Institution: Swansea University
Unit of Assessment: 4 - Psychology, Psychiatry and Neuroscience
a. Overview

The Department of Psychology conducts distinctive research that reflects two themes: Clinical/Health Psychology and Cognitive/Neuroscience. The Department's upward trajectory is reflected in a doubling of the number of doctorates awarded since RAE2008 and research income in the upper quartile of the UoA, having risen to £1.7 million, 170% up on the previous period. In 2013 there were 37 registered PhD students, more than double the median number of postgraduate research students per academic FTE in the sector; there has been significant investment in staff since 2008, while the department benefits from state-of-the-art facilities. The unit comprises 19 academic staff (7 Professors, 1 Reader, 4 Associate Professors, 5 Senior Lecturers, 2 Lecturers), with ten appointed since 2008. It has well-resourced laboratories within the College of Human and Health Sciences (encompassing research in ageing, health, social policy and psychology), and the College of Medicine's Institute of Life Science.

The approach to research has two underlying principles. Firstly, when considering research, potential i**mpact is a fundamental consideration** at all stages of the process. In addition there has been an **emphasis on developing alliances** such that papers have been **published with nine of the top twenty universities in the Times World University Rankings.** Thus Swansea is locally dynamic but also functions in a worldwide academic environment.

b. Research strategy

Swansea University aspires to be a UK top 30 and a world top 200 university by 2017, working with practitioners to ensure impact and the attraction of non-traditional sources of funding. The Department's vision is to be a *research-led, internationally focussed centre of excellence that sustains psychological research of the highest calibre*. To ensure maximum exposure for a small department a policy was established of focusing research while forming world-wide and world-class research collaborations and networks. The strategy emphasized:

(1) Maximizing impact by focussing research on two core themes;
(2) Developing staff and particularly early career researchers to allow them to excel;
(3) Seeking in addition to traditional sources funds from a range of commercial, private, public and third sector sponsors;
(4) Nurturing a lively postgraduate research community.

The **success of this strategy** is evidenced by:

1. The consolidation of research activity on two themes that have delivered well received basic research that often has been developed to have 'real-world' impact (see impact statement);

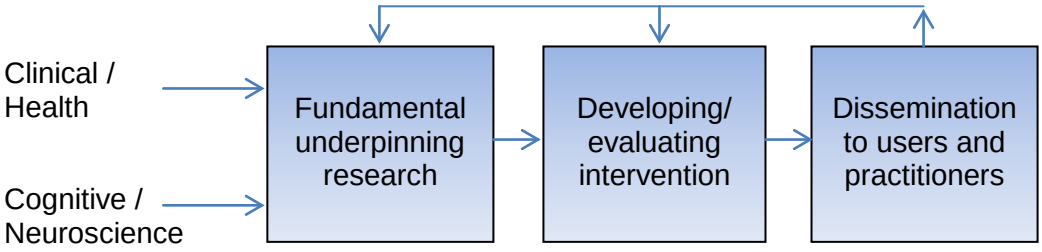
2. The targeted recruitment and effective progression of staff (see Section C below), to establish the critical mass required to advance the core themes;

3. The growth in research income over the period (see Section D below);

4. A vibrant postgraduate community, with more than 40 doctorates submitted in the period.

Performance since RAE2008: Since a small department can only be good at a few things, the research groupings submitted to RAE2008 (Brain and Behaviour, Cognition and Perception, Learning and Behaviour, and Psychology Applied to Health and Medicine) were consolidated into two core themes: Clinical/Health Psychology and Cognitive/Neuroscience. Following RAE2008, the Department reflected on its historical strength in applied work and decided to make the application of its research a strategic priority. Rather than something considered after the event, impact is central to the research process from the beginning. Research has been focused by **introducing a three-stage approach** that at all stages has **impact as a fundamental, driving component.** This sequence encapsulates the research strategy. It informs how research is planned so that although inevitably theoretical considerations initially predominate, the needs of end users may play a part. It informs how researchers operate: fundamental research is seen as only a first step that leads on

to the development and testing of interventions'. It dictates that part of the process is dissemination: there is interaction with end users in addition to academic audiences. The approach allows the response to 'real world' needs, for example national initiatives.



