Institution: UNIVERSITY of WEST LONDON

Unit of Assessment: 11 | COMPUTER SCIENCE and INFORMATICS

a. Context

This Computer Science and Informatics submission represents a broad portfolio of research that has taken place within the School of Computing and Technology (SoCaT) and the Institute for Practice, Interdisciplinary Research & Enterprise (INSPIRE). This cluster of research is organised into five themes with associated researchers that lead the translation of research outputs into useable practice that has an impact.

The institutional culture has changed significantly since RAE 2008 as the University has adopted a more inclusive and interdisciplinary stance, and a scholarship portfolio for all academics. This nurtures the work of new researchers; co-ordinates educational research funding bids; and provides a research home and identity for researchers in Computer Science and Informatics. This has benefited the REF submission with a significant growth (since RAE 2008) in research output and staff submitted within the unit. The number of registered research students has increased significantly, and key appointments at a senior and junior level have taken place.

Contributions of staff submitted here include mentoring and training of staff, bid writing, postgraduate research student supervision and training, development of doctoral programmes, and provision of research dissemination opportunities. The associated impact is demonstrated in two case studies: usability culture in academic and industrial sectors specifically in India and China and, locally, on businesses, and practitioners of model-driven software architecture. This was in line with presented plans in the RAE 2008.

Sociotechnical Centre for Internationalisation and User Experience (SCIUX)

Rooted in the discipline of human-computer interaction (HCI), SCIUX aims to support software developers in building systems that meet all the needs of end users. A particular focus is the understanding of cultural differences and associated design solutions in a global market. SCIUX projects have involved stakeholders and users across Europe, Africa, Asia and Latin America.

Two research challenges were identified to enhance understanding and knowledge of cultural differences in international software development:

- Computer science and interdisciplinary challenges that need to be addressed in order to provide HCI tools, techniques and methods for software developers;

- institutional and governmental challenges to overcome resistance to change so new tools, techniques, and methods are implemented commercially. Implicit here is the requirement to collaborate with academics and practitioners internationally, both in promoting HCI and usability generally and localising the discipline itself, particularly in developing countries.

The centre has been instrumental in a number of EU and EPSRC funded projects (IESUP, SESUN, VESEL) as well as a KTP with Siemens on medical imaging.

Centre for Model-driven Software Engineering

Originating from research on component-based design for application development first pioneered at Texas Instruments, the Centre for Model-driven Software Engineering aims to develop software methods to support the transition from component-based approaches to the emerging service oriented architecture paradigm and to apply these methods in the Higher Education domain and in businesses. A key research theme is the use of model-driven practice and advanced use of the Unified Modelling Language together with its integration with business process management and Enterprise Architecture.

Within this overall context, the group is exploring the following computer science and applied computing challenges:

- The development of model-based software methods that support business process driven service oriented architectures;
- the design of software applications for mobile devices;
- the application of conceptual modelling approaches to new domains.

The centre has been involved in several JISC funded projects since 2005, as well as four KTPs and four Knowledge Connect projects. In addition to these two areas of impact, an EPSRC funded project in cybercrime (computer and network security) has started recently, and is progressing with some innovative work using case-based reasoning for gold ore extraction and intelligent sensing.

b. Approach to impact

In seeking to deliver high-quality research outcomes that would deliver real world impact, the submitting unit worked to ally its research agenda with economic and social needs. In consistently securing funds from sources such as KTPs and Knowledge Connect, the unit ensured that the solutions they developed were, from inception, planned in terms of direct application to partners/beneficiaries. An important aspect of this was to develop research talent through our PhD programme while engaging with businesses and international networks for dissemination. Making research knowledge usable by practitioners and local industries is central to our approach and is evidenced in the two case studies.

Recognizing that HCI needed to be reconceptualised/redefined in the local country or culture and that HCI concerns and its importance needed to be embedded in local national organisations, SCIUX engaged with India and China in a series of research activities, networking events, conferences, and partnerships addressing IT&C programmes in the EU and Asia, (now extended to include Africa and Latin America). The reported impact shows the success of this approach.

