Institution: Queen Margaret University

Unit of Assessment: UoA 28 Modern Languages and Linguistics

a. Context

QMU, which gained university title in 2007, is an HEI with a strong practical heritage. Since 2011 Speech and Hearing Sciences (SHS), the main Division for this UoA, has been in the School of Health Sciences. Most SHS teaching is vocational, leading to qualifications in Speech and Language Therapy (SLT) or Audiology. The majority of staff are qualified SLTs and/or audiologists with a firm commitment to impact and knowledge exchange. The majority of research outputs are generated through externally-funded projects in association with non-clinical postdoctoral research fellows and through collaboration with other HEIs. The comparable UoA in RAE2008 was Linguistics.

Our most productive research is in instrumental articulatory phonetics, and our chosen case studies also reflect a focus on impact in this area. The case studies are selected from a broad range of activity flowing from research in other key disciplinary areas: clinical linguistics, sociolinguistics, phonology, acquisition, bilingualism, and other areas of phonetics. In general, we pursue fundamental research in non-clinical or normative / neutral linguistic topics, while knowledge exchange and teaching is more orientated to clinical and social aspects of communication disorder. It is at the intersection of these that most impact is generated.

Non-academic users of our research include: (a) people who use the relevant clinical services and their families; (b) service providers and managers, e.g. NHS clinicians, clinicians in private practice, providers of support systems in the educational sector, third sector support; (c) the speech technology sector; (d) the media and the general public with an interest in language issues; (e) people with a professional interest in speech production; and (f) phonetics teachers and curriculum designers throughout the university sector.

We rank the types of impact underpinned by our own research in terms of their ambition. We aim for: (a) increased understanding by the general public and in the media of areas like speech production, language variation, language acquisition, and disorders of communication; (b) increased understanding of our research methods, findings and their implications among clinical practitioners, NHS managers, policy makers, charitable funders of services and support, and among clients and their families; (c) enhancement of the economy, both locally and through international export of goods and services; (d) increased numbers of clinicians with enhanced skills and knowledge; (e) increased penetration of our research into relevant specialist clinical communities through their own contributions to the evidence-base for practice; and (f) improvements to the health, well-being and quality of life of people with clinical communication disorders.

Introduction of Audiology programmes at the new campus increased demands on clinical space, and with the departure of a key researcher / Speech and Language Therapist with expertise in Electropalatography (EPG) in 2010 (Gibbon), plans for on-site EPG clinics have been put on hold. However, advances in ultrasound research have been rapid; these are now feeding into clinical research and impact plans while increased space needs are being addressed. In 2011, our Speech Science Research Centre was relaunched as “CASL”, the Clinical Audiology, Speech and Language Research Centre, with a steering group including non-academic partners, reflecting a long term strategy of research with impact.

b. Approach to impact

We continue with the impact generating research and knowledge exchange (KE) activities that led to our Queen’s Anniversary Prize (2002) for the clinical application of speech science. We have adopted a symmetrical strategy which particularly encourages impact (and KE) in areas that feed back into research. One focus has been to support the spin-out company Articulate Instruments Ltd. through undertaking beta-testing and piloting its hardware, software and methods, while structurally ensuring its financial viability through its independence from the constraints of the university sector (Case Study 1). Another focus has been to seek funding and make resources available for impactful activity related to existing research projects (Case Study 2). An example of this approach is the research into new models for clinical delivery (Wood), which has used an “impact-first” model: EPG therapy is undertaken off-site, in schools, with children with Down’s Syndrome, then eval-

uated for efficacy via applied research methods (Nuffield, £147k). Also, the EPSRC-funded ULTRAX project (Cleland, Scobbie) was designed to incorporate ultrasound therapy as an impactful activity, letting us pilot aspects of the research undertaken in the project in a real-world setting (cf. the project site http://www.ultrax-speech.org/ which has links to 7 media stories and to 2 positive client testimonials). Both projects promote collaboration to enhance impact. A QMU bursary for an SLT to undertake a clinical PhD (~£45k) was secured in 2011. The doctorate comprises case studies of ultrasound therapy for children with speech disorders associated with cleft palate. Impact in terms of improvements to the speech of clients was achieved as a part of all these activities.

