

**Institution: Edinburgh Napier University**

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

**a. Context**

The Institute for Informatics and Digital Innovation (IIDI) was established under the directorship of Prof Jessie Kennedy with an advisory board of comprising industry representatives covering the sectors and technology themes of the Institute. IIDI contains five nested centres representing the main research strengths of its staff and, in common with all research areas of the University, aligns its activities with key sectors of the Scottish economy. Each centre is led by a professor, while ten cross-cutting offer innovation and outreach in a manner appropriate to industry and third-sector partner consumption.

For example, the *Future Interactions* theme has generated consultancy with multinationals such as Astra Zeneca in technologically-advanced meeting rooms; The *Digital Health* theme has involved working with the Kensington and Chelsea Hospital Trust; the *Information Visualisation* theme has engaged with several companies, including Gamevis and Toshiba on the use of visual analytics; *Optimisation* has provided consultancy on scheduling and loading to a range of companies, including local SMEs, IKEA and Tornado. IIDI's impact thus includes SMEs, large multinationals, individual scientists (see case study 2) including taxonomists and ecologists, the public sector, including governments (see case study 1) and non-governmental organisations. For example, there is extensive ongoing work under the *Cyber Security* theme, which has a long-term engagement to provide advanced cyber training to the Scottish Institute for Policing Research (SIPR) and is also developing scenario based cybercrime training across Europe.

IIDI produces many different types of impact. Economic impact is evident through the Innovation Voucher scheme (see section b), delivering a total of some £300,000 of academic time, specifically to improve SMEs in Scotland. In addition IIDI has created 3 spin-out companies during the assessment period. In terms of public policy and services there is on-going involvement with SIPR and with health organisations through two separate initiatives; the FI-Star project funded under the EU Future Internet (FI-PPP) programme and the spin-out sa.fire. Impact on society, culture and creativity is evident through the UrbanIXD project that is building a European network of artists, architects and designers focusing on the future of cities and through case study 1 concerned with e-participation in national and local government. Health impacts are evident not only from the digital health projects but also in the work on carbon reduction. The Scottish Government provided funding to undertake a carbon-reduction proof of concept and IIDI is currently advising a local milk delivery company on optimised routing. The impacts on practitioners are most keenly felt through the work on biodiversity (case study 2) where Kennedy has developed new data standards adopted globally by biodiversity scientists. Impacts on society have occurred in areas such as work for Scottish Gaelic language learning using the Ulpan method that has had significant impact on students across Scotland.

**b. Approach to impact**

Impact is central to IIDI's mission. There are three full-time staff dedicated to business development. They help academics to obtain grants and contracts and manage outreach and commercial activities. There is a customer management system that holds details of contacts and companies that IIDI has engaged with. IIDI has developed a sophisticated database-driven management system that holds details of all projects and proposals.

Economic impact has been enhanced by the Scottish Funding Council (SFC) Interface initiative, which acts as a brokering service to encourage knowledge exchange between SMEs and universities. The scheme offers innovation vouchers to universities of up to £5000 for SMEs who match funding with in-kind support. IIDI has enthusiastically embraced the opportunities provided by this scheme and has undertaken over 60 projects during the assessment period. Innovation projects are undertaken with SMEs to initiate a partnership and build on this with follow-on innovation projects, Knowledge Transfer Partnerships (KTPs) and collaboration through Scottish Government funding for small businesses. From these initial relationships IIDI has already completed three major follow-on projects assisting firms to grow their business, and the pipeline is

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expanding. For example, Bright Red Publishing, Scotland's leading provider of schools' course revision materials, collaborated with IIDI to provide advanced Web-based content, using responsive designs and pupil-focussed learning, to supplement the text learning, which is enhancing children's learning experience.

