

**Institution: University of East London**

**Unit of Assessment: 11 - Computer Science and Informatics**

**a. Context**

The University of East London's submission to UoA11 comes from its Software Systems Engineering research group, whose work follows the theoretical-to-applied axis and largely focuses on Software Engineering and Security Engineering. We have particular interests in areas such as secure software systems engineering, web services and cloud computing. Despite our small size (4FTE submitted to REF2014), we have worked hard to develop partnerships allowing the transfer of our specialist knowledge in these fields to a wide range of industrial, commercial, policy-making and governmental departments, as well as to broader public audiences. As a result, our work informs, influences and improves the delivery of myriad processes, IT products and services, and has enhanced public awareness of important social, political and financial issues relating to our fields of interest.

Key partners currently include Microsoft, British Telecom (BT), Telecom Italia, and HelloByte, to whom we have delivered particular benefits in terms of the development of novel software tools (e.g. for Microsoft) and improved IT processes and infrastructure (e.g. for HelloByte). There is a strong international dimension to both our research and its impacts: since 2008, work in areas including software engineering (**Falcarin**), security requirements (**Mouratidis**), IT law (**Preston**), and Risk Management (**Islam**) has been used by both policy-makers and commercial organisations in Italy, Greece, Mexico, Bangladesh, and the USA, as well as in the UK.

**b. Approach to impact**

Since 2008 the Unit has taken a pragmatic, user-led approach to impact, driven by and responsive to the changing needs of our principal research user-groups. Benefits accrue to those users particularly as a result of our **transfer to them of specialist knowledge and expertise**; however, we take a multi-faceted approach to effecting that transfer, including via the following mechanisms.

Our specialist knowledge in Secure Software Systems Engineering has been particularly important in developing productive links with external organisations, including through our Specialist Professional Doctorate programme in Information Security. We understand that, in an interconnected world, the most significant impacts often require an approach that moves beyond traditional, monolithic, subject-specific solutions. As such, our research agenda includes a strong **focus on innovative cross-disciplinary collaborations** with partners across and beyond UEL, both as a means of increasing the utility of our research to established user groups, and of extending the range of our impacts through our research partners' networks. To that end we have **collaborated with external partners in the arts and cultural heritage sectors**. Notable examples include our collaboration since 2010 with both UEL's School of Arts and Digital Industries and the Matrix East Research Laboratory on the 'Creating the Museum Integrated Digital Archiving System' (MIDAS) project, for which we provided technical support in the delivery of scanning services to UK museums, with partial funding from the UK JISC programme. As well as allowing beneficiaries in the museums sector to provide enhanced services and an improved visitor experience to their users, the project delivers wider public benefits by increasing access to the digital images of museum artefacts.

The benefits of our research to industry are delivered partly through our production of **commissioned research** leading to the development of new end-user frameworks, methods and tools for use within the IT and computing industries. Recent examples include the successful application of **Bashroush's** research on Capacity Planning to the development of a tool adopted by Microsoft for their Lynch Server 2010 solution. Our work on security simulation has, likewise, been used to develop advanced tools to support Training Environment for Crisis Scenarios, already used to demonstrable impact effect in the Emergency Planning College (EPC)'s training of UK crisis managers. Our approach to engaging and supporting large organisations, policy-makers and other governmental bodies both in the UK and abroad has also incorporated the development of the Professional Doctorate in Information Security, which ran for the first time in 2008 and whose

**Impact template (REF3a)**

students come from large organisations such as Verizon and Thomson Reuters. The many insights and general benefits accruing from this programme are able to be transferred rapidly between academia and business by virtue of the fact that student undertake research projects within their home organisations. Thus, for example, Preston worked between 2010 and 2012 with Travelex on the development of a methodology for constructing an appropriate Code of Conduct for use in Digital Forensics Investigation.

Our impacts on commercial organisations are further advanced through our engagement in various **knowledge exchange and industry-led projects** and provision of **consultancy services to industry**. These pathways to impact include **Knowledge Exchange Partnerships** (as in Mouratidis's work with Powerchex Ltd - see UEL11-01); formal awards such as **EPSRC CASE awards** (e.g. with BT and FORD); and **technology centres**. We also communicate and cascade the insights from and benefits of our research expertise through consultancy and other advisory services delivering important economic benefits to a wide range of partner organisations. These have included local SMEs supported by the European Regional Development Fund (ERDF) through the EUREKA, m-COMM and FLASH projects, and by schemes such as Innovation for Growth and Innovation Associates. Schemes such as Enterprise Bureau and Knowledge Connect (supported by the UK government and European Union) have enhanced the impacts delivered through consultancy work in terms of improving the security of IT processes and software systems of local and national companies such as Powerchex Ltd., GOL Ltd., and Conrad Ltd. Our consultancy activities extend, moreover, beyond our provision of expert advice to commercial organisations to work with local authorities and educational bodies. We have, for instance, worked since 2012 with LB Redbridge and LB Newham to transform the Secondary School Curricula in the CS&I area from an Information Technology (IT) focus to one that is Computer Science based.

