

Impact template (REF3a)

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| Institution: The University of Leeds |
| Unit of Assessment: UoA6 |
| <p>a. Context</p> <p>UoA6 staff and research profile was substantially adjusted after 2008 (see REF5) to impact on priority areas articulated in the strategy documents of bodies such as the RCUK and FSA:-</p> <ul style="list-style-type: none"> ● food security, quality of life and health of the population ● increase economic competitiveness, e.g., through high value manufacturing via physical sciences ● increase public awareness and dialogue with scientists ● generation of policy guidance advice & knowledge that makes real differences to clinical practice ● protection of consumers' other interests (in food safety & hygiene) in relation to food and drink. <p>These bodies recommend such priorities be best achieved via combinations of high quality basic and applied research in agriculture, bioprocessing, food and health issues, plus non-lab based trials and interventions. Strategic appointments made in restructuring UoA6's research into 3 groups [<i>Food Chemistry & Biochemistry (FC&B)</i>, <i>Food Colloids & Processing (FC&P)</i>, <i>Nutrition & Public Health (N&PH)</i>] - see REF5 for details] addressed these recommendations to form a unit capable of impacting on basic and applied food research in biochemical, chemical and physical aspects, through to nutrition, public health and dietary interventions. The main stakeholders and UoA6 research impact types, principally in commerce & health & welfare include the following:-</p> <p>(a) The food manufacturing industry - the main beneficiary with respect to commerce, through their investment in research and its application to produce new technology and products.</p> <p>(b) Non-food sectors – that also benefit in commerce, since UoA6 research involves industry with parallel interests in personal care, specialist chemicals, agrochemicals & pharmaceuticals.</p> <p>(c) Government & non-government organizations - that receive dietary guidelines as a result of lifestyle interventions that inform public policy and public understanding of nutrition-related health. These include the NHS and FSA; international health organizations; local council & public health organizations; independent scientific bodies; public broadcast media.</p> <p>b. Approach to impact</p> <p>UoA6 has developed and widened methods of engaging with stakeholders and academic expertise elsewhere, to aid diversity of impact and also to develop initial expressions of interests into major initiatives. Opportunities for impact are developed utilizing the above personnel plus academic staff time (built into the School workload model) on confidential short-term contracts and consultancy. A key objective is that some contract work should lead to further funding for research that is of long-term impact on commerce in industry or other stakeholders, concomitantly aligned with UoA6 staff's basic research themes. Income generated is invested in facilities for future impact, e.g., upgrade of light scattering & rheometry in <i>FC&P</i>. Exploratory research projects have ensued with over 25 multinational companies and SMEs since 2010.</p> <p>Support to enable impact has included UoL use of HEIF funds to consolidate activities of Akhtar and an Employment Enhancement Officer (see Sect. c below) in developing a 4,000+ company contacts database to aid external collaboration. Director of Research (Murray) discusses opportunities for enterprise and knowledge transfer (including consultancy) with staff as new collaborations and research outputs emerge. Discussions occur 6x each year at Research & Innovation Committee (R&IC) meetings of UoA6 researchers and with staff on an individual basis once a year. Follow-on funds have also been used (Povey, GR479033)</p> <p>UoA6 researchers have employed UoL's Press Office, Campus PR and Marketing teams to support dissemination and public engagement and advice from the Innovation Network (http://lin.leeds.ac.uk) and IP Group plc. A UoL subsidiary company (Consulting Leeds) has advised on and formulated consultancy contracts. UoA6 researchers attend workshops organized by the Staff & Departmental & Development Unit (SDDU) and UoL's central Research Innovation Service Office via their Commercialization team (http://www.leeds.ac.uk/business), that provide advice on IP protection and opportunities development and collaboration. 'Pump-priming' UoL Enterprise and Clothworkers Innovation Funds have been used by Akhtar and Povey (CIF 13007).</p> <p>Reach and significance have proliferated compared to pre-2008: all UoA6 staff now develop impact on commerce with industry or health and welfare aspects. More substantial impacts on commerce have been achieved by following up such short-term research with successful bids for funding of larger projects. Examples include: Nestlé & TSB (Povey, GR484960, £299k); Bakkavor and TSB (Murray, GR484014, £120k); McCains & TSB (Chen, Povey & Ettelaie, GR473685, £18k, GR484439, £12k, GR 475763, £226k); Proctor & Gamble (P&G) (Povey, GR482479, £40k);</p> |

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McCains (Povey, £ 85k); Syngenta & TSB (**Povey**, GR474603, £60k); DEFRA (**Akhtar**, GR478324, £42k); The Potato Council (also leading to a PhD studentship to **Orfila**); P&G (leading to a PhD studentship to **Povey** + Applied Maths at UoL).

