Institution: Manchester Metropolitan University

Unit of Assessment: A3 Allied Health Professions, Dentistry, Nursing and Pharmacy

a. Context. MMU is one of the largest providers of non-medical health practitioner education in the UK giving us the opportunity to interact closely with the professional, statutory and regulatory bodies that accredit and approve our taught programmes thereby helping shape the impact of our research upon the wider professional and research community. We offer taught programmes in a range of disciplines including; Adult Nursing, Biomedical Science, Clinical Physiology, Dental Technology, Physiotherapy, Reconstructive Science, Speech and Language Therapy and a unique joint qualification in Psychology and Speech Pathology. Recently, the University was awarded the tenders for the Scientist Training Programmes of the Department of Health project, Modernising Scientific Careers, in Haematology, Neurophysiology, Cardiac Sciences, Respiratory and Sleep Sciences, Cellular Sciences (including Reproductive Science) and Reconstructive Science (Maxillofacial Prosthetics). These taught courses are designed to be advanced research led training programmes for the scientific workforce of the future NHS and we are either the sole provider or one of two providers, nationally, for these programmes. All of our taught programmes provide us with a strong relationship with the NHS North West and NHS West Midlands as well as other Universities and research organisations in the Manchester area thus providing networking opportunities for impactful research. In addition to these interactions with the NHS, our impact strategy is informed by the policy statements and funding priorities of UK and International government agencies, the World Health Organisation, the funding councils, health professional bodies and the healthcare business and industry as well as the voluntary sector. In the local context, priorities set by the Greater Manchester Academic Health Science Network are now particularly important in informing our impact strategy.

We have a strong belief that the public should be kept informed of research advances that impact upon their health and well-being and, to this end, we engage in a host of activities that help in the public understanding of science and medicine. In addition, we engage with patient groups and are active in Public and Patient Involvement (PPI) initiatives that inform research needs.

The main non-academic user groups of MMU's Allied Health submission are:
Local, National and International Government agencies – the major non-academic user of our research in the UK is the National Health Service and its associated agencies. In addition, the following are main user groups in this category: the National Institute for Health Research, the UK research councils, in particular, the Medical Research Council, the World Health Organisation, the European Commission, the European Space Agency, Valuing Older People (Manchester City Council), local NHS Trusts (e.g. Wirral PCT), Manchester Learning Disability Partnership and UK Sport.
Health and well-being agencies and charities – in the UK and International (e.g., Stroke Association, Arthritis UK, Mencap, Indian Institute of Cerebral Palsy, Communication Matters, Scope, Diabetes UK, SPARKS, British Heart Foundation, the Neuro Foundation),
Business and Industry e.g., Danone, GlaxoSmithKline, Nestle, Unilever, and Smith and Nephew
Practitioners and Professionals – physicians, nurses, pathologists, healthcare scientists (biomedical and clinical scientists), clinical physiologists, speech and language therapists, reconstructive scientists (maxillofacial prosthetics), dentists, physiotherapists, psychologists, special educators, social care staff, private health care clinics, professional sports teams.
Community organisations and societies - the media, schools and colleges, cultural and leisure services including sporting organisations and bodies supporting elite athletes. There is also a focus on supporting an ageing population and therefore much work is conducted in partnership with various elderly support groups, local and regional stroke groups, charities and individuals.

Impacts have been generated around the behaviour of culture and society, health, welfare and quality of life, commercial and economic impacts, public policy and services, international development and impacts on practitioners and services. Research has informed and influenced health service delivery and professional practice in the UK and internationally, including the issue of patient safety.

b. Approach to impact. Impacts vary in nature and emerge from all of our different types of research activities. These activities are:
Fundamental research – research into basic cellular, biochemical or physiological processes.
Applied or translational research – research that seeks to apply the results of fundamental and empirical research to various real life issues such as the development of new drugs or new processes to improve health and well-being.
Practitioner research – research that examines current professional practice with a view to improve outcomes for patients and/or add efficiencies to the Healthcare system.
Public understanding and media engagement activities – activities which seek to inform the public about Health issues and, thereby, improve the health of the general population.

There are a number of mechanisms whereby the Unit can discover areas or problems where research might impact. The submission, through its constituent Faculties, holds regular formal meetings with the NHS North West and with the NHS West Midlands who are the local commissioners of much of the work with the Unit. These meetings inform both teaching and research policy. The relationships with the NHS are supported, in the case of Healthcare Science, by a dedicated Clinical Academic Network led by an NHS Clinical Scientist who has a fractional appointment in the University. There is, therefore a vibrant community of academics and healthcare professionals in central Manchester that can identify research and other health related priorities. This close interaction has recently led to the creation of the Manchester Academy for Healthcare Scientist Education (MAHSE) that has been successful in gaining funding for many of the important research rich Scientist Training Programmes of the Department of Health. These are 3-year postgraduate programmes that commenced in 2011 and 2012. A further example of interaction with the NHS is the 15 year collaboration with the Manchester Learning Disability Partnership, initially Culyer-funded, and has involved joint appointments with MMU (Chadwick 1999-2009 and Mitchell 2007-present) to evaluate service innovations and embed research into practice. People with learning disabilities have been involved in shaping this research and its dissemination (e.g. joint Manchester Learning Disability Partnership-MMU event 14th February 2012). Goldbart and Caton's collaboration with the Manchester Learning Disability Partnership plus Goldbart's with Special Interest Groups and special schools led to a commissioned evaluation of interventions for the most complex communication impairments for the learning disability charity Mencap and Department of Health's Valuing People team to inform commissioning and service provision. An easy read version of the report is available online for people with learning disabilities.