- **Stage 1: Basic research establishes theoretical underpinnings**
- **Stage 2: Methods of intervention in the real world are developed and evaluated**
- **Stage 3: Findings disseminated to interested parties** (see Impact statement for details)

Clinical/Health Psychology: The focus of the clinical/health grouping is "Lifestyle, wellbeing and healthy aging", which is closely aligned to national and international priorities. For example, dementia - described by the UK Prime Minister as a 'national crisis' – is an important research focus in collaboration with the University's Centre for Innovative Ageing. The action plan of the World Health Organization includes areas relating to Swansea research, including breastfeeding, pre-school and school nutrition, and informing consumers about health-related matters. The unit's interests make it well placed to respond to such initiatives (see Impact statement that highlights how research has influenced policy and public recommendations). The **success of the three-stage approach** in integrating fundamental and applied research can be seen in the following examples where success is measured by both theoretical advances published in high impact journals but also real-world application. These include:

- The theoretical insights from studies by Wood and Williams, of those with brain injuries, that led to the development of the St Andrews-Swansea Neuro-behavioural Outcome Scale, now widely used in the United Kingdom, Australia, Canada and the USA;
- Reed's findings on the impact of parenting stress on autistic individuals that led Local Education Authorities (e.g. Barnet) to take a new approach;
- The Willner findings on alcohol purchasing led to changes in legalization in both the UK and other countries (see case study);
- Fundamental insights into the impact of glucose release on mood and cognition have influenced public-health advice and aided the development of novel items by the food industry (see case study).

Cognitive/Neuroscience: the basic principle that it is beneficial to establish **collaborations** is illustrated by a few of many examples:

- Thornton, working with the University of Heidelberg and Computer Science in Swansea, evaluated relevant parameter that enhance the information that is conveyed by pixel-based visualization;
- Dymond, working with Exeter University and the University Medical Centre Mainz, examined the neural mechanisms associated with the impaired decision making associated with pathological gambling;
- Tales, working with Bristol and Cardiff Universities, reported an association between the variability in performance, Mild Cognitive Impairment and Alzheimer's disease;
- Boy (with Cardiff, UCL and Johns Hopkins, USA) found that individual differences in impulsivity were predicted by the levels of the neurotransmitter GABA, with the possibility that they play a role in a range of psychiatric disorders;

- Johnston used feedback from real-time functional imaging to self-regulate the brain (with Bangor, Cardiff and Maastricht Universities): an approach to be examined for its potential therapeutic use.

A benefit of a comparatively small department is that the research community shares ideas readily, enabling cross-fertilisation. In addition to formal meetings of groups, there are many opportunities for informal interaction and ideas, often coming from 'chance meetings at the water-cooler', followed up by prearranged meetings involving those with the necessary skills, both within the department and wider university, but also end-users and those from other institutions.

Sustainability and future plans: The primary objectives for the next five years are to maintain an **integrated, multidisciplinary research environment** that continues to attract talented staff and research students; to foster **strong collaborative links** with research users, and to further increase the quality and quantity of novel and rigorous applied research that has **international reach and significance**. Research activity will continue to be aligned to RCUK (especially ESRC, MRC and BBSRC) and European Research Council priorities, as well as to those of the Welsh Institute for Cognitive Neuroscience. Opportunities to attract research funding through the EU Horizon 2020 programme will be explored and other non-traditional sources of funding identified.

The Department's sustained growth over the period is planned to continue for at least the next five years. This is aligned to the University's objective to **increase the quality and scale of its research**, with a focus on engagement with industry. The strategy for the next five years is therefore to build on strengths and successes, consolidating activity within the research themes, while developing the research base through targeted appointments. The Unit's sustainability will be secured through the development of **new, interdisciplinary collaborations** as well as developing existing research collaborations, such as those with Medicine, Humanities and Computer Science. The three-stage approach will therefore underpin research activities. Planned projects include studying individual differences in the effect of alcohol on decision-making; how motor preparation is influenced by unconscious cognitive conflict; the neuroimaging of disordered gambling: the health effects of Ecstasy/MDMA consumption; developing a model of bilingual language acquisition; understanding the nature of brain damage to inform both research and therapeutic communities.