Reach and significance of impact on **commerce** in the **food manufacturing industry** and **non-food-sectors** are developed via UoA6 researchers providing private research lectures to companies, e.g., **Murray** to Nestlé, Mars, Cadbury's, Unilever, DSM, P&G; **Povey** to Nestlé, Unilever and P&G. Repeated invitations are evidence of impact on adopting advice on **new technology and processes**, as are long-term **industry** advisory roles, e.g., **Williamson** to Nestlé Research Centre (Lausanne) on **business strategy** with respect to nutrient bioavailability (2007-present); **Ettelaie** to ICI/AkzoNobel on **business strategy** of polymer design (2001-2009); **Chen** to the Nestlé Nutrition Institute re. **investment in research and development** on dysphagia (2010-present). The **business strategy** of **non-food sectors** also benefits from confidential written reviews, e.g., **Murray** for GSK in 2009, whilst *N&PH* aims to provide impact on **public policy** and **public awareness** via formulating key **public health** messages and reviews from new research findings for **public health** stakeholders. UoA6 researchers contribute to training courses to improve **industry performance** (e.g., **Murray**, **Povey** in colloidal dispersions and ultrasonic processing). Feedback of impact on intended beneficiaries is obtained via staff serving (planned for in workload models) on committees of scientific societies, UK **Government** and EU commissions, advisory and grant awarding committees (see REF5, Sect. e, for details).

Evidence of successful impact and follow-through include commissioned reports and **consultancy** for **Government and non-government organizations** on health and nutrition. Exemplars include: NHS **dietary guidelines** on caffeine intake during pregnancy (**Cade**); new **diagnostic technology** for allergens (**Morgan**); **dietary guidelines** on cinnamon in foods for the **FSA** (GR475327, £120k). **Alwan**, **Burley** and **Cade** have contributed to **public awareness of health risk**, e.g., via the Standing Advisory Committee on Nutrition re. iron supplementation and pregnancy, plus commissioned reviews on diet and cardiovascular disease. **Evans**'s work on school meals was quoted as part of the support for the Government's newly announced (09.2013) £ 600M School Food Plan and she appeared (05.09.13) on Channel 4 News to discuss this. **Orfila** and **Marshall** had **lifestyle intervention** impact via Healthy Business Award (GR479035, £34k), where food in socially deprived areas was improved through changes to raw materials and catering practices via *FC&B* and *N&PH* research. **Public engagement** by UoA6 researchers is provided by press releases and public lectures, e.g., by **Cade**, **Povey** and **Williamson** at Café Scientifique (York) and the Wellcome-funded project "You are what you ate" (**Williamson**, **Cade**) disseminating long-term **health risk awareness** of diet to >3000 school children and adults.

Evidence of reach and significance of impact on the **public** and **commerce**, i.e., non-academic users, is seen in the **consultancy** contracts, **industry** funded research, commissioned reports mentioned above and also in significant press releases. Examples include **Williamson**'s lecture on "Superfoods" (Oct. 2008), that led to national newspaper and international magazine coverage. External press conferences have been used to highlight industrially relevant research, e.g., Nestlé Boost Smoothies, Manchester, 9.4.08; Nescafé Green Blend (15.9.09). Facilitating staff involvement in external scientific committees and **public engagement** has resulted in follow-through, e.g., in successful grant applications where the involvement enhanced UoA6 researcher reputation, such as: European Research Council Advanced Fellowship (POLYTRUE, 2.5M Euros) to **Williamson** on **health claims** of polyphenols; EU OPTIFEL (0.3 M Euros) on oral texture to **Chen** following on from **Chen**'s contributions to the Nestlé Nutrition Institute re. dysphagia.

c. Strategy and plans

UoA6 strategy is to broaden the activities and expertise of its team so that these skills can be brought to bear on the complex problems faced by **commerce** and **public health** providers, because critical mass is essential in order to have a substantive impact on the food challenges of the future. Complementary changes to the UoA6 staff complexion have continued with the appointment (see REF5) of **Rappolt** (Chair in Lipid Biophysics) plus **Bosch** as Lecturer in Nutrition with emphasis on the (bio)chemical aspects to strengthen the links and synergy of the *N&PH* group and the other 2 UoA6 research groups (*FC&B*, *FC&P*). **Akhtar** was appointed (in 2010) to support staff with industrial liaison and **consultancy** activities. An Employment Enhancement Officer (EEO) was appointed (2012) to link UoA6 researchers with companies employing students on BSc Industrial Placements, to identify potential collaborations. Our External Advisory Board was revitalized post-2008, with new members from independent regulatory bodies (e.g., FSA),

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Government research, international and national manufacturers and retailers, SMEs and independent consultancy agencies. These cover the full range of stakeholders (a) to (c). The Board meets biannually, giving feedback to UoA6 on impact opportunities.

