Institution: The Open University

Unit of Assessment: B11 Computer Science and Informatics

a. Context

The Open University's (OU) resources and infrastructure connect millions of people to university research on a scale unparalleled by any other higher education institution in the UK. Each year OU-BBC co-produced TV and radio programmes attract more than 150 million views and listens, many engaging the public in calls-to-action. The scale of our web presence on YouTube, Facebook, iTunes U and OpenLearn also engages millions of people with free access to new knowledge, and provides opportunities to tweet and blog with OU researchers. Thus, research at the OU uniquely takes place within this wider context, defined by the OU's operations at scale and overall mission, summarised in the strapline 'open to people, places, methods and ideas'.

Such a context influences the types of impact and, as a result, much of our research focuses on social and educational impacts, and on improving quality of life. We also contribute to fostering economic and environmental benefits, e.g. through the delivery of solutions for online collaboration.

Given the OU context, scalability also defines an important common thread across projects and approaches, to ensure that robust solutions can be deployed for large user audiences. As a result, the OU has always led in the application of technology to its mission, capitalising on its Computing research excellence. When Apple's press release in February 2013 announced one billion downloads from iTunes U worldwide, two universities were cited as leading innovators: Stanford University and The Open University.

Hence, Computing research at the OU responds to a wide set of theoretical and practical research challenges, many of which are inspired by the specific context of the OU as a public organisation with a large online presence: maximising the value of open access contents, new ways of engaging and exploring learning material, new technologies to improve user experience and support learning and collaboration in massively distributed settings, and novel approaches to removing barriers for people with disabilities, to name just a few.

In addition, an emphasis on developing generally applicable and reusable solutions ensures maximum impact in a variety of user contexts. For instance, our research programme on supporting live, virtual collaboration has been used well beyond OU courses, by local schools, business and academic organisations, as well as government and community organisations.

b. Approach to impact

Since 2004 Computing research at The Open University has taken place within the umbrella of the Centre for Computing Research (CRC), which is made up of two distinct units: the Computing Department, an academic unit focused on research, teaching and training, and the Knowledge Media Institute (KMi), a research and development institute that plays a strategic innovation and technology transfer role for the University.

The approach to impact pursued within the Computing area capitalises on the distinct nature and missions of these two units: the Computing Department pursues a long-term approach to impact with a focus on knowledge generation and training, while KMi follows a problem-oriented approach with a focus on exploitation.

This dual approach to impact effectively integrates bottom-up (serendipitous) and top-down (strategic) activities and combines an agile, opportunity-driven approach with a long-term strategic approach. On a quarterly basis, opportunities for impact are identified with respect to capability developments and external opportunities, and focused initiatives are put in place. To implement this approach, a dedicated Business Development Manager (BDM) was appointed in 2007 to coordinate and support all non-academic impact activities. Most of the success stories highlighted in this document have resulted from the strategic programme put in place by the BDM.

The dual impact strategy focuses on a set of key objectives: increasing public engagement with research; enhancing digital skills of public and private organisations; and enhancing quality of life for all through novel digital methods and tools. Impact is delivered via key strategic partnerships

with major companies (e.g. the BBC, Apple and SAP), as well as collaborations with Small and Medium Enterprises (SMEs), governmental and not-for-profit organisations, charities and local schools.

This wide scope of impact activities is managed through a continuous structured Customer Relationship Management programme and a dissemination strategy, which covers a wide array of channels, such as industry workshops, public engagement events, and social and broadcast media. In particular, the strategic relationship with the BBC has been instrumental in generating wider impact from OU Computing research. Examples include joint initiatives on using linked data for content integration, and collaborations that have raised public awareness of OU Computing research, such as the BBC Horizon 'Monitor Me' TV programme on the Computing Department's life-logging research. Other important strategic collaborations include the one with the Dynamic Systems Development Method (DSDM) Consortium to identify new ways of working in the context of agile software development projects, and a long-established one with SAP on specifications for technical and business services.

The OU has also made a strategic decision to actively promote Knowledge Transfer Partnerships (KTPs) and several of them have been established through the CRC, e.g. with the Milton Keynes City Discovery Centre and The Hallé Orchestra. We also offer a consultancy service to facilitate highly focused, typically short-term but high-value, activities. In recent years, examples have included: a consultancy on collective intelligence for the new national Institute of Health Visiting, leading to the deployment of the Evidence Hub platform at the heart of their professional development infrastructure; a consultancy for the Royal Institution of Chartered Surveyors, centred on a feasibility study on implementing automated competence assessment methods; a collaboration with Sunderland City Council, which resulted in the take-up of our FlashMeeting (FM) server technology to support the Sunderland Digital City of the Year initiative; the creation of an intelligent dashboard for the NHS ViTaL for Doctors programme; and a feasibility study for UNESCO on cross-cultural online learning.

c. Strategy and plans

Our main goal for the next few years is to strengthen the synergy between our unit-specific approach and operations and the wider University strategy. In particular, over the next three years an important focus will be the OU's commitment as a RCUK Catalyst to delivering the Manifesto for Public Engagement of the National Co-ordinating Centre for Public Engagement (NCCPE), using our digital infrastructure and novel web 2.0 solutions to engage with research users and the public.

