Institution: De Montfort University
Unit of Assessment: 11 – Computer Science and Informatics
Title of case study: Using Research to Change Policy
1. Summary of the impact (indicative maximum 100 words)

Research from the world leading Centre for Computing and Social Responsibility (CCSR) influences policy decisions and practice at national and international levels.

The specific examples cited in this case study demonstrate the role CCSR research played in shaping electronic voting and electronic government in the UK, leading to the suspension of electronic voting in 2008 and an annual cost saving to the UK Government of £4m, and impacts on European ICT research policy including direct contributions to an EGE Opinion, namely the "The Opinion on Ethics and ICT". EGE Opinions are considered to be "soft law" as they are authoritative in their area of expertise. The 'Opinion on Ethics and ICT' guided ICT research policy with regards to ethics and ICT during the FP7 funding programme, and it has been adopted as a set of underpinning principles for the Horizon 2020 programme. Other research findings have similarly informed the Horizon 2020 cross cutting theme of 'Responsible Research and Innovation'.

2. Underpinning research (indicative maximum 500 words)

The CCSR was formed in 1996 and remains the only UK based research centre specialising in ethical and social issues of computing and information systems. The CCSR established a conference series (called ETHICOMP), which, since 1995, has provided regular European forums debating social responsibility implications of ICT. It is recognised as the field's premier conference series in Europe and the Far East. The research described in this case study was undertaken by Professors Simon Rogerson and Bernd Stahl, Senior Research Fellow Dr N Ben Fairweather, and Research Fellow Dr Kutoma Wakunuma.

The CCSR has consistently been researching computer related topics of social and political interest since its inception in 1996, in particular analysing technologies before implementation using foresight research and the analysis of pilot exercises.

In 2001, researchers from the Centre were commissioned to prospectively analyse electronic voting as part of the "Implementation of Electronic Voting in the UK" research project (jointly commissioned by the Dept for Transport, Local Government and the Regions, Office of the e-Envoy, Electoral Commission, LGA, IDeA and Solace). Fairweather (DMU 1996–present) and Rogerson (DMU 1983–2010 then Emeritus) were tasked to produce the "Technical Options Report" (2002), a substantial part of which was an analysis of security requirements. Key research insights included the following observations:

- resources that might be deployed to subvert elections were such that "any system should be able to withstand an attack equivalent to the most extensive that the UK security services could mount against such a system";
- "the electronic voting system needs to avoid being vulnerable to single points of failure"; and
- the "development of a voter friendly system should be based upon the concept of inclusive design. That is based on providing facilities for all that cater for the needs of all voters including those with disability, linguistic constraints and restricted literacy."

This research was further disseminated to a much wider audience through publication in *Representation* in 2003, a journal associated with the Electoral Reform Society and which is read by politicians and electoral administrators as well as academics (Fairweather & Rogerson 2003). Further analysis was conducted and published, inter alia, in Fairweather & Rogerson (2005). In particular, building on the analysis of security requirements, a key insight from this later analysis was that implementations piloted in 2003 had violated the security policy on which they were based.

A collaboration with colleagues in Finland showed that many of the same issues were significant in

the Finnish E-voting experiment of 2008 (Heimo, Fairweather and Kimppa 2010). Further research by Rogerson and Fairweather, with various collaborators in Bahrain and the UK, has confirmed these findings and has been influential in electronic government more generally.

Research by the CCSR had an important focus on professionalism in computing, which contributed to the development of professional standards in bodies like the ACM, IEEE Computer Society or BCS (Gotterbarn, Miller and Rogerson 1999), thus providing the background for European guidance for ICT research.

Foresight research for the benefit of European ICT research policy began in 2009 as part of the FP7-funded ETICA project (Ethical Issues of Emerging ICT Applications). This project was coordinated by Stahl (DMU 2003–present). ETICA aimed to identify emerging ICTs and the ethical issues these may cause, evaluate these issues and review governance arrangements with a view to providing policy guidance via a large scale discourse analysis of policy and research documents. Ethical issues were explored via bibliographic methods and philosophical analysis. The evaluation of these issues used a multi-method approach from the angles of technology assessment, institutional ethics, law and gender.

ETICA showed that the ethical issues that emerging ICTs are likely to raise can be roughly divided into two classes:

- issues that are already being researched and regulated. Some of the predictable ethical issues of emerging ICTs include privacy, security, trust, liabilities and digital divides, echoing the findings in Fairweather & Rogerson (2003).
- issues that are currently less tangible and further removed from current debates. Less predictable ethical issues arising from the emerging ICTs tend to be centred on difficult conceptual issues, such as human identity, the relationship between humans and technologies, and relationships among individuals or groups. Individual identities may change due to the way we interact with technology.