The staffing strategy has included expanded use of staff to further develop and exploit its company database (see Sect. b). The resulting success in improving impact has secured UoL support for recruitment of a research lab. technician in early 2014 to facilitate rapid response to future demands from stakeholders for application of research knowledge for impact on **public health** and **commerce**. Additionally, we will use our EEO as a single point of contact for increasing media requests for scientific comment on food issues and to ensure rapid response from the most appropriate UoA6 researcher(s) to maximize reach, significance and quality of impact on **public understanding**. This also involves planned increased activity of **Evans**, recently selected (one of only 4 scientists across the whole UK) by the BBC for advanced media training ("Our Chosen Experts", 01.05.2013) stemming from her media work on school children's packed lunches (see REF5). **Marshall** and **Orfila** will also expand their work in local schools, using examples of UoA6 research and its impact relevant to student curricula, to improve **public awareness** of food issues.

Our 'Industry Day', including all UoA6 researchers, final year PhD students and colleagues in the UoL Food Security Hub (see below), has been initiated to increase awareness of the new-look UoA6 and to increase opportunities for collaboration. The first was held in 14.01.13, with over 100 visitors. Summaries of the research presented were made available to participants via <http://www.food.leeds.ac.uk/research/working-with-business/industry-day-2013>. So far 9 companies have started potential project discussions as a direct result of Industry Day, including support for 3 new Industrial CASE studentship applications. Its success has enabled us to plan for it to be a biennial event. UoA6 industrial contacts and facilities also enhance engagement of the Food Security Hub (FSH) with **industry**. (FSH is a HEIF-funded initiative that brings all sectors of UoL, including UoA6, together with **industry** to address national and global food security issues). UoA6 senior management group will continue to encourage UoA6 researchers to develop further links with academics elsewhere that will aid UoA6 team to address multidisciplinary challenges. Recent examples include *FC&P* in a successful bid for a Centre for Doctoral Training in Soft Matter and Functional Interfaces, in conjunction with Universities of Durham and Edinburgh).

Staff activity and plans for delivering impact will continue to be monitored and encouraged at: individual level via annual staff reviews; research group level via UoA6 R&IC Meetings; UoA6 level via monthly Faculty R&IC meetings - responsible for maintaining good research governance.

d. Relationship to case studies

UoA6 researchers' vision is to develop a more integrated approach via basic research of the highest quality. The Case Studies selected illustrate how creation of a larger unit with broader interests - advanced statistical analysis of dietary consumption in *N&PH*; leading edge research into availability of minor dietary constituents in *FC&B* - can lead to instances of high impact.

In Case Study 1 (CS1) (Caffeine intake in pregnancy: impact on national **public health** guidance (**Cade**)), caffeine intake in pregnant women was found to be associated with increased risk of fetal growth restriction. As a result, the FSA issued new advice to pregnant women to limit daily caffeine intake. CS1 was also the result of the long-term vision and approach of UoA6, here exemplified by *N&PH*'s UK Women's Cohort Study, in following a large group of individuals over long time periods. This allows important new links between long-term diet and health to be uncovered and investigated further. Fundamental to this was the approach in bringing together data and skills from other groups gathering similar information to increase the power of the conclusions. CS1 also informed subsequent research and impact in *N&PH* in highlighting the need for better ways of quantifying food intake and for updated information on food composition, provided by *FC&B*'s research on caffeine and other phenolics, for example.

Case Study 2 (Research supporting claims for a new "healthier" coffee from Nestlé (**Williamson**)) illustrates how our commitment to investigating model systems at a fundamental level can in the long term lead to high economic impact on **commerce** and **health and welfare**. **Williamson**'s general expertise in polyphenols and quantification of their activity, plus his willingness to act in an advisory capacity to the company, led to his impact on Nestlé's products. This illustrates how our approach in developing long-term links with **industry** allows development of mutual trust and understanding that enables the gap to be bridged between fundamental discovery and translation to very high impact on the UK's industry and economy.