Environment template (REF5)

Institution: University of Nottingham

Unit of assessment: UoA4 - Psychology, Psychiatry and Neuroscience REDACTED FOR PUBLICATION

a. Overview

UoA4 comprises the School of Psychology (**SoP**) in the Faculty of Science, the Division of Psychiatry (**DoP**) and the Nottingham Hearing Biomedical Research Unit (**NHBRU**) in the Faculty of Medicine and Health Sciences, and the MRC Institute of Hearing Research (**IHR**).

Together **SoP**, **DoP**, **NHBRU** and **IHR** provide a supportive and vibrant research environment and continue to make a significant contribution to national and international research priorities in their respective areas. This is evidenced in this REF period by:

- over 1400 peer-reviewed scientific publications
- £7 million strategic investment by the University of Nottingham (UoN) in the new Institute of Mental Health (IMH) building
- NHBRU established with £10 million investment from NIHR
- research income from external sources of over £19 million including over £2.5 million for 11 externally-funded research fellowships
- lead or major partners in NIHR awards of £21 million and *Collaboration for Leadership in Applied Health Research & Care (CLAHRC)* funding of £45.5 million
- appointment of 27 new staff across the unit of assessment since 2008
- a substantial increase in PhD awards (154 FTEs) and number of registered research students (219 FTEs), with £1.7 million awarded in externally funded studentships
- the formation or development of a number of centres of research excellence including: the Brain and Body Centre, The Health Technology Cooperative (HTC), the Accident Research Unit, Centre for ADHD and Neurodevelopmental Disorders Across the Lifespan (CANDAL), Centre for Translational Neuroimaging in Mental Health, Cochrane Schizophrenia Group
- major partners in European Commission consortium awards worth €25 million
- significant upgrade of research facilities
- expanded research capacity by opening a new School of Psychology at the University of Nottingham Malaysia campus

SoP has 41 academic staff, drawn from a diverse range of scientific backgrounds. Research in the School covers a broad range of psychological topics and is organised and coordinated by thematic research groups.

DoP is an inter-disciplinary group of 30 psychiatrists and applied psychologists. Their research focuses on understanding the causes, mechanisms and treatment of mental disorder and criminal offending across the lifespan and promoting health and wellbeing.

NHBRU (12 staff) and **IHR** (15 staff) are complementary groups studying core auditory function (**IHR**) and translating this into clinical treatment (**NHBRU**).

b. Research strategy

Achievement of strategic aims for research during the assessment period

In RAE 2008, panel UoA44 highlighted cognitive neuroscience, neuroimaging and the development of early career researchers as major strengths of **SoP**. To build on this, **SoP** has

made several key appointments in neuroimaging and cognitive neuroscience (*Bauer, Derffuss, Nicolle, Pitiot, Schluppeck*), reorganised the Brain and Body Centre under three new interdisciplinary research themes, and developed a new MSc in Brain Imaging. To provide world-leading research facilities for driving research and a focus for collaboration between **SoP**, **DoP** and industry (e.g. Jaguar-LandRover) (see section 5), the *Nottingham Integrated Transport and Environment Simulation (NITES)* facility for driving research opened in 2011 with £1.5 million funding from the University's Capital Investment Fund.

DoP's stated goal was to use the IMH, a partnership between UoN and Nottinghamshire Healthcare NHS Trust, to develop inter-disciplinary research in mental health and to facilitate the application of the findings from that research to clinical practice. This strategic aim has been advanced by the completion of the award-winning IMH Building in May 2012. The IMH provides the base for the NIHR *Collaboration for Leadership in Applied Health Research & Care – Nottinghamshire, Derbyshire & Lincolnshire* (CLAHRC-NDL). Awarded in 2008, CLAHRC-NDL is funded for £17.5 million (from the NIHR and matched funding from regional NHS partners and UoN) and aims to improve the quality, delivery and effectiveness of healthcare in the East Midlands. This success has been consolidated by the award of £28 million for a second CLAHRC with a Mental Health theme (*Morriss*). Achievement of this strategic aim is also demonstrated by a substantial expansion of applied research income (particularly from NIHR) and by building capacity through the appointments of Chairs in Psychological Intervention and Behaviour Change (*Daley*), Medical Statistics (*Yang*) and, most recently, Dementia Research (*Dening*).

The **NHBRU** was established in 2008 with £3.75 million NIHR funding in order to achieve the goal of facilitating the translation of basic auditory science from the MRC-funded **IHR** into practical benefits for patients with hearing impairment. In 2012, a further 5-years (£6.25 million NIHR) funding was secured for this translational unit. **NHBRU** is a partnership between UoN, **IHR** and Nottingham University Hospitals NHS Trust and enhances **IHR**'s links with the University and the NHS. The links between **IHR, NHBRU** and **SoP** have been strengthened via strategic appointments in hearing research (*Hall, Hartley, Shub*).

