Institution: University of Chester

Unit of Assessment: 11: Computer Science and Informatics

a. Context

The research of the Unit is undertaken by members of the School of Computer Science and Mathematics and other colleagues from the new Faculty of Science and Engineering. The focus of the research centres on three themes: User Generated Content, Optimisation, and Human in the Loop systems. These themes interact at their boundaries and the research conducted is applied in nature, involving interactions and collaborations with other research groups and stakeholders from different disciplines (such as social scientists and healthcare professionals as well as mathematicians).

The recent rise of social media and mobile devices on which to both consume and author content has led to a crisis in the way in which traditional social science departments collect, process and analyse data. This has profound consequences. The construction of the COSMOS (Collaborative On-line Social Media Observatory) is an early example of computer scientists working closely with social scientists to explore these new challenges. The impact of this work has the potential to be profound, leading to insights to inform local policing (on the basis of detection of a rise in indices of local tension and hate speech through social media channels such as Twitter) and real time decision support at major events or disaster scenes.

The use of computational techniques to optimise multi-parameter design spaces also has widespread impact, ranging from shape optimisation for artefacts operating in difficult physical environments to providing automatic methods of porting legacy computer codes to increasingly parallel computational platforms without the need for expert human programmer intervention.

Much of the application of the Unit's research involves humans and focuses on their interaction with the system under consideration. An extreme example of this is the research undertaken to understand and computer assist human performance in high stress environments such as single seat military jet fighter pilots in combat situations. This research was undertaken in a high fidelity simulated environment with RAF test pilots and lessons learnt from this can be translated to other work environments such as surgical operating theatres.

Research using novel haptic displays has been applied and spun out to commercial activities and patients and ultrasound practitioners worldwide are benefitting from new innovative computer-based training methods arising from this research.

A key strategic development at the University has been the acquisition of the former Shell Thornton Research Centre which will become the University's new science and engineering campus and host of a major new science park. The School plans to develop strong collaborations with engineering and technology researchers and will provide further focused R&D support to local and regional businesses through the science park. This will provide the catalyst to broaden and deepen the work of the Informatics Centre, which was established in 2007 to enable the University to provide software development services to local businesses. The Informatics Centre has undertaken in the order of 100 projects since its establishment, mostly with local SMEs and hospitals. Forty projects (with a total value of £198,000) were supported by the NWDA innovation voucher scheme, which allowed SMEs to access the skills of the Informatics Centre at modest cost and did much to support the local high tech economy. Among the comments received from Innovation Voucher customers, one company noted that the work of the Informatics Centre had allowed them to be responsive to change affecting their business due to the economic downturn and helped to facilitate opportunities developed with overseas companies. Another client reported that the work was estimated to have saved three full time equivalent jobs for a period of at least three years. At its peak, the Centre was turning over £1/4 million per annum. Its future plans include an intensification of the development of mobile device apps, and a greater focus on industrial applications alongside its existing strengths in business-related services.

b. Approach to impact

Application of the results of research undertaken by the School has always been at the heart of its activities. Recognising that computer science and mathematics research in its applied form usually has an indirect, rather than direct impact, there has therefore been a considerable focus on engaging with scientists from areas which themselves interact directly with users. These interactions and insights have driven the areas of research activity and helped prioritise research questions for the School's work as well as expanding capacity to conduct high quality research with impact.

The fundamental approach of the School is to interact early with people who already understand the needs of the applications area. The aim is to ensure that the needs of the application area are translated through this collaboration into clear and achievable objectives and research questions. Having formulated the research questions, the strategy is to work on the project but keep the lines of communication with users open via the translator to test new insights against reality. The final stage in the process is to communicate and disseminate results both in the computer science and informatics literature and translated into a form that will be useful to the users. A feedback mechanism is then employed by listening continuously to the users to see how they interpret and use the results. Some of the work in computer science is undertaken jointly with colleagues from mathematics who are part of the same School and Faculty and who have a strong record of collaborations with engineers and bioscientists, and who have related interests in computational efficiency, parallelism and optimisation. This strategy demonstrates that answering questions that are of relevance to users has been at the heart of our research activities.

For example, the Informatics Centre has worked with NHS trusts to develop mobile apps. 837 instances of DIYPhysio, a mobile app to help with back relief designed in conjunction with a physiotherapist, have been sold since November 2011, generating revenue of £1,247 for the client's organisation. The Centre has worked with the Countess of Chester Hospital to explore the benefits of a screening process for stoke patients with the aim to bring benefits to both service users (patients and their families) of the stroke care unit and the operational efficiency of the unit itself. The pilot trial explored three main areas of impact that can be identified as a result of this project:

- reduction in cost to NHS trusts as a result of unnecessary re-admission;
- giving service users the most appropriate contact with the most appropriate healthcare professional; and
- encouragement and improvement of self-management of care for patients in the community.

Within the wider institution, impact is rewarded through being one of the criteria considered explicitly in applications for promotion to Professor or Reader. The annual Performance and Development Review (PDR) process also explores impact in terms of opportunities for commercialisation of research, and public engagement activities and opportunities. The University's Research and Knowledge Transfer Office monitors all funded projects closely, and one aspect of this monitoring is a report on impact activities. Where appropriate, this can lead to a cross-referral to the University's Knowledge Transfer grant schemes which can pump-prime commercialisation of research outcomes.

Moving forwards, the acquisition of the Shell Thornton Site as a science park and science and engineering campus provides the School with an excellent opportunity to develop its applied research portfolio. The University is establishing a working group to identify strategic collaborations and research objectives for the extensive range of potential industrial applications.

c. Strategy and plans

The University's commitment to the development of future impact from research undertaken now is underpinned by an expectation that a minimum of 20% of the QR income from the RAE2008 exercise is deployed in impact-generating activities. This is an institutional policy that has been embraced by the School. In addition, funding has been sought through the University's capital

projects awards to provide further infrastructure and equipment to support research and drive impact. For research outcomes that are close to the marketplace and closest to commercial exploitation, the University operates a system of Knowledge Transfer grants, funded using HEIF income, to pump prime the commercialisation of research. The establishment of the Informatics Centre demonstrates our commitment to this, and projects with several local companies (currently subject to confidentiality agreements) will benefit from collaboration with the Unit, supported by HEIF funds, going forward.

We anticipate that such activities will continue, and be strengthened further through the development of the science and engineering campus at the former Shell Thornton site, which provides new opportunities for collaboration in the engineering sciences and for commercialisation of research in applied computer science and informatics in the future. In September 2014 the Informatics Centre will move to new bespoke premises on the science park and will be ideally placed to assist SMEs on site.

d. Relationship to case studies

The majority of staff within the Unit have been recruited during 2013. Whilst their work has given rise to impact that could form potential case studies, the underpinning research was conducted at other HEIs. The Unit, therefore, has not submitted impact case studies in this REF exercise.

Nevertheless, the successful development of the Informatics Centre, through the careful deployment of successive HEIF development grants, demonstrates the effectiveness both of the Informatics Centre itself in responding to external demands for services, and also of the University's approach to investing in new projects that have strong potential to achieve impact and in developing identifiable centres with a clear external focus on providing services to business.