ETICA has shown that current ways of identifying and addressing these issues are likely to miss many of these more novel and less explored issues. ETICA has therefore produced a set of recommendations for both policy makers and practitioners (Stahl 2011), and it is from these recommendations that the impacts described in this case study emerge.

3. References to the research (indicative maximum of six references)

- Fairweather NB & Rogerson S (2003), Internet voting - well at least it's modern, Representation, 39(3), pp 182-195, DOI 10.1080/00344890308523222
- Fairweather NB & Rogerson S (2005), Interfaces for electronic voting: focus group evidence, Electronic Government, an International Journal, 2(4), pp 369-383, DOI 10.1504/EG.2005.008329
- Gotterbarn D, Miller K, & Rogerson S (1999). Software engineering code of ethics is approved. Communications of the ACM, 42(10), 102–107
- Stahl BC (2011), IT for a Better Future, How to integrate ethics, politics and innovation in Von Schomberg R (Ed) Towards Responsible Research and Innovation in the Information and Communication Technologies and Security Technologies Fields, pp 17-34, Luxembourg: Publication Office of the European Union, DOI 10.2777/58723

Title / Topic	Granted by	Role of the CCSR	Time Frame	Financial contribution
CONSIDER (Civil Society Organisations in Designing Research Governance)	EU FP7	Coordinator	02/2012 – 01/2015	€1,499,381
Framework for Ethics in ICT (led by Marina Jirotka, University of Oxford)	UK EPSRC	CI	09/2011 – 03/2014	£397,172
ETICA, Ethical Issues of Emerging ICT Application	EU FP7	Coordinator	2009 – 2011	€834,000

4. Details of the impact (indicative maximum 750 words)

Research into electronic voting, by Fairweather and Rogerson, played a key role in a dramatic change from a steady move towards implementation of e-voting in the UK to its abandonment in 2008.

The Electoral Commission reported on the 2002 electronic voting election pilots that: "The primary aim of the e-pilots was to establish the security and reliability of the voting mechanisms and to start to build public confidence; this was achieved," (2002, p4). In the same year, Fairweather and Rogerson produced their technical report from the "Implementation of Electronic Voting in the UK" project – a report which was critical of the pilots and highlighted the need for more security analysis. As part of their dissemination strategy of the "Implementation of Electronic Voting in the UK" project, the Fairweather and Rogerson (2002) report was made available on Government websites. From here, the technical report was cited by the 2002 Security Study of the UK's National Technical Authority for Information Assurance (CESG), who stated that Fairweather and Rogerson (2002) had 'interesting recommendations' (p 39). These 'interesting recommendations' were then incorporated into the main recommendations from the CESG (2002).

The Electoral Commission took on board the criticism by both Fairweather and Rogerson (2002) and CESG (2002) that more thorough security analysis of pilots was needed. The subsequent security analyses revealed that the pilot projects did not "apply best practice in the area of security" (Actica 2007, p15).

Between 2002 and 2008, decisions on further e-voting election pilots were taken annually, however, during this period it was noted that "There has been some impact on the pilots by some reports of academics in the UK, making it more difficult to go ahead" (Pieters 2008, p49, quoting Peter Facey).

In November 2008, the Government announced that: "The Government are considering what the appropriate next steps are in relation to remote electronic voting," (Hansard 2008), simultaneously announcing for the first time there would be no piloting in 2009. There have been no further pilots of electronic voting since. The announcement in Hansard (2008) can now be seen as the effective announcement of an end to progress towards electronic voting in the UK, with an estimated annual cost saving of £4m (Actica, 2007, pp 19–20). In Finland, criticism such as that contained in Heimo, Fairweather and Kimppa (2010) has resulted in e-voting not being piloted at elections that have taken place since October 2008.

Stahl's and Rogerson's research into the ethical issues associated with ICTs has played a key role in the policy direction of the EUs FP7 and Horizon 2020 research funding programmes.

The European Commission recognises that ICT can raise specific problems that require specific guidance, and for the FP7 funding programme they established the website http://cordis.europa.eu/fp7/ethics-ict_en.html (European Union 2007) to help address these issues. The website was constructed in close collaboration with the CCSR based on research undertaken in the centre since its inception in 1996. The guidance provided in it was aimed at all ICT research proposals submitted to the FP7 programme (which ran between 2008–2013) and had an overall EC contribution of approximately €7 billion.