Another approach to impact is to provide well-curated corpora, such as Mocha-TIMIT and DoubleTalk, both based on Electromagnetic Articulatory (EMA). These were created in collaboration with the Centre for Speech Technology Research (CSTR) in 1999 & 2012 respectively. They have been used in automatic speech recognition applications, and DoubleTalk and the EMA recording facility have been used for the creation of automated avatars for text-to-speech by Speech Graphics Ltd. http://www.speech-graphics.com/, a spin-out company from CSTR in the commercial sector.

We share events for "pathways to impact" so that multiple research projects can contribute. For example, three ESRC-funded sociophonetic / acquisition projects (Lawson, Scobbie, Zharkova) contribute to activities such as outreach to the general public, media events, science-centre or local group outreach events and workshops with clinicians. Such events can present a broader picture of our research in phonetics, contemporary changes in Scottish English accents and acquisition (e.g. The One Show, BBC, on Scottish Accents in April 2013).

We have gained specific funding or in other ways enabled staff to develop impact from research:

a. The MRC-funded research project showing EPG to be beneficial in the treatment of speech disorder among children with Down's Syndrome (2005-2008, £350k, Gibbon, Hardcastle) employed a conventional treatment control group. Additional funding from the Baily Thomas Charitable Fund (£~40k) in 2008 offered EPG therapy for those children, resulting in positive outcomes that otherwise would not have occurred (Case Study 2).
b. Our ultrasound and sociophonetics research have led naturally to impact in education and training, influencing curricula, teaching materials, and practice "significantly beyond the submitting HEI". Examples include formal workshops (Scobbie: Netherlands LOT Summer School 2013) in Ultrasound Tongue Imaging (UTI) and securing funding for the Seeing Speech website at http://www.seeingspeech.arts.gla.ac.uk/uti/ (Lawson, Scobbie: Carnegie Trust, £40k, 2012-13). The site, of indexed films of model IPA articulations, already feeds into the curricula at the 5 partner Scottish institutions (2012). It uses QM-made MRI and UTI movies of Beck and Esling (Dr John Esling, president of the IPA) as reference talkers. It launched formally in September 2013 but in January-July 2013 already attracted around 7 page-views per visit, on an average 250 visits per month. See historical usage figures at http://www.ipaarticulation.arts.gla.ac.uk/cgi-bin/awstats.pl.
c. Pilot studies of ultrasound therapy have produced positive client and parent testimonials http://www.ultrax-speech.org/links and received media and then public interest (e.g. Scotsman 01/09/2011, Scotland on Sunday, 14/05/2011, Times Educational Supplement, 09/09/12).
d. Research into vowel system disorders (Watson) underpins a new clinical instrument, the PPSA, put online for clinicians to download free http://www.qmu.ac.uk/ppsa/ in 2012. It was recognised by SLT Caroline Bowen's as "Speechwoman Site of the Month" (January 2013).

c. Strategy and plans

Our key strategies for enhancement of our impactful (and KE) activities in the future are:

a. To facilitate the development and use of impact-creation skills among the existing staff team. To achieve this the division has re-organised teaching and administration loads for lecturing staff, freeing up time for training of clinicians off-site, workshop participation, and research activities. For example, Wood is training clinicians in EPG at the Edinburgh Hospital for Sick Children from Autumn 2013, with expenses covered by an NHS Education award (£5k).
b. To obtain internal and external investment in impactful activity. For example, Cleland has applied for an ESRC Future Research Leaders fellowship, for which QMU has committed to fund a 0.4FTE role for 3 years from October 2015 (value of ~£80k) to set up and run an articulatory

clinic at QMU with ultrasound and EPG. This impact-oriented clinic will also supplement the evidence base via case studies, feeding back into research, which is ideal for our vocational MSc students' research theses. Also, QMU's core Charitable Development Strategy is focusing on plans to deliver articulatory therapy and other audiological and SLT activities drawing on our research. This strategy is consciously designed to enhance impact as well as providing student placements. To this end, we are collaborating with NHS therapists (including adult and paediatric leads) to plan the design of a "well-being on wheels" WOW bus for off-site impact, taking equipment to hard-to-reach locations and providing resources for wider collaboration in articulatory and other specialist therapy.