To maximise impact through spin-outs, we have developed a process taking PhD research suitable for commercial exploitation, through Scottish Enterprise Proof of Concept (PoC) and Royal Society of Edinburgh Fellowship funding onto the creation of spin-outs or licensing arrangements. This has been supported through the Scottish Informatics and Computer Science Alliance (SICSA), a collaboration of all fourteen universities in Scotland. SICSA provides various schemes that focus on knowledge transfer including the annual Demofest event that brings in industry and investors to meet academics. Demofest typically attracts over 250 participants with 88 separate companies registered in 2012. IIDI typically has 3 to 5 exhibits. Other SICSA impact-focussed events have benefited IIDI, for example funding one PhD student who has obtained £20,000 to build a commercial product from his PhD. Innovation lectures are provided by SICSA with facilitators from MIT and through the 'Engage Invest Exploit' event are run through SICSA and the Scottish Software Federation, ScotlandIS, which have been attended by IIDI students and staff.

IIDI has had five Proof of Concept awards during the assessment period with three spin-outs created. These have enabled commercialisation of academic ideas and have resulted in three spin-out companies. One particular example of this is the company ZoneFox that has attracted over £500,000 of business angel investment and is now producing software for Wolfson microchip manufacturer. Other activities aimed at improving impact include organising industry-focused conferences and contributing to trade events such as the Edinburgh Tourist Action Group where we regularly present outreach from our digital tourism research. The Institute also engages actively in networking, for example through IIDI engaging with ScotlandIS at networking events, hosting talks at the British Computer Society's Edinburgh branch and engaging with professional bodies such as the Usability Professional Association.

IIDI has had impact with larger organisations through consultancy, contract research and CPD. Twenty-four CPD projects have taken place during the assessment period including a regular training programme for the Japanese company Lincrea (approximately £27,000 annually) and a novel work-based training programme in Strategic IT management for women in Wales (worth £75,000). There have been thirteen separate consultancy projects (with a value of some £150,000) and twelve contract research projects (worth over £300,000) all with beneficiaries outside academia as noted earlier, cyber crime training has been provided for Police Scotland and EU-funded training for cybercrime has recently begun. IIDI has a particular interest in engaging the public in science. Several externally funded projects have public engagement activities as part of the workplan.

**c. Strategy and plans**

IIDI strategy is to grow the number and types of impact bringing in new research staff and students. This is done both from the pragmatic perspective of increasing funding and from the belief that we should be transferring our research knowledge into the UK economy. The IIDI impact strategy is fundamental to our research strategy (see REF5) given that income from commercial activities is used to underpin PhD recruitment.

IIDI will continue to provide consultancy and contract research in the area of 'future meeting rooms' where ENU has established an international presence, designing environments for Redmond Police force in California and international agencies such as Enquest and Blue Rubicon. IIDI will continue work in the areas of digital tourism, information visualization and data analytics knowledge transfer (KT), the subject of a major strategic initiative by the TSB starting in 2014. It is expected that KT and commercially oriented work in security, cybercrime, optimisation and advanced networks will expand. IIDI will continue to provide CPD in software engineering and develop other professional CPD such as 3D modelling. The overall strategy is to continue to grow income from commercial activities and to exploit research through consultancy, contract research, exploitation of IP and other forms of knowledge exchange. IIDI recognises the need for strategy to

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be agile with respect to the opportunities that exist, while having a targeted strategy through programmes such as the EU's Horizon 2020. In particular significant impact in the Digital Health domain is expected as the follow-on projects in FI-PPP are focused on industry deployment, along with computer security and cybercrime.

The size and shape of Scotland and her economy makes for a particularly supportive environment for exploitation of research and IIDI will continue to build on its links with SICSA, ScotlandIS and its own network of collaborators.

**d. Relationship to case studies**

The two selected impact case studies show how the pro-active focus on engaging with the public which IIDI aims to foster can make a significant difference to people's lives. The case studies demonstrate the ENU philosophy to seek out opportunities to engage with the wider community and to undertake research that is useful in society.

The e-participation case study is a classic example of applied informatics research leading to significant impact in the context of new technologies. It describes the development of e-petitioning systems that are now widely used by a variety of agencies such as local authorities and central government.

The second case study concerns how the pure research funded by UK research councils can lead to benefits in the vital area of biodiversity. As a result, IIDI work has enabled botanists, zoologists and others working in the field of biodiversity, including policy makers, to adopt a common approach to exchanging information previously unavailable. Thus allowing critical questions regarding biodiversity and invasive species more easily addressed.