Institution: Brunel University

Unit of Assessment: 34 – Art and Design

a. Context

Design - and design thinking - is widely acknowledged to be both a driver of innovation and competitiveness [Design Council, NESTA, DTI, EU] and a direct contributor to social innovation and quality of life [OECD, Design Council, Young Foundation]. Design as a key creative industry and as a systemic approach to problem solving are approaches that are evident in Brunel Design's distinctive position and the generation of research-led impacts. Beneficiaries of the impact arising from Brunel Design research encompass public sector and policy; commerce and industry; third sector/NGOs; design sector; and societal end-users. These vary according to the application field, duration of research and stakeholders identified at various stages of the research, however our research impact strategy underpins particular targets, as follows:

Policy-makers - e.g. government/agencies, local government, EU, overseas government and institutions. Examples include the development of design-based guidance, toolkits, good practice case studies, standards, policy briefings and related dissemination, e.g. CPD/ training, media (DVDs/Video); and Design policy guidance and impact measurement.

Industry - specific sectors include Healthcare/Assistive Technology; Textiles/Materials (smart, sustainable); Automotive; Food; Cultural & Creative; Digital & Software; Energy (housing, sustainable, distributive); and SMEs in these and other sectors in the regional economy.

The scope of our research and consequent impacts is both local and global. This includes intensive lab-based work (e.g. JaguarLandRover), test-bed oriented research undertaken with local stakeholders (e.g. accessible transport, innovative health care equipment), but which generates national and international knowledge transfer and scaling-up (e.g. Samsung, NHS). Regional scale research informs economic and innovation policy as well as infrastructure investment (e.g. transport, ICT), whilst we also work in collaboration with other HEIs (UK and overseas), major firms and partners through consortia based projects and in more community-focused research (e.g. AHRC Connected Communities). International scope is evident for example through current research-led KE/KT projects with African HEIs/local communities on sustainable distributed energy systems under EU/DEFRA programmes, and Design for Social Innovation and Sustainability (DESIS Lab) projects and case studies as part of international networks and good practice dissemination.

In all cases our research is underpinned by end-user collaboration and co-design, with impact 'designed in' at an early stage and maintained throughout and beyond the life of individual projects and clusters of research (e.g. health, vehicles). Through our thematic research groups [RA5] we have been able to build on this research and accumulate both impacts and knowledge exchange resources, whilst identifying new research trajectories and opportunities.

b. Approach to impact

Impact is embedded in the university's core mission and prioritised in both research and KT strategies respectively, for example through collaboration/strategic relationships, business development, public engagement, patents/IP and valorisation of research and cross-disciplinary research. This is manifested through the designation and funding of university-wide interdisciplinary Collaborative Research Networks (CRN), notably the Creative Industries CRN and active participation in the Brunel Institute for Ageing Studies (Inclusive Design group – Dong, Nickpour) and leadership (Giacomin/Ajovalasit) of the Human-Centre Design Institute (HCDI).

Brunel Design's approach to optimising and enabling the societal and economic impacts from its research is to integrate impact strategies and pathways at the outset in the formulation of research questions, methods and projects, as well as through strategic partnerships. Each group continuously cultivates relationships in their immediate 'target' sectors, with whom they develop research with industry, NGOs, etc., that is driven by their challenges. For example, the *Perception Enhancement* projects are structured in such a manner as to embed the researchers within the

semantics and operations of the business partner. Each project is organised as a relatively seamless collaboration in which the research staff are physically located within the premises of the university or business partner at a given point in time depending on the equipment, methodology or staff requirements. Most of the projects have as their main output either an internal company test standard, as in the case of the Shell funded project on the human perception of the engine idle, or a major system redesign, as in the case of the JaguarLandRover funded eco-driving research. In addition this group has actively sought to apply knowledge developed through its work with the automotive sector to the healthcare products sector by forging new relationships outside the area in which they are established, e.g., the "Light.Touch.Matters" (£562k) FP7 EU project.

As a primarily applied research practice, end-user involvement is evident at research ideation stage and in developing research methods and objectives. This is realised through an emphasis on co-creation, open and social innovation and subsequent co-design and co-production. The development of novel research methods in this process has informed the consideration and measurement of impacts across all Design research activities. For example, EPSRC /TSB EMPOWER project was focused on User Centred Design for Energy Efficiency in Commercial Buildings, and was supported by More Associates' CarbonCulture behaviour-change platform and a collaboration with the Department of Energy and Climate Change. EMPOWER's work packages began with ethnographic workplace studies of users' interactions with energy and decision making processes, and drilled down into detailed user insights and users' mental models. These insights have underpinned a series of highly iterative and novel participatory design workshops within workplaces, with users and stakeholders. The outcomes of the workshops have been driving the product development process for More Associates' CarbonCulture behaviour-change platform.

A strategic and sustained approach to impact has also been facilitated and guided by research funding imperatives, e.g., successive RCUK Digital Economy (DET); Connected Communities and KT/KE projects (i.e. grant conditions and assessment), which Brunel Design has embraced. This is evidenced through success in RCUK and EU (FP) grant awards with high end-user involvement and dissemination, and key industry sponsored research and research-led KT. The latter includes HEIF, ERDF and RCUK KT awards (AHRC, EPSRC).