c. To continue to provide an integrated framework for impactful activity in externally-funded research projects, as appropriate. For example, the Ultrafest workshop in (f) will be a collaborative "route to impact" event associated with the EPSRC-funded ULTRAX project (Scobbie, Cleland) and two other ESRC grants (Lawson, Scobbie, Zharkova, Lickley).
d. To collaborate with a wider range of charities, professional Special Interest Groups and policy makers to seek input on possible research avenues and to help channel research findings into the community and institutions responsible for supporting communication needs.
e. To expand training in articulatory analysis. For post-graduates, researchers and clinicians, Wrench (Autumn 2013) and Scobbie (Spring 2014) have been invited to lead workshops in Brazil. We also aim to expand and enhance the Seeing Speech website (e.g. we have collaborated in an AHRC (Big Data) application, Autumn 2013).
f. To train clinicians in Ultrasound Tongue Imaging (UTI) and Electropalatography (EPG) therapy. As well as (a) above, we have organised a clinician study day at the Ultrafest VI Conference. Also, as part of her PhD studies, an SLT (Roxburgh) is evaluating UTI as a tool for use in a clinical setting in collaboration with clinicians (cleft palate team) (Autumn 2013-Spring 2014).
g. To continue public engagement and outreach. For example Roxburgh will be a "Researcher in Residence" at local primary schools in the academic year 2013-2014, demonstrating UTI.
h. To extend potentially impactful research. For example, our work in Vocal Profile Analysis, quantitative acoustic analysis and telematics for SLT have led to a prototype Voice Health Check Tool ("FitVoice"), using smartphone technology. Funding had been obtained from Scottish Enterprise (Beck and F. Schaeffler, £26k, 2008-2009) and we aim to adapt the method for people with Parkinson's Disease on an iPad platform (Ma, F. Schaeffler and Beck).

d. Relationship to case studies

Case Study 1: on-going financial viability of Articulate Instruments Ltd. arising from its UK / international customer base, both clinical and non-clinical, with some early steps towards UTI therapy.
Case Study 2: uptake and effects of one particular technique arising from our research, i.e. EPG.

Our two case studies illustrate independent strategies towards impact creation but are, of course, related. They reflect the core focus of our impact/research strategy outlined above, i.e. the translation into impactful activity of what we identify as our particular research niche: instrumental articulatory phonetics. Selected activity that has generated notable impact or which is intended to do so after 31 July 2013 has been given here. Some of it is closely related to these cases while other parts reflect the broader research agenda of the UoA outside this niche. We do not include KE activity here, though it enhances the development of impactful collaborations with private sector companies (e.g. Oticon, Propeller) and attracts funding for clinical activity (e.g. ICGA project).

Case Study 2 could have been broadened out to include UTI in addition to EPG. We chose the tight focus on EPG mainly because the two technologies are at different stages in development in research and impact creation. Case Study 1 covers the mainly economic impact which results from underpinning technical research and the strategic decision to spin out Articulate Instruments Ltd. to facilitate CE marking, and hence encourage impact to occur. Neither directly champions UTI, which features so heavily in our future plans, because its level of impact is at an earlier stage.

Both cases are underpinned by overlapping research from the last two decades. We emphasise different types of impact and different strategies towards impact. Our judgement is that both the underpinning research and our impact-creation activities are sustainable, and that our strategy will lead to more impact and impactful research in the future.