SCIUX's impact also takes place in other professional and academic communities in the UK and overseas. In the last three years SCIUX has grown to 12 members, including permanent academics, research assistants, full time doctoral students and visiting fellows. They disseminate findings in relevant HCI conferences and journals. Dr Abdelnour-Nocera, current head of SCIUX, holds different roles in professional and academic societies where SCIUX's research agenda and impact are directly promoted, disseminated and used. These include the Sociotechnical Specialist Group of the British Computer Society and the Technical Committee 13.6 on human-work interaction design in the International Federation for Information processing. He is also an active steering member of international conferences in HCI and cultural aspects of interaction design (e.g. IFIP Interact, IWIPS and ACM ICIC.

The Centre for Model-driven Software Engineering was able to establish a series of connected JISC and Knowledge Connect projects, and Knowledge Transfer Partnerships KTPs). Regular information events showcasing results provided the basis for transferring research results into SMEs. Dr Samia Oussena, head of the Centre, is an active member of the JISC community. She has participated in a number of JISC events and is a member of the Enterprise Architecture practice group (EAPG) representing UK universities with an interest in Enterprise Architecture. She has also served on a number of JISC panels for the review of proposals. Dr Oussena is also a member of a number of BCS specialist groups such as the Enterprise Architecture Requirements Engineering Specialist Group. She has continued to be a member of several international conference Programme Committees including for ICEIS and IMMM since 2006.

In 2012, the School of Computing and Technology set up a new infrastructure to increase its impact by appointing Professor Peter Komisarczuk as Head of Enterprise and Professor Thomas Roth-Berghofer as Head of Research and Research Training. Since then both have collaborated in proactive and systematic engagement with local businesses. A series of workshops in 2013 helped develop a better understanding of services offered by the School and those sought by businesses.

This series was organised by UWL's Business School, the Chamber of Commerce, and West London Business (representing of over 7000 businesses in the area).

c. Strategy and plans

The Computing UoA strategy is focused on the following:

- Extending the reach of our partner network at national and international levels to maximise our impact and develop our research expertise and project portfolio. For example, in order to translate research findings into usable knowledge our UoA works with organisations like the Technology Strategy Board and its innovation networks. By working with national and international professional associations like BCS and ACM, the UoA is able to increase its impact beyond academic contexts;
- supporting interdisciplinary research in order to maximise the application of our research findings. Computing researchers based in INSPIRE are best placed to facilitate interaction and focused research activities across different disciplines. SCIUX and the Centre for Model-driven Software Engineering will continue their successful work in cooperation with the other centres, Schools at the University, and externally with business and our network of research partners.

The unfolding of our strategy can be seen in the following activities:

- The Centre for Model-driven Software Engineering and the CIC developed the vision of the Smart University, which promises to deliver foundational data to drive the analysis of the teaching & learning environments in higher education institutions in the UK and overseas;
- SCIUX is now offering consultancy services through their newly established lab aimed at clients with an interest on tackling cultural aspects of user experience;
- the Centre for Model-driven Software Engineering is moving to Semantic Web approaches and standardised knowledge exchange in the form of Linked (Open) Data and seeks to make these technologies available for the software development industry in 2014;
- the Centre for Mobile Computing, founded in 2013, has focused on data compression and communication systems that operate in constrained environments e.g. applying Packed Objects algorithms to optimise the Internet of Things in rural telemedicine scenarios supporting treatment of patients in anticoagulant therapy;
- the Centre for Networks and Distributed Systems has recently started a 3-year EPSRC funded project in cyber security whose findings will be directly relevant to the UK industry.

d. Relationship to case studies

The two case studies demonstrate the effectiveness of a knowledge transfer-oriented approach that has collaboration with businesses and other end-users at the heart of its research agenda.
SCIUX's case study reflects the approach to impact in various ways: through its engagements with India and China, where HCI concepts and methods were adapted to suit the local country/culture; acting as a lead partner forming international consortia to actively promote culturally aware HCI in industry and academia, whilst simultaneously establishing links with local and national organizations, and by demonstrating the rollout and adoption of effective usability practice in industry.

The submitting unit is engaging with local businesses and practitioners in the Greater London area. This is reflected in the second impact case study. The Centre for Model-driven Software Engineering is actively seeking opportunities to apply its research results in the production environment of software companies. The key impacts for the software companies are focussed their development processes and products. The growing list of JISC and Knowledge Connect projects and the Knowledge Transfer Partnerships since 2005 is evidence for the reach of engagement, while the impacts reported by the software companies furnish evidence for the significance.