Future strategic aims and goals

SoP has developed a 5-year research plan and identified a strategic need to build research capacity in *Computational Neuroscience, Social Cognition* and *Psychology of Mental Health*. To increase collaborations and joint funding within the Faculty of Science, **SoP** will be making a number of joint appointments (senior and junior) with the School of Mathematical Sciences in *Computational Neuroscience,* with the ultimate aim of creating a new research group in neural computation and neural engineering. **SoP** has recently made a new appointment in the field of *Social Cognition* (*Einav*) and will be recruiting new posts in the field of Psychology of Mental Health.

Supported by the University's Development Campaign and the UK Charity 'Tourettes Action', a joint programme of research (between **SoP, DoP,** Sir Peter Mansfield Magnetic Resonance Centre and the School of Physics and Astronomy) called the *Nottingham Child Neuroimaging Initiative* (NCNI) has recently been launched. This new collaboration will exploit UoN's international reputation in MR physics and clinical excellence in childhood neuro-developmental disorders to develop a longitudinal atlas of the developing brain.

DoP's broad strategic aim is to continue to build capacity for research that translates a growing understanding of the neurobiological, psychological, developmental and social contributors to mental disorder into clinical applications that have a demonstrable impact on mental health and wellbeing. A specific strategic goal for **DoP** is the development of a multi-disciplinary centre for dementia research under the leadership of the recently appointed Barchester and Nottinghamshire Healthcare NHS Trust Chair in Dementia.

As an interdisciplinary collaboration with computer science and engineering based in the **DoP**, the *NIHR Health Technology Cooperative (HTC)* will aim to bring patients, clinicians,

academics and industry together to develop and implement effective technologies to promote mental health.

NHBRU priorities will focus on strengthening collaborative research partnerships with Nottingham University Hospitals Trust to become a national hub for early phase multi-centre trials, especially for cochlear implantees and people with tinnitus. The UoN is committed to expanding hearing science and will shortly appoint a new director of the **IHR** (a UoN post) to strengthen research collaboration between **NHBRU**, **IHR** and other academic units.

Research Groups

SoP: Major research themes in **SoP** include *Visual Neuroscience*, *Behavioural Neuroscience*, *Perception and Action*, *Cognition and Language*, *Human Development and Learning* and *Personality, Social and Health Psychology*. Recent achievements include; understanding attitudes towards new energy sources (EPSRC); revealing how associative learning changes over time (BBSRC); characterizing the mechanisms behind value based judgements (BBSRC); investigating the skills underlying maths competency (ESRC); uncovering how important aspects of cognitive control develop in humans (ESRC); and mapping the topography of human somatosensory cortex *in-vivo* at unprecedented levels of resolution (BBSRC).

In addition to basic psychological research, **SoP** conducts translational research on a number of important clinical conditions that affect brain function and social welfare. Examples include, evaluating hippocampal activity in schizophrenia (Royal Society); generating new insights into the plasticity of motor (BBSRC) sensory (Wellcome Trust) and cognitive systems (ESRC); harnessing newly discovered knowledge of neural plasticity to develop novel rehabilitation strategies (Age UK, NIHR, ESRC); and understanding and assisting young people who self harm (NIHR & DoH). **SoP** also hosts the *Accident Research Unit*, which translate empirical work on cognitive processes to understand driver behaviour and improve road safety. This group have recently developed an animated hazard perception test (Driving Standards Agency); new training procedures for learner drivers using simulation (EPSRC); and have revealed how people with autism learn driving skills (Leverhulme Trust).

DoP: Research is organised into three areas with significant collaboration and integration across groups:

Clinically applied adult mental health includes strengths in mood disorders, forensic mental health, epidemiology and dementia. It also includes the *Cochrane Schizophrenia Group*, a centre of excellence for systematic review. Members of this group have leading and integral roles in several large-scale collaborative projects, including funding through numerous NIHR streams such as Programme Grants, CLAHRC, HTA and SDO, the MRC-funded AESOP studies, and the EU. Recently funded projects include: an investigation of the utility of visual arts interventions in enhancing the health and wellbeing of those with dementia (Arts and Humanities Research Council).

Child and adolescent mental health and wellbeing research is largely focused within the Centre for ADHD and Neurodevelopmental Disorders Across the Lifespan (CANDAL) with additional strengths in behavioural interventions. ADHD research is a major focus and an internationally recognised strength with on-going research into the early detection, intervention and management for ADHD in community and clinical settings. Other research strengths include community-based (especially schools) interventions for mental health and wellbeing in children and adolescents; Tourette's Syndrome and risk factors for obesity. Members have leading and integral roles in several large-scale collaborative projects, including funding from NIHR (CLAHRC, HTA, HTC, Programme Grant, PRP and SDO), EU and Action Medical Research. Recently funded projects include the NIHR Healthcare Technology Co-operative (HTC) in Mental Health and Neurodevelopmental Disorders (£800K).

