policy, and commercial organisations utilising findings to develop new products. Some examples of the groups and organisations that research has impacted upon include:

- Women undergoing pre-natal screening and GI condition sufferers (inflammatory bowel disease, coeliac disease, colorectal polyps)
- Patient groups and charities for Multiple Sclerosis (MS), Parkinson's disease, Neurofibromatosis, Alzheimers', Mantle Cell Lymphoma, and Oesophageal Reflux.
- Clinicians through specialty groups and clinical networks and, directly, health professionals and clinical scientists in the National Health Service (NHS).
- The National Institute for Clinical Excellence (NICE), National Fetal Anomaly Screening Program, the Health Protection Agency (all UK), and the US Federal Drug Administration.
- Pharmaceutical companies such as Astra Zeneca, Pfizer, and Bayer Pharmaceuticals, and diagnostic and risk assessment companies such as PerkinElmer.

Our researchers are at the forefront of health improvement and novel treatments in chronic neurological degenerative disease and cancer. Therefore, our strategic focus is devised to bring academic areas of strength, clinical expertise, and interest directly to bear on national priorities, such as investigating Alzheimer's disease or developing new methods of cancer prevention and treatment. The Unit aims to stimulate public debate and improve understanding around health issues more generally through media coverage of its research. An example is Zajicek's use of his research and clinical expertise on the benefits of cannabinoids for MS to comment on newly licenced products and the 'postcode lottery' issue, so helping to improve public awareness of the growing evidence base. Wright, working in collaboration with Nicolaides (King's College), has received significant media coverage regarding research that is driving improvements in pre-natal screening for Down's Syndrome. Research led by Jankowski has featured on BBC radio documentaries and contributed to the debate around the effectiveness of aspirin in cancer prevention. The Unit has also been successful in recognising the potential from research discoveries for developing new diagnostic tests e.g. pre-natal screening and protocols in collaboration with clinicians e.g. National Institute of Clinical Excellence BADCAT for Barrett's oesophagus to help ensure better uptake in practice.

b. Approach to impact

The Unit's approach to impact has been informed over the period by the shared approach of the constituent Schools. A more strategic adoption of best practice and approach is being developed in both focused areas of expertise and in broad cross cutting disciplines where regional developments can be exploited. An underlying principle of the PMS research strategy, continued into PUPSMD, has been to remain patient-focussed and to be translatable into direct benefit at the earliest opportunity. Engagement with research users has been facilitated at a strategic level by a Research Committee that includes representatives from local NHS trusts and the National Institute for Health Research (NIHR) infrastructure. Key researchers have Honorary Contracts with local NHS trusts (e.g. Hobart, Hanemann, Jankowski, Rule, Zajicek, Playford) and these facilitate direct collaboration on clinically-relevant projects. Patients and carers contribute to the shaping of the research itself and are kept engaged throughout the process with regular updates. This embedded approach has contributed to our success in long-term studies, where patient retention can impact upon the validity of results, for example in Zajicek's Cannabinoid Use in Progressive Inflammatory brain Disease (CUPID) trial and South West Impact of Multiple Sclerosis Project (SWIMS).

We have engaged with potential users of their recognised research through taking leadership in the formation of public policy as clinical advisors, as expert committee members, and in consultation exercises. Examples include Wright's membership of the NHS Fetal Anomaly Screening Program Executive Group, Zajicek's chairing of the NIHR Clinical Research Network Nervous Systems Disorders speciality group, Hobart's advisory role for the US Federal Drug Administration, and Jankowski's chairing of the NICE gastroenterology advisory group and membership of the NICE Dyspepia/Gastro-oesophageal reflux disease Guidelines Development Group. Jankowski's systematic review produced consensus statements for the management of Barrett's Dysplasia/early-stage adenocarcinoma and is the first non-government sponsored GI guidance ever to be adopted as formal NHS Evidence. Staff also actively engage with industrial partners including Wright's role as a product expert for CE marking with Lloyds QA and as a consultant with PerkinElmer on risk assessment and the assessment of new markers. Jankowski was a consultant to AstraZeneca when considering its $15m investment in the AspECT chemoprevention trial.

Major funders in clinical medicine now require the consideration of plans for impact development at the outset of any project proposal. This has been a key driver in staff development for impact achievement and awareness-raising and in the restructuring of our internal systems. The School of Biomedicine has a long-standing academic peer review and staff mentoring programme that is designed to support and enable the achievement of impact. Its Centre for Research in Translational Biology includes an exploitation work strand that involves regular review by the Director and Head of School to identify potential commercial research applications, such as Jarvis's work on vaccine development *via* cytomegalovirus vectors. ITSMed has been extending this approach by formalising similar mechanisms on a school-wide basis under the leadership of Hanemann. Examples of best-practice are shared in workshops to inform funding applications. PhD students are also exposed routinely to approaches to the commercialization of research and the management of intellectual property. Prior to 2012, the medical school maintained a dedicated technology-transfer unit, Peninsula BioVentures, and agreed an IP framework between both Universities and all local NHS partners. In the new School, commercialisation of IP arising from the Unit's research activity is directly managed by Plymouth University in partnership with Frontier IP Group plc, which assists spin out and licensing activities and helps maximise the commercial value of technologies emerging from their research programmes. This system (and the PMS system before it) works through Plymouth University's trading company, UoPEL, which has received £437,000 of license income since 2007 for sales of measurement scales developed by Hobart and targeted specifically at patients with MS and Parkinson's disease.