Evidence of follow-through from these activities to identify resulting impacts
Fundamental research in this unit on muscle physiology, funded by the European Union, has led to impacts that inform healthy ageing in humans and has improved the well-being of astronauts during space flight. ***Applied research*** at MMU in analytical biochemistry along with interactions with the NHS and its agencies, mostly the former Health Protection Agency, has led to the development of mass spectrometry for the identification of microorganisms and, interdisciplinary research alongside the food industry, has led to the development of hygienic food preparation surfaces. In our ***Practitioner research***, an evaluation of chronic obstructive pulmonary disease for Wirral Primary Care Trust has been used in an NHS "improvement story" and Goldbart and Caton's report (http://www.mencap.org.uk/Communication_complex_needs) has been uploaded by service delivery organisations across the UK and included in NHS Education Scotland's Knowledge Network, Social Services Knowledge Scotland and the Social Care Institute for Excellence. In addition, Murray's Augmentative and Alternative Communication online database, enabling people who use aided communication, their families and practitioners to access evidence to support practice, was launched in March 2013 at http://www.aacknowledge.org.uk/. Moreover, diagnosis of malaria will be enhanced world wide by the introduction of an online gallery of microscopic images for the World Health Organisation. ***Public understanding and media engagement activities*** have included work with the Manchester Beacon, annual engagement with Manchester Science Festival and many activities with schools and colleges including Bad Bugs Book Club, Zombies, Contemporary Dance, arts for health, working with professional societies and other stakeholders e.g. General and Applied Microbiology, Wellcome and National Healthcare Science Week.

How the unit specifically supported and enabled staff to develop impact

The submission has run a number of workshops to identify and articulate impacts that have occurred since 1994. Although this approach has been retrospective, we have been engaging in impact activities for some time. For example, the Science Communication and Engagement Group is a supportive network of peers at all levels from Professor to ECRs, undergraduate students, administrative and support staff as well as researchers. Activities of this group have included; staff training and development, staff and student induction processes, postgraduate student presentations at Research Days, evaluation training and toolkits (Manchester Beacon / Higher Education Science Technology Engineering Maths North West), and the Engage website. Job descriptions for academic posts have included engagement as an essential criterion, Public Engagement Champions, Public Engagement interns, various workshops on different facets of impact generation e.g. KTP workshops have been organised.

MMU hosts the Greater Manchester Allied Health Research network. This group promotes engagement between university-based researchers and NHS-based (and other) allied health practitioners. Through these interactions and through academic staff involvement with clinical placements, clinical and research questions arise. This form of collaborative research makes impact a natural consequence of the research activity.

The North West Qualitative Research Group in Health is also based at MMU, providing support for allied health practitioners to develop and disseminate robust qualitative research.

Within the annual research development review (led by the unit's senior staff within the faculties) staff are able to negotiate dedicated time allocation within their workload for impact activities, knowledge exchange, public engagement activities and research dissemination. Activities are presented as case reports at local Research Seminar Series and AHP special interest groups.

How the unit made use of institutional facilities, expertise and resources.

The Research Knowledge Exchange (RKE) office of the University provides administrative support and advice for impact activities. The Finance and Legal Services department of the University provide essential help and support for Intellectual Property (IP) and drawing up contracts with our user groups. In addition, there is Business Development Managers (BDM) who operate at Faculty level. The BDMs are aware of all of the research and enterprise expertise that is available within the Unit and proactively seek research and enterprise opportunities that are relevant to our user groups. General facilities are used in public engagement events. The Department of Exercise and Sports Sciences (ESS) at MMU Cheshire runs physical activity sessions for older adults (linked to research projects), the Crewe Stroke Group use our facilities, "Schools in Manchester" brings their talented athletes to physiological, biomechanical and psychological screening sessions (through the Diane Modahl Sports Foundation). We also run several Open Lecture series. Collaboration between MMU and a consultant physiotherapist has informed an innovative service redesign project in London gaining nearly £800,000 for primary care physiotherapy services.

c. Strategy and plans The University is developing a research strategy that places impact at its centre. One of the outcomes of this strategic approach will be to further enhance the support mechanisms currently available through MMU's Research and Knowledge Exchange and the relevant faculties. Healthcare research at MMU is being further enhanced by the establishment of a cross faculty body that will promote the University's Research Strategy in this area thus enabling fruitful engagement with the recently established Greater Manchester Academic Health Science Network (GMAHSN). Furthermore, we recognise the link between health and wealth and will support research that leads to commercial outcomes as well as to research that promotes health and well-being.