Centre for Translational Neuroimaging in Mental Health aims to understand the mechanisms of psychiatric disorders in order to develop and evaluate clinically relevant applications of technology. This group has been supported by a continuing series of MRC project grants and is an integral part of the MRC funded programme that supports ultra high-field magnetic

resonance imaging in Nottingham. Recently funded projects include an MRC Experimental Medicine Programme Challenge grant for defining the disturbance in cortical glutamate and GABA function in psychosis.

NHBRU has a research portfolio encompassing seven specific areas of translational research: tinnitus aetiology and management; habilitation of hearing loss; sensori-neural plasticity and rehabilitation; cochlear implantation; paediatric ENT and audiology; large scale studies of hearing health; and advanced imaging and translational neuroscience. The translational programme draws together basic scientists and clinical academics to provide an evidence base for clinically relevant challenges facing hearing services. In addition to its 5-year core renewal funding, recently funded projects include two major industry awards for evaluating sound therapy for people with tinnitus and implanted devices for people with single sided deafness (both UK 'firsts').

IHR conducts research into: the structure and function of the auditory system; auditory signal processing; auditory learning and development; auditory disability; spatial hearing and auditory scene analysis. Methods include physiological and histological studies of mammals and psychophysical and experimental research with human participants with normal hearing, impaired hearing and cochlear implants. This research is core funded by a renewable 5-year MRC grant of £15 million.

c. People, including:

i. Staffing strategy and staff development

Enhancing career development

The University strives to help staff reach their full potential and ultimately develop successful and rewarding research careers. To support this, mentorship, annual appraisals and personal development and performance reviews are provided. Clinical academics have joint NHS/University appraisals. The University has implemented the Concordat to support the development of researchers and incorporated the researcher development framework (www.vitae.ac.uk). An extensive range of professional development courses are offered within the University, such as grant-writing, research fellowship application workshops, research supervision training and research management courses.

Supporting equality and diversity

The University has been awarded the Athena Swan Silver Award and has established the WINset committee to ensure equality of opportunity, representation and recognition of women in Science Engineering Technology and Medicine. **SoP** has recently renewed its ATHENA-SWAN silver award, and is one of only 4 Psychology departments in the UK with this award. **NHBRU** gained its Silver Award in September 2013 and is contributing to the School of Medicine (including **DoP**) team that is currently working towards the ATHENA-SWAN silver award. Both Schools are working to create an environment free from discrimination. Valuing diversity is fundamental to UoN's goals and practice (Equality and diversity), and is underscored in new staff induction procedures. **IHR** supports the RCUK Equalities and Diversity Policy, promoting equality through communication and on-going awareness training. The renewal of the **IHR** Investors in People accreditation confirms this commitment.

Supporting research staff & maximising sustainability

SoP has specific policies to support the research activities of academic staff. Funding is available via a grant pump-priming scheme, an annual research and training grant scheme, an equipment fund and a conference travel fund - all administered by the School's *Research Committee*. In 2013, **SoP** introduced a new Sabbatical Leave Programme (SLP) to foster the delivery of high quality research outputs and research grant applications. The appointment of four new graduate teaching assistants enables flexible teaching cover for the SLP. The School

has a policy of replacing professors, where appropriate, with more junior staff appointments to allow scope for promotion. In the assessment period, all junior members of staff who have applied for promotion, and received School support, have been successfully promoted. To increase the sustainability of different research groups, early career researchers have secured 9 competitive externally funded research fellowships from a range of funding bodies (Wellcome Trust, Leverhulme Trust, NIHR, ESRC), generating research income with a total value of over £2 million. To build on this success, **SoP** has introduced a School Fellowship scheme - competitively awarded posts designed to facilitate the development of promising independent early career researchers in order to win externally funded research fellowships. The first recipient (*Roach*) successfully obtained a 5-year fellowship from the Wellcome Trust. **SoP** has recently appointed two new School Fellows (*Nicolle*, *Denniss*). Externally funded research fellows are offered permanent academic posts at the end of their fellowships (*Webb, Roach, Shubb, Schluppeck, Cragg*).
DoP academic staff training focuses on updating research skills (e.g. systematic review, structural equation modelling, grant application processes) as well as promotion workshops. **DoP** has a commitment to retaining excellent researchers and to fostering home-grown talent - successful support of career development is demonstrated by promotions in the REF period (Research Fellow to Lecturer (*Groom, Liddle)*; Associate Professor to Reader (*Doody, Sayal, Vollm*); Reader to Chair (*Doody*)). A Wellcome-funded clinical research fellow (*Palaniyappan*) has been appointed to a University-funded Associate Professor post. Both **SoP** and **DoP** hold an annual research away day for all research-active staff to strategically plan future research goals.