Measures of success of the Department's strategy for the next five years will include:

- **Doubling** of **research income** (from a broader range of sources);
- A **25% increase** in the number of **postgraduate research students**;
- Establishing **new research networks and collaborations** aligned to the core themes;
- **Hosting major international conferences** in areas of research strength;
- Increasing interactions with **end users.**

c. People, including:
i Staffing strategy and staff development

The strategy has been to ensure sustainability by forging lines of world-leading enquiry tied to the appointment of staff capable of delivering high-quality outputs. As research is central there is an emphasis on the recruitment, development and promotion of both established research staff and ECRs. Of those submitted to RAE2008, fifteen are no longer available to Swansea. This has provided an opportunity to attract ten strong academics from the UK and overseas to help deliver our strategic ambitions and exploit our excellent facilities. For example, consistent with the RAE2008 plan, we recruited staff to maximise the use of the new MRI scanner.

There is a commitment to help ECRs make the **transition to independent researchers** by giving reduced teaching, offering mentoring and priority access to PhD studentships to jump-start a research programme. That **five staff were promoted** to associate professor and one to reader is **evidence that progression has occurred**. A senior member of staff is responsible for overseeing applications from postgraduates and research associates for postdoctoral fellowships. An early success was the **awarding of an ESRC fellowship** to Brown. Funding is available for junior staff to attend international meetings. Time for research is created by placing teaching in blocks.

Sabbaticals, compatible with the research themes, are encouraged; in the period, three staff undertook sabbaticals in Canada, Sweden and Australia.

The University's **Performance Enabling** process clarifies the support and training available to enable optimal staff performance. In 2012, the University won a Times Higher Leadership and Management Award and a UHR Excellence award for this initiative. The process incorporates individual staff KPIs that are related directly to measures of success. At a departmental level, the decision was made to **include impact in annual reviews**, facilitating and monitoring the three-stage research approach. The University is committed to the implementation of the **Concordat to Support the Career Development of Researchers**, being one of the second tranche of HEIs to be awarded the **HR Excellence in Research Award** from the European Commission (which we retained in 2013). The cross-institutional training unit, the Academic and Professional Enhancement Centre, coordinates a comprehensive skills development programme: aligned to the Vitae Research Development Framework it supports researchers in a post-Roberts environment. The contribution of research staff is fully recognized and support mechanisms, and an inclusive culture, promotes a sense of belonging. Since 2011 the **Researcher Development Framework** has **shaped training provision** in four areas: Knowledge and Intellectual Abilities; Personal Effectiveness; Research Governance and Organisation; Engagement, Influence and Impact.

Equality of opportunity is promoted through a Strategic Equality Plan. Seven lecturing staff and 20% of research students are from overseas and a third of staff are female. The University's commitment to gender equality is reflected by the retention of the **Athena SWAN Bronze Award** and in addition the College was awarded its own Bronze Athena-SWAN Award. The Department also has the support of the Women in Universities Mentoring Scheme (WUMS), a Welsh initiative to enhance women's academic career progress. Staff can take advantage of onsite nursery facilities and participate in the University's Childcare Voucher Scheme, which supports affordable and practical childcare provision. All academic vacancies are advertised as suitable for job share, part-time or flexible working, enabling those with caring or parenting responsibilities the opportunity to balance work and home requirements. Promotion data for academic staff are monitored annually by protected characteristics: where appropriate resulting trends are highlighted for action. The University is also a member of Stonewall's Diversity Champions Programme.