The European Group on Ethics in Science and New Technologies (EGE) is an advisory body reporting directly to the President of the European Union. Under the direction of European Commission President Barroso, the EGE has published an 'Opinion on Ethical Issues of ICT'. Stahl was the first external expert to present his views to the EGE in preparation of this Opinion on 12 April 2011 and was re-invited for a public hearing on the same topic on 15 Nov 2011. Stahl's presentation was based on the findings and recommendations of the ETICA project. He also presented at the final hearing of the EGE, in preparation for the publication of the Opinion (published in 2012). The EGE's website (http://ec.europa.eu/european_group_ethics/index_en.htm, accessed 23.05.2011) states that "the

Opinion may offer a reference point to the Commission to promote a responsible use of the Digital Agenda for Europe and facilitate the societal acceptance of such an important policy item. The Opinion should take into consideration different possible applications of ICT, such as widespread take-up and use by citizens of the internet, e-health and use of ICT in environmental and agricultural domains." EGE Opinions can be considered "soft law" as they are considered in their area of expertise. The Opinion on Ethics and ICT has guided the ICT research policy with regards to ethics and ICT for the remainder of FP7 (2012-13) and established underpinning principles for the Horizon 2020 programme.

The EU Directorate General Research and Technology Development, Directorate B (European Research Area) is preparing a recommendation for Member States on the topic of "responsible research and innovation" (RRI). The ETICA, PHM Ethics and CONSIDER projects are all financed by this directorate and involved the CCSR as coordinators or WP leaders. As a result of this research, the CCSR's Director, Stahl, was invited as a participant in the first preparatory workshop (May 2011) to develop the principles of responsible research and innovation and ways to achieve it. As a consequence of these and related activities, responsible research and innovation is also being implemented as a cross-cutting activity in all Horizon 2020 research (worth more than €70 billion). Thus, this research has directly informed the policy framework for the Horizon 2020 programme in two distinct areas.

5. Sources to corroborate the impact (indicative maximum of 10 references)

1. ACTICA Consulting (2007) *Summary of Technical Assessments of May 2007 e-voting Pilots* (accessed 19.1.2013) http://www.electoralcommission.org.uk/__data/assets/electoral_commission_pdf_file/0018/16191/Actica_Summary_27244-20136__E__N__S__W__.pdf
CESG Security Study (2002) (accessed 17.8.2011) http://web.archive.org/web/20030403054926/http://www.edemocracy.gov.uk/library/papers/study.pdf
2. Electoral Commission (2002), Modernising Elections: A strategic evaluation of the 2002 electoral pilot schemes (accessed 10.11.2011) http://www.electoralcommission.org.uk/__data/assets/electoral_commission_pdf_file/0016/13156/Modernising_elections_6574-6170__E__N__S__W__.pdf
3. Hansard (2008), House of Commons Hansard Written Answers, 26 Nov: Column 1693W online at (accessed 19.1.2013) http://www.publications.parliament.uk/pa/cm200708/cmhansrd/cm081126/text/81126w0048.htm
4. Pieters W (2008), La Volonte Machinale: Understanding the Electronic Voting Controversy, Doctoral Thesis, Radboud University Nijmegen. (accessed 19.1.2013) http://wwwhome.cs.utwente.nl/~pietersw/Pieters-La_volonte_machinale.pdf
5. ETICA/STOA Parliament event, 31 Mar 2011 – STOA website on the final ETICA event, demonstrating the acceptance of CCSR and related work in the European Parliament. (23.5.2011) http://www.europarl.europa.eu/stoa/events/workshop/31032011/default_en.htm (accessed 19.08.13)
6. European Union (2007) Ethics Review in ICT website - Specific guidance on ethics for ICT research in FP7, with significant contributions from CCSR's inaugural director, Prof S. Rogerson. A representative from the DG INFSO is happy to be contacted to verify these comments http://cordis.europa.eu/fp7/ethics-ict_en.html (both accessed 18.01.2013)
7. Responsible Innovation, 16-17 May 2011, Brussels – Workshop hosted by the European Research Area Directorate of Directorate General RTD to develop a novel approach to responsible innovation (accessed 19.08.2011) http://ec.europa.eu/research/science-society/document_library/pdf_06/responsible-research-and-innovation-workshop-newsletter_en.pdf
8. The Vice Chair of the STOA panel is happy to be contacted to corroborate the information provided in this case study