Effective development of early career researchers
Both **SoP** and **DoP** support early career researchers through allocation of significant start-up funds (up to £30K to facilitate rapid establishment of research programmes), grant writing boot camps and training delivered by the Staff Development Unit. Conference funding is available for junior academic staff and researchers on fixed-term contracts. **SoP** staff members are assigned a research mentor to offer support and advice on internal and external funding opportunities and all applications go through a rigorous internal peer review process. The School's Fellowship Officer (*Webb)* supports applications to externally- and internally-funded research fellowship schemes. Mentors in **DoP** are assigned to junior academics and early career researchers to provide regular support, and maximise opportunities for developing research skills and careers. Events to improve transferable research skills are funded regularly through the staff development fund and targeted at researchers.

ii. Research students

Across UoA4, the number of postgraduate research (PGR) students registered in each academic year has been relatively stable and includes students completing PhDs in **SoP**, **DoP** and **IHR** as well as a number of applied courses. An unusually large entry group in 2007 have now completed their studies, and overall numbers are increasing. The number of students completing a PhD each year across UoA4 has increased from 20.5 (FTE) students completing in 2008/09 to 33.7 completing in 2009/10 and 33.6 completing in 2010/11. Over 154 (FTEs) doctoral degrees have been successfully awarded during the assessment period. These figures indicate a healthy PGR community with a critical mass of students and a culture of supporting and enabling PGR level training and development.

Building postgraduate research student capacity
SoP and **DoP** are both part of the new ESRC Doctoral Training Centre (DTC) in Psychology and Mental Health and Wellbeing, which funded 10 new students in 2012/13. This allows research units to share the costs of PGR training with the DTC and offers exceptional interdisciplinary training. In addition, staff are strongly encouraged to build training opportunities (PhD studentships), where appropriate, into external grants. **SoP** has worked hard to build postgraduate numbers, by leveraging £80K per year of School funding with funds

from the ESRC-DTC and external partners (e.g. Age UK, MRC, Fight for Sight). **SoP** runs MSc courses in Brain Imaging and in Psychological Research Methods, and considers training at MSc level to be an important part of building postgraduate research capacity. **DoP** has increased funded studentships from 6 to 10 by i) full or part-time internal scholarships funded by **DoP** ii) joint fully-funded studentships funded by Nottinghamshire HealthCare NHS Trust and the (ex-Sainsbury's) Centre for Mental Health and iii) competitive studentship competitions with the MRC and other Public and Third Sector organisations such as Mental Health Research UK.
IHR studentships are flexible to match the breadth of the research portfolio to the candidate's individual skills. Studentships on a new Masters-PhD scheme (1+3) with enhanced stipend level have increased, and in future more translational projects will be offered via **NBRUH**. **NBRUH** renewal of its core funding included an increase in PhD studentships from 3 in 2009 to 6 per year from 2012 onwards. Further studentship support has been obtained from the University and the British Tinnitus Association, making a total of 9 current PhD students.

Fostering a thriving research culture for postgraduate research students
A thriving research culture is made possible by:
(1) High Quality Supervision. Every PGR student has primary and secondary research supervisors. In **SoP** and **DoP** a dedicated postgraduate tutor provides a point of support for all PGR students and progress is monitored via a formal supervision procedure. A minimum of 10 formal supervisions per year are submitted to the director of postgraduate studies. To ensure successful completion of PGRs within the allotted four years, an independent member of staff assesses and reports on student progression and the quality of supervision each year. All **IHR** PGR students have one supervisor from **IHR** and another from the University.
***(**2) Appropriate Skills Training.* PGR students receive credit for completing graduate school and ESRC-DTC courses and are funded to attend relevant external training courses. **DoP** offers additional internal training opportunities including specialist research training in qualitative methods, systematic review skills and advanced statistics.
(3) Networking Opportunities. **SoP** and **DoP** organises frequent internal and external seminars and all final year PGR students present their work at an internal seminar. **DoP** provide funding for PGR students to run their own website and monthly seminar series sharing information on research, training and funding opportunities. **IHR** and **NHBRU** have joint bi-annual research days, and a shared seminar program, which all PGR students from both units attend. **SoP** and **DoP** organise an annual PGR student research day where they share their work (poster or short talk) with other researchers. All students can access travel bursaries from the graduate school. International conference presentation is strongly encouraged to promote networking and ensure our students develop into internationally renowned researchers.
(4) Research-Friendly Environment. Modern offices and access to state-of-the-art research equipment provide a solid foundation for developing a strong research culture. All PGR students are based in the same building as their supervisors and have access to appropriate equipment and resources (see Section 5). Excellent research facilities and support mechanisms ensure that PGRs can achieve their full potential. The success of these measures is demonstrated by a PhD student completion rate of over 90% across the unit of assessment.