Research quality and integrity: To maintain standards in research, staff members are encouraged to participate in the College's research seminar series and to provide constructive feedback to colleagues who present papers. The College Ethics Committee ensures the integrity of research programmes, as do robust procedures at the Departmental level. The College Research Committee oversees the delivery of research projects and has a quality assurance role.

c. II. Research students

There is a stimulating postgraduate programme, with a vibrant community of 37 PhD candidates, and 90 Master's students enrolled on courses in Clinical and Abnormal Psychology, Cognitive Neuropsychology or an ESRC-recognised course in Research Methods; all courses include a project associated with a departmental theme. The number of PGRs per FTE is well **above twice the sector median** and since 2008 40 doctorates have been submitted. The unit operates a balanced approach that involved recruiting PGR students according to their potential and the strategic positioning of their research interests.

The University and College provide a supportive and friendly environment in which to study, combining scientific rigour with applied relevance. Support and supervision is undertaken within a robust framework, ensuring induction into the University and a comprehensive programme of **training tailored to individual needs**. Students have a first and second supervisor and progress is monitored annually by an independent progression team. Students attend and participate in regular research colloquia, organized by both research groups and the department. During the first year all research students receive examined instruction in research methods and at the end of each year give a talk at an internal conference attended by peers and supervisors. The **Postgraduate Academic Board** ensures transparent procedures for probation, annual reviews and completion; arrangements **commended by the QAA**. The WICN runs a 'Graduate School'

that allows students from one centre to benefit from resources in another. In 2010 Swansea organized a summer school on “Cognitive and Affective Neuroscience: Insights from EEG”.

In the 2008-11 period, the University made strategic use of Roberts Funding to develop a **research student training strategy**, including appointing a full-time Research Students Skills Officer and the implementation of a **research student training programme**. In 2011, the University’s Senior Management Team adopted the recommendation of Research Councils UK to introduce an “uplift” of £200 to the fees of all research students, and ring-fenced the income generated to fund an expanded, integrated programme of skills development. Courses are available, without additional cost, to all postgraduate research students that offer comprehensive training. Courses in entrepreneurship and employability are available in addition to academic skills. A **Skills Development Award** is given those who undertake transferable skill training.

At a departmental level research students have personal desks and the necessary computing and related facilities in a series of multi-user rooms that generate camaraderie and the transmission of information and ideas. The University has an extensive modern library that provides desk-top electronic access to hundreds of appropriate journals and databases. Attendance at weekly departmental seminars is expected. The Health and Social Care Conversazione allows experience of speaking to be gained, while subsidized attendance at external conferences aimed at post-graduates, such as those run by the Welsh Branch of the British Psychological Society and the UK Feeding and Drinking group offers additional experience. Importantly **attendance at international conferences is encouraged and facilitated** by departmental funds that allow post-graduates, towards the end of their candidature, to present at overseas meetings. The success of the training received is demonstrated by eight PhD students over the period being appointed to lecturing posts.

d. Income, infrastructure and facilities

HESA data show that research income increased by 170% over the period, and in 2011/12 was significantly above the sector median figure placing it in the upper quartile. Research has been funded by a number of national and international organisations, including one MRC and eight ESRC awards. Consistent with the **policy of exploring a range of funding opportunities**, grants were received from health-related sources, local authorities, charities such as the Leverhulme Trust, and commercial organizations. Other sources included the US National Institute of Health, the European Foundation for Alcohol Research, the Australian NHMRC. In keeping with a policy of establishing research alliances and fostering interdisciplinary collaborations, staff have been co-applicants for ESRC-funded work carried out in the College of Arts and Humanities into linguistics, and EPSRC-funded work in Computer Science. Similarly, individuals have been co-applicants for research council-funded work elsewhere, including work on face recognition with colleagues in Hull and further work on face recognition with Exeter. Two projects, funded by the Welsh Office for Research and Development, in collaboration with local clinical psychologists, have considered interventions for those with learning disabilities.

Grant capture is supported by **an effective institutional framework**. Staff work closely with the Department of Research and Innovation (DRI), which provides support for applications and the managing of external funding. DRI also provides training to develop research staff by providing themed seminars and workshops that increase the quality and quantity of research proposals. The Planning and Strategic Projects Unit also works with academics to support the development of funding proposals, and provides managerial support to those running major projects.