The Research Groups within the Unit of Assessment have well developed strategies for the development of impact towards the year 2020. For example, the Cognitive Motor Function group is developing new ways to image muscle to improve the efficacy of rehabilitation interventions and has developed App-based software to extend its work in stroke rehabilitation. The Genetics, Cell and Molecular Biology group is developing novel treatment interventions for vascular disease as well as innovative ways for screening for obesity propensity. The Disability, Ageing and Quality of Life group is investigating impact of an age-appearance morphing programme and other interventions on smoking cessation. The choice of all of these potential impacts is informed by the research priorities of the NHS (as the principal end user) and the UK Research Councils

d. Relationship to case studies

There are seven impact case studies reported in Ref3b. These have all arisen from our central aim of improving the health, wealth and well-being of men, women and children. All have focussed on national and international priorities set by the agencies outlined above. They all demonstrate the reach and significance of our research in improving the diagnosis of disease and providing interventions that enhance the quality of life of humans. **The case studies are:**

Case Study 1**.The Impact of MMU Research on Transforming the Development of Services and Provision for Augmentative and Alternative Communication (AAC) (Murray, Goldbart and Marshall).** This case study in speech and language therapy reports an impact that resulted from a Cochrane Review co-authored by Goldbart and Marshall in 2004 into communication interventions offered to children with cerebral palsy. It led, *inter alia,* to the development of a website making information and advice accessible to lay people, families, and people with communication disorders and a resource for uploading AAC case studies thereby developing a basis for evidence based practice to which allied health practitioners and researchers can contribute.

Case Study 2. **Musculoskeletal responses to Spaceflight and Exercise Countermeasures: The Influence of MMU's Research (Reeves, Narici, Rittweger and Maganaris)**. This impact developed from a project that set out to measure routine physiological and biochemical parameters in astronauts in a European Space Agency funded project through collaboration in Italy. It led to a gravity independent exercise device to enable astronauts in the International Space Station (ISS) to maintain a healthy level of physical activity. The research further influenced the concept and design of the exercise systems currently used on board the ISS. Taken together this research at MMU has contributed to the UK government's decision to become a main contributor to the European Space Agency.

Case Study 3.**Combating musculo-skeletal disuse: MMU research impact on the understanding of factors that influence successful ageing and rehabilitation (Pearson, Rittweger, Reeves, Narici and Maganaris).** This impact arose directly from our work with our partners in an EU funded project, currently MYOAGE and MOVEAGE. It reports how the research directly informed the Gold standard physical activity and rehabilitation guidelines for older adults published in the USA as well as the UK government's guidelines for older people thus giving international reach and significance to the impact.

Case Study 4. **Research-informed development of appropriate services for people with disabilities in Majority world countries (underserved countries) (Goldbart and Marshall).** This Impact rose directly from British Council and DfID-funded collaboration with the Indian Institute of Cerebral Palsy and with the speech and language therapy programme at Makerere University/Mulago Hospital, Uganda. It led to much needed speech and language services in Uganda, Kenya, Rwanda and Tanzania and enhanced disability services in West Bengal, thereby improving the well-being of some of the most vulnerable people in hose communities.

Case Study 5. **Pioneering Research at MMU that transformed microbial identification using MALDI-TOF-MS (Gordon, Claydon, Davey and Edwards-Jones).** This project arose through an interaction between an HCPC registered Biomedical Scientist with vast experience in the NHS and an Analytical Biochemist at MMU. It led to a method for identifying infectious microorganisms quickly and accurately with the technology being incorporated into medical microbiology laboratories worldwide.

Case Study 6. **Enhancing the lives of people with severe and complex disabilities (Caton, Chadwick and Caton).** This case study reports an impact that arose through a Culyer funded collaboration between MMU and the Manchester Learning Disability Partnership and with Melland and other special schools in Manchester. This research informed, *inter alia* the National Patient Safety Agency's Paper on dysphagia and guidance to commissioners on communication intervention for people with profound intellectual impairment and severe challenging behaviour**.**

Case Study 7**.Interdisciplinary research that enabled EU and SMEs to improve the hygienic status of food contact surfaces (Verran, Liauw and Kelly).** This case study demonstrates how interdisciplinary research can provide impacts on health and welfare, public policy and food production and processing. Verran is a microbiologist, Kelly a Surface Engineer and Liauw a polymer scientist and looks at how microorganisms stick to surfaces. It has attracted much interest in the food industry, especially in food preparation and in the media.