Supporting and developing staff to provide effective doctoral supervision
The **SoP** and **DoP** handbook and quality manuals detail the role and expectations of a PGR supervisor. These expectations are monitored at the student's annual review, and via supervision logs and student feedback. The PGR representatives are the first port of call for all staff should they require advice or support on any issue related to PGR supervision. Staff members new to PGR supervision are paired up with a more experienced supervisor for their first supervisory role. The Nottingham Graduate Centre provides workshops on PGR supervision, and within **SoP** there is an Education Forum open to all staff, which includes the latest information about University-level PGR issues**. IHR** encourages development of supervision skills through attendance at management training courses offered by MRC and RCUK. **IHR**'s mentoring arrangements also support an enhanced level of doctoral supervision.

Promoting and offering diversity in postgraduate training

All departments within UoA4 provide fully funded studentships including scholarships for international students and additional travel funding if needed. This removes many financial barriers to participation. Both **SoP** and **NHBRU** have ATHENA-SWAN silver awards, and as a part of that process routinely monitor diversity issues and provide mentoring to PGR students. This is particularly important for reducing female drop-out rates, but implementing this program benefits all staff and minorities. Part-time studentships are available to attract a wider range of students, especially mature and female students. 62 part-time PGRs have studied in UoA4 over the 2008-2013 period, with 4 in **NHBRU** or **IHR**, 16 in **DoP**, 24 in **SoP** and 18 taking applied psychology courses or joint courses. **DoP** offers research studentships to PGR students coming from clinical backgrounds including nurses and allied health professionals, which increase diversity within the Division. The University also provides strong support for international diversity. **SoP,** via its presence at the UoN Malaysia campus, encourages inter-campus research trips by PGRs. Joint PhD studentship opportunities are in place with Korea University (South Korea), Lund University (Sweden) and Amity University (India). **DoP** has close links with the Shanghai Centre for Mental Health and Fudan University Shanghai, and provides funded internships for PGRs and early career researchers to travel between these centres.

d. Income, infrastructure and facilities

Research income

University-administered spending on research grants over the REF period is documented in REF4b. UoA4 also has strong links to the NHS and benefits from a number of collaborative projects which are not fully captured by these figures. These include the £17.5 million NIHR-funded CLAHRC-NDL, led by researchers in **DoP**, £28 million for a second CLAHRC-NDL, plus an additional £21 million in NIHR awards (**DoP**) and £10 million funding to **NHBRU**. **DoP** has also been successful in attracting awards to support collaborative basic and translational imaging (£400K MRC Experimental Medicine in Mental Health; £4 million MRC programme grant with Manchester and Cardiff). A translational collaboration between **DoP** and Nottinghamshire Healthcare NHS Trust has recently received Transformational Programme support of £150K to establish a *Neuromodulation Treatment Centre* to deliver neuroimaging-guided Transcranial Magnetic Stimulation (TMS) for treatment-resistant depression and hallucinations. **NHBRU** has received £1.5 million in NIHR funding and recently secured an award of £350K to set up a Tinnitus Clinic.

An aim across the UoA was to increase its number of international research partners. This has been achieved by members of both **SoP** (*Paus/Lawrence, Underwood, McGraw*) and **DoP** (*Hollis*) acting as major partners in 4 consortium awards from the European Commission worth a total of €25 million.

University infrastructure and investment

The University has invested substantial resources over the REF period and as a result the facilities available to researchers in UoA4 are first-class. The investment of £7 million in the award winning IMH building has delivered new sound-proofed lab facilities, participant reception area, dedicated interview rooms, breakout spaces and conference facilities.

The opening of a new **SoP** in Malaysia (2009) with 10 academic staff, over 100 undergraduate and 16 postgraduate students has generated new research collaborations, joint supervision of PGR students and presents unique opportunities in cross-cultural research. This has been particularly beneficial in the areas of normal and atypical human development, where a number of joint projects, funded by the Malaysian Government, have been initiated. Other major resource investments include:

(1) *NITES* (Nottingham Integrated Transport and Environment Simulator) - a new £1.5 million facility providing three driving environments (a BMW mini car in a 360 degree projector dome simulating driving on actual roads; a flexible environment simulator; and a fully instrumented

vehicle for on-road research). All three facilities are fitted with state-of-the-art eye tracking technology, as well as visual and psychophysiological testing equipment. Over 8 research groups across **SoP**, **DoP** and the *Faculty of Engineering* make use of *NITES* facilities.
(2) The *Sir Peter Mansfield Magnetic Resonance Imaging Centre* with three MRI scanners (7T, 3T, 1.5T) and a MEG system is one of the premier medical imaging centres in the world. Research groups across UoA4 make use of the scanners and technical support from the SPMMRC in their research.
(3) [text removed from publication]
(4) The *Anechoic Chamber*, which is used by 5 research groups in **SoP**, **IHR** and **NHBRU** to study spatial hearing and sound perception, recently benefitted from a significant refurbishment (£200K), making it one of the leading facilities of its type in the UK.