Infrastructure and facilities: The Department has **benefited from significant investment** in excess of £300,000 in laboratory equipment and facilities, addressing the needs identified in RAE2008. The department is now extremely well equipped in all areas of interest. In addition to several dozen general purpose cubicles, facilities include:

- Video and audio recording, and animation suite for stimulus preparation and data analysis;
- A motion capture system for studies of the perception of human movement;
- Access to virtual reality environments/supercomputer processing for imaging data analysis;
- A laboratory with remotely controlled hidden video cameras for micro-analysis of behaviour;

- Actigraphs to monitor sleep and circadian rhythms in field studies;
- A perception laboratory with hardware for millisecond accuracy recording;
- Equipment for monitoring eye movements;
- A dedicated psychophysiology laboratory has facilities for measuring ECG/EMG;
- Two eye blink startle systems and state-of-the art multi-channel neuro-feedback systems.

Perhaps **uniquely in British psychology** there is a suite of bedrooms/testing rooms with full living facilities, in which subjects can live for extended periods. These are used to study circadian rhythms and sleep but also to monitor dietary intake over time.

A key development in the period is the establishment of **state-of-the-art brain imaging facilities**. The College of Medicine's Institute of Life Science (ILS) is an **£80 million investment in medical research**. Phase 1 (£52m) opened in 2007; Phase2 (£29m) in 2011. ILS houses facilities of vital importance to the Unit, including a **Siemens MAGNETOM® Skyra 3 Tesla MRI** and an associated Cambridge Research Systems BOLD fMRI screen, mirror-fitted head coil, and fibre optic MRI compatible response boxes. A stimulus presentation PC has E-prime and Presentation (Neuro-biobehavioral Systems), while Brain Voyager is used for image analysis and visualisation. High-resolution CT scanning with the possibility of anatomical slicing (SOMATOM®) has been acquired.

Consistent with the strategy set out in RAE2008 for the development of brain imaging, facilities were improved in 2010 to support a long-term interest in EEG. A fully equipped, state-of-the-art **high-density EEG laboratory was created within a Mu-Metal Faraday chambe**r. The system allows for the recoding of up to 128 EEG channels in addition to 8 auxiliary channels for EOG, EMG, and/or ECG recordings. The system also interfaces with additional sensors for Galvanic Skin Response and a plethysmograph, allowing direct measures of skin impedance and blood flow concurrently with EEG, EOG, EMG, and/or ECG recordings. These facilities complement those available to the UoA through the Welsh Institute of Cognitive Neuroscience in both Cardiff and Bangor, where the Department has priority access to some of the best brain imaging facilities in Europe, including Magnetoencephalography and Transcranial magnetic stimulation

e. Collaboration and contribution to the discipline or research base

A key policy was to encourage collaborations and to establish research networks to create critical mass and to benefit from complementary facilities and expertise. The **success of the strategy, and evidence of functioning in the international arena,** is demonstrated by publishing papers over the REF period with **colleagues based in 21 countries and 34 UK universities** (including 14 Russell Group HEIs). In the USA alone there were collaborated with 23 universities, including six out of eight of the **Ivy League: Pennsylvania (6 papers), Harvard (5 papers), Yale (2), Princeton (2), Cornell and Dartmouth**. Of many examples:

1) Supported by two ESRC grants, Blagrove published 3 papers with the Center for Sleep and Cognition at Harvard Medical School, and UC Berkeley. There was evidence of a seven day memory consolidation process.

2) The US National Institute of Health funded Parrott and Case Western Reserve University, to conduct the first study of the influence of Ecstasy during pregnancy. The findings generated considerable interest when they were published in Paediatrics, the top journal in the area: there was evidence that motor and cognitive problems resulted.

3) Wiedemann, working with colleagues in the University of Pennsylvania and Princeton, in **Nature NeuroScience** reported for the first time that the neuronal activity of neurosurgical patients suggested that humans and other animals code spatial information in similar ways.