The Unit set up an Industrial Liaison Board (ILB) in 2010. The ILB has almost thirty members who meet both online and in face-to-face meetings to discuss and feed into the Unit's research agenda and to suggest and support pathways to industry impacts arising from its research. By providing an interface between the Unit and commercial organisations, the Board helps us ensure that research conducted within the Unit is as relevant and responsive as possible to the changing needs of both existing and potential non-academic user groups.

Our international research impacts are achieved particularly through our **provision of expert advice to commercial organisations beyond the UK**: Falcarin's work on distributed software engineering has been used by Telecom Italia, and Islam's work on risk analysis by a large company in Bangladesh. Mouratidis's work on security requirements engineering has underpinned the security analysis of the Greek National Gazette and IT security processes at HiUMAN (Mexico), whilst Preston's work on IT law has informed IT processes within oil companies in Uzbekistan. Preston is currently providing consultancy to a project to facilitate the legal processing of street crime in Kazakhstan, where he is also on the Data Centre consultative board for Astana EXPO-2017.

We also **provide specialist advice to international policy and decision-making** organisations, particularly through our **membership of strategic and advisory boards**. Mouratidis, for example, has contributed to the strategy for the development of Secure Information Systems at European Level through his membership of the NATO Advanced Research Workshop on Operational Network Intelligence. He is also a member of IFIP WG.8.1, the ERCIM Security and Trust Management Working Group, and of the Security Engineering Forum. Preston delivered a keynote on the SMI's annual Cyber Security for Military and the Defence Sector Conference.

Central support is provided at UEL for Knowledge Transfer activities by its Research and Development Support (ReDs) team and via the facilities and resources available through its Knowledge Dock. The Unit has worked closely with the ReDS team to organise **knowledge transfer events** and on various schemes such as Knowledge Connect and Enterprise Bureau.

**c. Strategy and plans**

Our strategic focus for the next five years is to develop and embed an "impact culture" underpinned by a commitment to producing research that is valued both within and beyond the academy. To

## Impact template (REF3a)

that end, we will maintain and wherever possible enhance and expand those strands of our current approach outlined above. In particular, we plan to:

- Better monitor, support and reward research impact. This will include the development of an impact database summarising information obtained through an impact forum. These improved records will be used both to promote examples of good practice within the Unit via a new, dedicated section of our website, and to recognise and reward staff involved in those examples.
- The recently appointed Director of Outreach and Enterprise will play a key role in developing and articulating a clear policy to recognise and support staff engagement in impact-generating activities, particularly via paid secondments and adjustable workload models allowing time in lieu of teaching and other administrative responsibilities. Both time and financial support will be allocated to allow Unit staff to maintain and enhance national and international networks and to undertake training programmes (both UEL-based and external) and to attend events that will enhance their understanding and improve opportunities for engaging with external partners.
- We will make more and better use of the Industrial Advisory Board to ensure the relevance of our work to industry users' needs. This will involve extending its remit to include contribution to our industrial impact strategy and annual evaluation of the strength of our industry impacts.
- We plan to increase our knowledge exchange and consultancy activities through the establishment of new Knowledge Transfer Partnerships (KTPs). We also plan to increase the number of events that we organise with local companies to make them aware of the KTP scheme and to maximise the impacts of previous KTP projects. More specifically, we plan to organise at least two high profile events per year with participation from local (London and South East) companies. By 2018, at least 50% of Unit staff will be involved in KE or consultancy activities.
- Increase cross-institutional research by strengthening our existing links with non-academic and academic institutions nationally (for example UCL, Imperial College, BT, Ford and HelloByte) and internationally (e.g. Japan National Institute of Informatics, Microsoft).
- Increase engagement with local, national and international industries, including at events organised to promote staff expertise and identify potential areas of impact. We will build on our experience of successfully organising such events in the past (for example the dedicated workshop on the e4business Conference in London organised by UEL and ACE and attended by more than 30 local businesses).
- Increase our contribution to policy making and standardisation activities through increased engagement with the working groups of national and international organisations relevant to our areas of research; these will include IFIP, ERCIM, BCS, and IEEE.

**d. Relationship to case studies**

The two submitted impact case studies exemplify the successful application of several strands of the approach outlined above in the context, particularly, of our work with industry partners. The first (UEL11-01), which describes the outcomes of our collaboration with Powerchex Ltd, demonstrates the importance of **knowledge exchange and industry led projects** to our capacity both to develop and maintain productive working relationships with key users, and to deliver benefits to those users. The second (UEL11-02) describes impacts resulting from **commissioned research** undertaken as part of an **international collaboration**, and reflects the Unit's commitment to working internationally to extend the reach of our impacts to global audiences of non-academic research users.

Both case studies have informed our strategic plans, particularly by highlighting the great opportunities that KTP activities provide to engage with and deliver benefits to industry. They will also form the basis for future activities relating to the development and dissemination among Unit staff of best practice examples of impact-generating activity.