SoP maintains a number of shared research resources, including: multiple eye trackers (Tobii, CRS and SR) widely used by researchers in the *Human Development & Learning Group*; several EEG facilities (Biosemi, EGI, Sensorium), multiple MRI-guided Transcranial Magnetic Stimulation (TMS) systems, transcranial Direct Current Stimulators (tDCS) that can be used in MRI environments and a robot manipulandum (vBOT) used in the study of motor control; a large library of *standardised psychological tests* including IQ tests for children and adults, and tests of visual processing, attention, language and motor skill.
DoP has new research resources in the IMH including state-of-the-art EEG, as well as TMS, eye tracking and participant testing facilities.
The University fully supports open-access publishing and hosts an e-print repository for archiving research papers and a central fund to cover the cost of open-access publication.

Policy and practice in relation to research governance
In **SoP,** long-term research strategy, succession planning and major research initiatives are managed by the *School Management Group*, which is supported by the *School's Research* and *Postgraduate Committees*. A major internal review of research is also conducted annually at the School's research retreat. External review, at both School and research group level, is undertaken on a 5-year cycle by a panel of externally appointed research leaders in psychology, with the recommendations of the most recent review in 2011 implemented in full. NHS research in the UoA4 is supported by the East Midlands Design Service, housed in the Division of Primary Care, Faculty of Medicine. It is funded by the NIHR to support the development of applied health proposals. It has expertise in medical statistics, clinical trials, health economics and service user involvement. The Institute of Mental Health also provides funds for researchers to set up Managed Innovation Networks (MINs). These bring together researchers, clinicians and service users to stimulate clinically relevant research proposals. **IHR** and **NHBRU** have set up joint reciprocal representation on their internal management boards, as well as a five-person joint external *Scientific Advisory Board*, comprising senior leaders in academia and the NHS, to support horizon scanning and research planning.

e. Collaboration and contribution to the discipline or research base

Effective academic collaborations
Researchers within UoA4 make critical contributions to a large number of national and international collaborations. Members of UoA4 have over 100 international collaborations with researchers in 22 countries around the world, with particularly strong links to researchers in the USA, Canada, Australia and Germany.
Formal departmental links between **SoP** and Lund University (Sweden) and Amity University (India) are encouraging internationalisation. **DoP** has established links with the Shanghai Mental Health Centre with a PGR exchange program. So far 15 PGR and research fellows have benefitted from this program which has resulted in 6 Cochrane systematic review papers and 5 additional journal articles. Developing Nottingham's emphasis on internationalisation, the new **SoP** in Malaysia has 10 staff members conducting internationally recognised research in areas such as active vision, autism, cognitive development, sensory systems, driving and face

perception. **SoP** staff in Malaysia have secured 4 grants from the Malaysian Ministry of Science worth £446K and supervise 16 postgraduate students, 5 of whom are jointly supervised with staff on the UK campus. Funding is available for research visits between **SoP** Nottingham and **SoP** Malaysia for both staff and PGRs.
Major international funded projects include:
(1) FP7 consortium award of £2.2 million for investigating mechanisms of plasticity in the normal and abnormally functioning visual cortex (*McGraw*, **SoP**).
(2) FP7 consortium award of £3.8 million for investigating motorcycle behaviour and causes of motorcycle accidents (*Underwood*, **SoP**).
(3) FP7 consortium award of £1.7 million (ADDUCE) investigating the long-term adverse effects of stimulant medication for treatment of ADHD (*Hollis, Sayal,* **DoP**).
(4) EU-DAPHNE award of £800K to facilitate the development and evaluation of Circles of Support and Accountability (Circles), an innovative community-based approach to resettlement of high risk sex offenders (*Vollm*, **DoP**).
(5) European Science Foundation Research Networking Award of £320K to develop an interdisciplinary research forum on sensorimotor function in health and disease. This has funded 11 international workshops, facilitating the training of early career scientists from across Europe (*Jackson*, **SoP**)
(6) Since 2009, members of **SoP** have helped build collaborative links between Korean and EU scientists via a series of annual 'Brain Science Workshops' held in South Korea (Seoul). Since 2011, these events have been funded by the *Global Partnership Fund* (awarded by Department of Business, Innovation and Skills). A Memorandum of Agreement has been established between Korea University and UoN to award dual PhDs. To support these links both universities have both contributed start-up funding and financial support for 2 full-time PhD students at each centre (*Jackson*, **SoP**).