Parrott holds an honorary post at Swinburne University in Melbourne. As well as jointly publishing several papers and running two conferences, an Australian **4 year National Health and Medical Research Grant** funded joint work on the neural damage caused by taking ecstasy. Izura was funded by the Spanish government to work with the University of Murcia: with colleagues at York

and Bangor they won the 2012 Spanish Society for Experimental Psychology prize for ***'best paper of the year'***. From 2011-13 Tucker was guest researcher at the Stress Research Institute of Stockholm University and in addition published with colleagues from Paris Descartes, Monaco and Toulouse Universities. To facilitate international relationships joint appointments have been made. Brysbaert, Research Professor at Ghent University, works on the production of language, particularly in those who are bi-lingual. The development of a model of bi-lingual learning is a stated aim. Similarly Ruby of the Neuroscience Research Institute of the University of Lyon works with Blagrove on the role of sleep in memory consolidation, a relationship that was facilitated by a post-doctoral fellow from Lyon spending 16 months in Swansea, funded by the ESRC.

Within Swansea there are **initiatives to facilitate interdisciplinary research**. Tree and Izura are on the Executive Committee of the Language Research Centre that involves the Institute for Arts and Humanities, that has been funded by ESRC to examine genetic influences on the use of language. The University was awarded **EPSRC Bridging the Gaps Funding** to stimulate cross disciplinary creative thinking. The initiative was embraced by both research groupings and funding was awarded for a series of projects: lexical retrieval in dementia with colleagues in English; visualisation of EEG data with Computer Science; the study of networks with Computer Science and Biology; the relationship between discounting the future and food temptation with Economics; the communicative profiling of online child grooming with English; mobile phone feedback and health behaviour change with Computer Science. Funding from the **Royal Society Wolfson Laboratory Refurbishment Scheme** has installed state of the art motion detection devices that will be used by Parrott, in cooperation with Biological Sciences, to look at the response to drug taking. Wood and Williams, together with University College London, will use exome sequencing in those with brain injury to find predictors of psychological co-morbidity. With the School of Engineering the consequences of brain injury will be considered using neuroimaging techniques, diffusion tensor imaging and for the first time finite element analysis (used by engineers).

The Department has made a major contribution to the discipline:

- Members of the department sit on the editorial boards of thirty journals;
- Over the period, the Department has received **several hundred invitations** to speak at international meetings. For instance, Wood gave 36 invited talks and Parrott 42;
- Reed is the President of the European Association for Behaviour Analysis;
- Wood was the Director of the British Neuropsychiatry Association, a **unique post** for a psychologist, and was awarded a **'Lifetime achievement award'** by the Welsh Government for his contribution to rehabilitation. In 2013 it was announced that he is to receive the prestigious **Rosenthal Memorial Award**, given in America every three years to recognize those "*who have made a major contribution to research or rehabilitation in the area of traumatic brain injury*";
- Two international conferences and two regular meetings of academic societies were hosted at Swansea during the period. Staff also served on the organizing committees of conferences held in Australia, Belgium, Malaysia and the USA.

Examples of established networks include Tale, funded by the Swansea based Older People and Ageing Research and Development Network, who created a **cognitive aging grouping** across Swansea, Cardiff and Oxford universities. Funded by the BPS, Lee set up a network involving Birmingham, Leeds and industrial partners that **considers the control of food** intake. Dymond is founder of the **Neuroscience Special Interest Group** of the Association for Behavior Analysis International, and with a colleague in Vermont was funded by the Learning Disabilities, Autism and Neurodevelopmental Disorders Network to develop ideas in this area. Wood coordinates the **Brain Injury Research Group** - an affiliation of UK research and clinical neuropsychologists. The **International Life Science Institute** encourages academic, government, and industry scientists to interact to benefit health: in this context Benton has been involved with activities in **Europe, North America, Japan, Brazil and South-East Asia.**

In summary Swansea has **a well-developed and demonstrably successful research strategy;** in which **impact is embedded;** from which the development of **world-wide collaborations have borne fruit**.