Brunel Design's applied research approach is informed by the identification of key research problems and wider (impact) contexts and trends, e.g. sustainability, inclusion and ageing. These in turn inform research methods and validation, whether lab-based, fieldwork, conceptual or modelling in nature (e.g. iterative and open design). For example, design research with hospital/healthcare suppliers (Design Bugs Out) whilst leading to new product design and manufacture has widely benefited the healthcare sector, professional and patients (see below).

c. Strategy and plans

Our vision is: *to be a leading provider of design research that addresses the major societal questions of our age* [RA5]. Given our thematic priorities of inclusive and sustainable design that is human-centred and technologically sound, the meta-challenges our design-led research addresses - e.g. ageing, climate change/ sustainable development, social inclusion - demands a full integration of impact within the research process rather than as an add-on or extension of post-hoc dissemination. Delivering impact from our research is in one sense good practice and a valuable test of its validity and effectiveness. In the context of 'co-production', open innovation, 'prosumers' and diversity - and a raised expectation from our stakeholders and funders in particular - engaging with end-users at all stages is a vital element in our research practice. This embraces ethical concerns and practice, the need to maintain robust, transparent, evidence-based approaches, and the development of strategies and methods to support and deliver impacts and outcomes over time.

The planning, delivery and evaluation of impacts from research generated by the Unit takes place at strategic and thematic/project levels. Firstly, support is provided by the central Research Support office (RSDO) during the research project formulation, bidding and award stages with detailed guidance, checklists and good practice resources on 'impact pathway' statements and impact planning, and articulating research activity in terms of impact potential. Expert central support is also provided proactively by the Business Development/KT office who act as both broker and conduit to industry and other end-user organisations (e.g. public sector, NGOs) based on

completed and in progress research. This includes organising research-enterprise events, 'match-making' and funding feasibility studies and facilitating collaborations between researchers and end-users. This extends to IP and related exploitation activities and support, as well as monitoring and evaluating impact and HEIF-related activities and outputs.

Design-specific support and promotion of impacts – current and prospective – is also facilitated through the Brunel Design Research Centre where staff seminars and workshops address the impact and research-enterprise process and evaluation and the evolving discourse on 'impacts' arising from research and how this effects research development, methods and end-user engagement. This includes the exchange of good practice (including detailed case studies) and experience between staff (including ECRs, RAs, PGRs) and other researchers. This strategy is further implemented at thematic research group level, where specific sectoral, methodological and impact types are discussed and reviewed in relation to current/recent and planned research projects. Through this strategy impacts are able to be incorporated in the whole research and scholarly process and form part of performance measurement for individual staff, research groups and the Unit as a whole.

Two specific mechanisms for disseminating research findings, opportunities to end-user audiences and stakeholder engagement are the annual *Made in Brunel* showcase held over four days each June and the Designplus unit which is part of the Brunel Design Research Centre, providing design consultancy, professional development and matching research expertise to clients (http://designplus.org.uk). This unit also monitors impacts arising from these interactions and follow-on projects, capturing both joint activity and impact evidence. As part of this initiative the Co-Innovate project, coordinated again by Brunel Design (Green), has been awarded funding (2012-14) under the European ERDF programme to extend research expertise to the regional economy focusing on SMEs and design research-based KT. For example the Co-Innovate project co-ordinates a series of industry engagement events, such as with the food and packaging sectors in support of the EPSRC funded 'Open Food' research programme. Designplus and Co-Innovate annually co-ordinates 30-50 collaborative projects involving students, academic staff and industry. Typically there are direct links between the Brunel Design Research Centre areas of expertise and the sector interests leading to impacts for the participating students (professional experience, employment, specialist expertise) and the collaborating companies (CPD opportunities, professional development, high quality employees). Therefore this platform allows for our design research to be further developed, tested and validated with a wide range of beneficiaries, and for ensuing impacts to be achieved and measured.

Brunel Design also has an established Industry Advisory Panel, meeting annually, drawn from design firms, agencies and academic practitioners (including alumni). This group review and advise on research activity and ideas from a design industry perspective, providing a critical review of impacts and trends as well as design course development and training needs.

d. Relationship to case studies

The two Impact case studies represent examples of research-based industry collaborations, both led by thematic research groups (*Perception Enhancement* and *Sustainable Design*) and by their respective group leaders (Ajovalasit and Harrison). Both also draw on supervised and sponsored doctoral research/EngD programmes and industry collaboration. In the case of impacts arising from research on fuel and human perception of engine idle irregularity, this combined human-centred approaches with lab-based testing environment - a good example of human-technology inter-action design.

Further exemplary impacts arising from Brunel Design research are evident in inclusive design work which has led to successful and award-winning new product development in healthcare equipment (Design Bugs Out Commode). Again the model of applied research with staff (Dong) and PhD student team working with design and manufacturing firms (Pearson Lloyd Design and Kirton Healthcare) has been successfully delivered through a research strategy that focuses on co-creation and open innovation which has enabled end-user and wider societal benefits to be delivered more successfully and with greater uptake. This project was funded by Design Council and Department of Health, evidence of cross-sectoral collaboration and a wide beneficiary group.