Other mechanisms being deployed to enable impact include the exploitation of scientific equipment used for research for projects with direct clinical and commercial application. A key example is the large post-genomics centre that provides Proteomics and Next-Generation Sequencing as a core facility. A collaboration with Plymouth Hospitals NHS Trust (PHNT) to develop Next-Generation Sequencing protocols for clinical use has been established through SBBS, as a participant in the Eurogentest EC FP7 consortium through Avent. This relates to non-invasive pre-natal diagnosis for Downs syndrome, mass scale Rhesus D genotyping of all D-negative mothers (real-time assay) and E. Coli and Clostridium Difficile subtyping.

c. Strategy and plans

Following the demerger from PCMD and to facilitate a planned merger of PSMD and SBBS, a unified strategy for achieving impact is being defined. The PUPSMD Research Committee and Research Strategy Advisory Group now include representatives from Biomedicine as well as Psychology and Health Services Research academics and is the main forum where structures and mechanisms for supporting and enabling impact are discussed. The University's Research and Innovation Strategy (2009-2012) stressed that research outputs should have demonstrable impact with health and biomedicine as key areas for development. The creation of PUPSMD has allowed this ambition to be pursued more comprehensively and the revised Research and Innovation Strategy (approved in 2012) affirmed a renewed focus specifically on clinically-relevant research through ITSMed to capitalise on the establishment of PSMD and strengthening existing local clinical networks. This underpins our development of a three-theme research strategy focused on Clinical Neurosciences, Genomics/Diagnostics and Cancer, and is central to our strategy of collaboration. In addition to supporting these latter strengths we also support success through broad cross cutting themes in prevention, personalised medicine, cognition and health technology.

PMS helped to found the South West Peninsula Clinical Research Collaboration between its two universities and NHS partners, its primary goal being to promote excellent clinical innovation and research in the region. This collaboration, which is considered essential for the efficient exploitation of research outcomes, has been carried forward in the principles of the South West Peninsula Academic Health Science Network (AHSN), which will ensure that the best research evidence informs local NHS innovation through the investment of c.£4.5m over five years in projects for innovation, clinical practice, and research. PU is a bid partner in the successful application for the next phase of NIHR-funded Collaborations for Leadership in Applied Health Research and Care (Clarhc), which are focused on clinically-relevant research and its translation into practice amounting to £1.85m/5 years. A dedicated NHS Engagement Officer with published expertise in local priorities for health research agendas has been appointed and a Research Design Service (RDS) has been established to facilitate NHS research collaboration, amounting to an investment of £0.6m/5years.

We are moving forward as a new School, drawing on our successes and expertise in developing impact to date and by connecting academics to work on collaborative projects with a multi-disciplinary focus. Our systems for knowledge translation and academic mentoring support staff in identifying potential for delivering the strategy and achieving impact. The next generation of researchers are encompassed in this work through joint studentships between PSMD and SBBS. Business partners and KTP specialists in PU's Research and Innovation division will continue to be key in facilitating links between academics, innovative collaborators and research users and, with PSMD's full integration into University structures, there is significant opportunity provided by this additional resource. In our broad cross cutting themes we have strategic links with Denham in psychology UoA4 (Cognition theme – functional MRI), Noad in primary care UoA22 (Health Technology theme - apps), Avent in Biomedicine UoA3 (Stratified Medicine theme – biomarkers for prenatal screening) and Jones in Primary Care UoA22 (Prevention theme – diabetes). Although our clinical and academic staff are our greatest resource for growing impact, the unit is also seeking to explore the immediate commercial opportunities of other scientific equipment, building on investments in post-genomics, for example, through investment in a new MRI scanner.

Recognising the importance of engagement and impact, we are establishing systems to ensure that evidence of impact is captured, monitored and shared. Affirming our commitment to the Concordat on Public Engagement with Research we are, as a priority, identifying impact 'champions' within PSMD to serve as a focus for the dissemination of best practice.

d. Relationship to case studies:

During the assessment period, well-designed programmes of research have helped establish the reputations of several academics as experts in their fields. The two case studies exemplify our developing work. The 'Improving Screening during Pregnancy' case study shows how we have been able to knowledgeably inform and advise local and national policy makers, managers and practitioners delivering health services. This remains a significant strength and will continue to be encouraged in line with PU's strategic intent to 'Make a Difference' through its research activities. This case study and the 'Multiple Sclerosis' case study exemplify how research (Wright's mixture model and Hobart's outcome measurement scales) can be applied directly in clinical practice and lead to benefits for patients. Wrights work has helped decrease invasive amniocentesis from 36,963 to approximately 13,000 in 5 years (perhaps saving hundreds of lives). Hobarts two most widely used instruments are the MSIS-29 (29 item multiple sclerosis impact scale) and the MSWS-12 (12 item MS Walking Scale). So far, the MSIS-29 has been used in at least 30,000 people with MS, and the MSWS-12 in at least 9, 200 people with MS.

The MS case study is an example of impact on society by increasing knowledge, changing behaviour and influencing policy around MS assessment and treatment.

These cases emerged as a result of the contingent combination of a number of linked factors: the University's strategic focus on enterprise and innovation, individual commitment to improving clinical practice, and the availability of training and expertise to support specific projects. However, the Research Committee has recognised that a more strategic and systematic approach to identifying the potential impact in projects is required in order to increase the overall range and significance. Our new mechanisms outlined above reflect this recognition and our commitment to learn from reflection on the lessons provided by successful cases. We shall enhance the impact achieved in such projects in the future and to apply emerging best practice in new projects.