Collaboration within the University
Staff members across the unit contribute to several university-wide organisations that promote inter-disciplinary research.
Horizon (*O'Malley, Ferguson, Spence* plus 42 other academics from computer science, engineering, business, maths and English) is a major research institute investigating how digital technology enhances the way people live, work, play, learn and travel. Horizon supports 4-year PhD studentships and organises regular seminars and events that support researchers in developing ideas and obtaining funding for research on the digital economy.
Children & Childhood Network (*Pitchford, Sayal, Groom, Cragg, Jackson, Townsend, O'Malley, Glazebrook* and over 90 academics across UoN) draws together academics from psychology, psychiatry and social sciences to facilitate multi-disciplinary research aimed at improving all aspects of children's lives.
Brain & Body Centre (28 researchers from **SoP**, **DoP** and **IHR** with additional collaborators in maths and physics) is an interdisciplinary centre for neuroimaging that brings together researchers studying brain development, brain plasticity and brain-body interactions. The centre hosts research seminars, coordinates teaching on the MSc in Brain Imaging and supports early career researchers within the neuroimaging domain. The Brain and Body Centre is leading the *Nottingham Child Neuroimaging Initiative*, an innovative project which uses brain imaging to understand developmental change and the origins of developmental disorders.

Collaboration with external bodies
Staff within UoA4 collaborate with the NHS, government and industry, allowing excellent integration of basic and applied research. As outlined in Section b, *CLAHRC-NDL* (*Adams, Daley, Glazebrook, Hollis, Morriss, McMurran, Yang, Sayal*) is an NIHR-funded research collaboration with regional NHS organisations - members of **DoP** lead 2 of the 4 research themes (Mental Health; Children and Young People). The NIHR-funded HTC (*Hollis, Daley, Groom, Jackson, Liddle, Morriss* plus academics in engineering and computer science) aims to improve collaboration between academics, industry and the NHS leading to new healthcare technologies. The *Cochrane Schizophrenia Group* (*Adams*) brings together academics from

around the world to review Schizophrenia research and maintain a database of clinical trials. Over 800 researchers have been trained by this group in Nottingham to conduct systematic reviews. The *East Midlands National Centre for Sports and Exercise Medicine* (*Glazebrook*, *Jackson*) is a collaboration between the Universities of Nottingham, Leicester and Loughborough and is funded by £10 million of Olympic legacy money. It provides a focus for interdisciplinary research into exercise as an intervention in mental health.

Researchers throughout UoA4 are collaborating with industry and charities to increase the impact of their research. Within **SoP**, the *Accident Research Unit* conduct studies in conjunction with the Institute of Advanced Motorists, the Department for Transport, the Highways Agency, the Vehicle and Operator Services Agency, the Driving Standards Agency, South Yorkshire Police and the Scottish Government, in order to improve road safety. The Visual Neuroscience Group has incorporated therapeutic learning protocols, developed in the laboratory, into a video game that has been made freely available to treat adults with amblyopia ('lazy eye'). **SoP** researchers collaborate with a number of charities including Harmless (*Townsend*); Young Minds (*Townsend*); Shine, the association for spina bifida & hydrocephalus (*Smith*); the James Tudor Foundation (*Jackson*).

In **DoP**, the *Child and Adolescent Mental Health and Wellbeing* research group measures the utility of computerised cognitive tests, including a mobile phone 'app', to help assess and manage children, adolescents and adults with ADHD. Staff (*Dening, Jones*) contributed to the DOMINO-AD trial which showed that continuing treatment with the cholinesterase inhibitor donepezil is of benefit even to patients with severe dementia, which has implications for clinical practice internationally and will affect NICE guidance. The Translational Neuroimaging group's work on psychosis involves applying basic neuroimaging research on psychosis in a systematic evaluation of diagnostic procedures. Links with charities from **DoP** include: Rethink mental illness (*Adams*); Alzheimers Society (*Jones*); Age UK (*Jones*); ADDISS ADHD information and support service (*Hollis*); Tourette's Action (*Jackson*); Save the Children (*Browne*); Nobody's Children Foundation (*Browne*); Hope & Homes (*Browne*);

Individual researchers have made critical contributions to external bodies. *Morriss* **(DoP)** is the lead of the NIHR-funded MHRN hub for the East Midlands plus South Yorkshire and was a member of the NICE mental health topic review panel (2008-2011). *Morriss* is also Chair of the NICE Guideline Development Group (GDG) for Bipolar Disorder (2012 onwards) and *Hollis* for psychosis and schizophrenia in children and young people (2010-2013). *Hollis* and *Sayal* were members of the ADHD GDG (2008).