Another key University-wide strategic initiative where we are involved concerns the OU Milton Keynes Collaboration Group, a strategic group that includes key public sector and business leaders, alongside senior OU staff. The objective here is to put in place collaborative initiatives with key stakeholders (e.g. local businesses) to achieve local and regional economic benefits. Other University-wide strategic initiatives focus on improving research communications with the East Midlands Local Enterprise Partnership and improving our ability to embed knowledge exchange in our research activity.

Within this overall strategic plan, the Computing area at the OU will focus on three key objectives:

1. An increased emphasis on high-profile, large-scale collaborative initiatives.
2. A closer alignment with national and European research policy strategies.
3. Improved mechanisms for collaboration between the units in the Computing area and the OU's newly restructured Innovation and Enterprise Team, to improve our ability to attract external sponsorships and achieve impact targets.

As one example of a large-scale collaborative initiative, we have recently been awarded as lead partner (with Milton Keynes City Council, a number of other universities, industrial organisations, SMEs and local community groups) an £8m grant by HEFCE, in the context of the HEFCE Catalyst programme on 'Higher Education's Contribution to Economic Growth'. The project, called MK:Smart, will put in place a digital innovation and support programme to leverage large-scale city data to sustain and accelerate economic growth. This programme, which is consistent with the wider University strategy that aims to ensure impact in the local and regional economies, capitalises on our unique strengths in data integration and analytics, semantic technologies and

security, to deliver effective teaching, research and entrepreneurship for innovation-led growth.

With respect to impact generation, MK:Smart will comprise three integrated elements:

- a business engagement programme, which will facilitate business take-up of the innovation capability developed in the project
- a unique smart city education programme for a wide range of audiences, from local schools to higher education students and businesses
- a citizen-centric innovation programme, which aims to increase public engagement in the creation of a smart city, a key element to ensure that the proposed technological solutions are successfully taken up by the population at large.

To align with national and European research policy strategies, including ESPRC priority areas, our focus is on strategic hiring in areas of potential high social and economic impact. These include big data, ubiquitous computing, urban computing (in particular, in relation to sustainability issues), software engineering and information retrieval.

Finally, to take advantage of the recent changes in the way the OU manages innovation and enterprise, we are working closely with the OU central team to deliver the University's four-year strategic Higher Education Innovation Funding (HEIF) plan. While initial activities are focusing on knowledge exchange in the context of our recent work on making sense of scholarly knowledge, other priority areas have been identified, including pervasive and ambient technologies, and the exploitation of knowledge media for education, health and well-being.

d. Relationship to case studies

The four selected case studies showcase our dual approach to impact. Two case studies, 'Supporting effective live, visual, virtual collaboration' and 'Enabling exploration of hidden, contextual knowledge within large collections of documents', exemplify the problem-oriented approach and demonstrate how Computing research has been inspired by real-world problems relevant to both the specific OU context as well as others, and has led to research results that have informed the development of innovative tools, such as FM for online interaction and collaboration, and CORE (COnnecting REpositories) for content aggregation.

FM is now in routine use by hundreds of thousands of users to support a variety of scenarios, such as remote training, distributed team-working and virtual science simulation fieldwork, while CORE has been selected to be both the European Library's default search service and the UK national aggregator of Open Access content. In addition, CORE was highlighted in the JISC Inform magazine (Issue 37) as one of the 'top 10 search engines for research that go beyond Google'.

The third case study ('Empowering people through technologically enhanced senses') exemplifies the top-down approach and demonstrates how a visionary long-term research agenda in human–computer interaction inspired unexpected and fundamentally new approaches.

The fourth case study ('Increasing society's capacity to tackle complex socio-technical dilemmas') exemplifies a mix of problem-oriented and visionary approach. A longitudinal OU research programme since 1995 has been investigating a new kind of literacy – reading, writing and debating ideas as networks rather than as conventional prose. The insights gained from this research are encapsulated in the Compendium software tool, which has enabled a new approach to managing complex networks of information and arguments, impacting public policy, urban planning, health and education.

The selected case studies provide examples of how the strategic context in which OU Computing research takes place defines a coherent roadmap for developing generally applicable solutions, which are then deployed in a variety of user scenarios, including (but not limited to) key scenarios of strategic importance to the University. They also reflect the values drawn from the core mission of the University. As a result, even though the generic nature of the solutions ensures a multi-faceted impact (e.g. the same technology for virtual collaboration is used in local schools and business contexts), they reflect an organisation-wide emphasis on social and educational impacts, improving quality of life, and economic and environmental benefits.