Outreach activities

Members of UoA4 contribute to a wide range of outreach activities at both local and national level. These include the British Science Festival, Brain Awareness Week, the Big Bang Fair, Understanding Animal Research and events organised by the Sutton Trust. More targeted communication activities include working with the National Police Improvement Agency, the Parliamentary Advisory Council on Transport Safety, the Department for Transport and the Association of Industrial Road Safety Officers, on various aspects of driving and road safety. Researchers have also worked with Police services, Youth Offender teams, local secondary schools and the NHS.

Co-ordinated by **SoP**, the Summer Scientist Week recently received a Vice Chancellor's Award for its significant contribution to public engagement. Since 2007, It has attracted over 1000 young children and their families, to take part in research on human development and learning.

The MIRAGE system (*Newport*), an innovative tool for virtually altering body representation, won an international award 'Illusion of the Year' at the Vision Sciences Society annual meeting (2012) and has been demonstrated to the public at over 10 national science events.

Editorships and editorial boards

6 Editorships: British Journal of Psychology (*Ferguson*); Child & Adolescent Mental Health (*Sayal*); Criminal Behaviour and Mental Health (*McMurran*); Frontiers in Cognitive Science (*Tunney*); Frontiers in Perception Science (*Schluppeck*); Journal of Neuropsychology (*Jackson*). *18 Associate Editor positions* including: Journal of Behavioural Medicine

(*Ferguson*); Journal of Consulting and Clinical Psychology (*McMurran*); Journal of Experimental Psychology: Animal Behavior Processes (*Bonardi*); Ophthalmic and Physiological Optics (*McGraw*) and Quarterly Journal of Experimental Psychology (*Jackson, Haselgrove, Bonardi*). *32 Editorial Board positions* including: Aggression and Violent Behavior (*Browne*); Computers in Human Behavior (*O'Malley*); Consciousness & Cognition (*Underwood*); Criminal Behaviour and Mental Health (*Yang*); Health Psychology Review (*Ferguson*); Journal of the Association for Research in Otolaryngology (*Palmer*); Neuropsychological Rehabilitation (*Lincoln*); Trauma, Violence and Abuse (*Browne*); Vision Research (*McGraw*).

Research funding Body Membership

19 Panel members: ESRC Research Committee (*O'Malley*); MRC Research Committee (*Liddle*); Wellcome Trust Strategic Award Panel (*McGraw*); BBSRC Fellowship Committee (*Cassaday*); MRC Training Fellowship panel (*Hollis*); RAE 2008 panel member (*Hollis*); BBSRC Studentship panel (*Cassaday*); Diet and Health Research Industry Club (*Cassaday*); Joint Research Councils New Dynamics of Aging Commissioning Panel (*Jackson*)*;* Action on Hearing Loss small grants panel (*Palmer*); Medical Research Council Board of Experts (*Morriss, Palmer*); British Tinnitus Association Research committee (*Hall*); ESRC Peer review college members (*Allen, Lawrence, Tunney, Newport, O'Malley, Ferguson*).

Fellowships and Awards

Externally-funded fellowships: *Webb*: Wellcome Trust Research Career Development Fellowship (2008-2013); *Roach*: Wellcome Trust Research Career Development Fellowship (2012-2017); *Hartley*: Wellcome Trust Clinical Scientist Fellowship (2006-2012); *Palaniyappan*: Wellcome Trust Training Fellowship (2012-14); *Pezze:* Leverhulme Trust (2009-2011); *Allen*: RCUK Research Fellowship (2007-2011)*; Schluppeck*: RCUK Academic Fellowship (2006-2011); *Cragg*: RCUK Academic Fellowship (2008-present); *Pitchford & van Heuven*: East Midlands Development Agency & European Regional Development Fund Business Innovation Fellowship (2011-12).

Positions of Esteem: Adjunct Professor, Korea University, South Korea (*Jackson*); Fellow of the Royal Society for Public Health (FRSPH); Co-Founding President of the British Society for the Psychology of Individual Differences (*Ferguson*); Fellow of British Psychological Society; Fellow College of Occupational Therapists (*Lincoln*)*;* Fellow of Royal Statistical Society (*Yang*); Special Professor of Medical Statistics in School of Public Health, West China Medical Centre of Sichuan University, China (*Yang*).

Prizes*:* Illusion of the Year at Vision Sciences 2012 (*Newport*); Schizophrenia Research prize, 3rd Biennial Schizophrenia International Research Meeting, Florence, 2012 (*Palaniyappan*); British Psychological Society Cognitive section prize 2012 (*Allen*); Lilly Young Investigator Fellow, International Society of Bipolar Disorders, Pittsburgh, 2011 (*Palaniyappan*).