Human Centred Computing approaches to embed Responsible Innovation in HCI

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ABSTRACT

The motivations and frameworks of Responsible Innovation (RI) speak to HCI in specific and powerful ways. The Human Centred Computing (HCC) theme at the University of Oxford is a

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CHI'19 Extended Abstracts, May 4-9, 2019, Glasgow, Scotland, UK.
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ACM ISBN 978-1-4503-5971-9/19/05.
DOI: https://doi.org/10.1145/3290607.XXXXXXX

KEYWORDS

Responsible Innovation; stakeholder engagement; hackathons; anticipatory governance

centre of excellence for RI in ICT. Theme members have been involved in a range of projects that adapt HCI approaches in order to fulfil RI principles of considering the societal and ethical impacts of innovation and identifying inclusive processes which can lead to better design outcomes. In this paper, we describe two ongoing theme activities that embed RI into HCI – the RI focused ethical hackathon and anticipatory governance in relation to the responsible development of social robots. These activities exemplify our approach, which positions RI as opening up a space for reciprocal dialogue in order to advance processes that shape the trajectory of research and development in creative and beneficial ways.

INTRODUCTION – RESPONSIBLE INNOVATION AND HCI

The field of Responsible Innovation (RI) has emerged at a time when powerful innovations in science and technology are perceived to introduce unique risks for society. The positive desire to produce the "right" impacts from innovation has gradually been drawn together with the risk of public mistrust and led to a reframing of responsibility and a re-thinking of scientific governance. As a consequence, Responsible Innovation has become firmly established in academic and policy spheres; as an initiative RI integrates ethical and societal considerations into the processes and products of research and innovation, in order to design technologies for greater societal benefit. The RI agenda has been strongly promoted by the EU, and is a crosscutting theme in Horizon 2020 [1]. National funding institutions are also increasingly adopting RI principles and encouraging RI for their funded research. For instance, the Engineering and Physical Sciences Research Council (EPSRC) in the UK, has provided the AREA framework [2] (based on work by Stilgoe, Owen and Macnaghten [3]) to represent the core dimensions of RI. This framework encourages researchers and innovators to *anticipate* intended and unintended impacts of innovation, *reflect* on the purposes and motivations for development, *engage* in a broad dialogue over these issues and use the outcomes of these processes to *act* in ways that positively shape the trajectory of research and development. These motivations and existing frameworks of RI speak to HCI in specific and powerful ways. As a field that explores the inter-connections between the human and the digital, HCI is well placed to consider the societal and ethical impacts of innovation and identify inclusive processes which can lead to better design outcomes.

HUMAN CENTRED COMPUTING AT OXFORD

The Human Centred Computing (HCC) theme [4] at the University of Oxford is a centre of excellence for Responsible Innovation in ICT. Through projects led by Professor Marina Jirotka, theme researchers have been involved in various RI activities that consider the ways in which new technologies can be more responsive to societal concerns and needs, and that promote improved design. We seek to operationalise normative RI guidelines, such as the AREA framework, into

robust research practices. This has frequently involved drawing on established HCI approaches and extending them to incorporate an RI lens [5]. For instance, we have adapted Participatory Design activities [6] to include a broader range of stakeholder perspectives and encourage reflexive awareness amongst developers of their own role in the design process. In this paper we describe two ongoing theme activities that embed RI into HCI. In doing so we demonstrate how we view RI as opening up the innovation space to a range of stakeholders and facilitating practices to engage with them. This in turn allows the opportunities and challenges inherent to the innovation process to become visible and to be addressed creatively.

EMBEDDING RI IN HCI

The RI focused ethical hackathon

Within the HCC theme we have been developing the traditional hackathon model to create a novel design event that includes an explicit RI element [7]. We move away from the sole focus on technical features of design to create challenges that require interdisciplinary collaboration in order to address ethical and societal issues within a problem solving activity. The idea of the RI ethical hackathon arose as a key outcome of a specific project that sought to embed RI into ICT practices [8]. Teams including computer scientists, engineers, ethicists, lawyers, social scientists and business researchers complete a task that requires them to anticipate and reflect on the social and ethical issues that may arise from an innovation and consider how to address these in the emerging technical designs. Depending on the task, teams might produce a design document, mock up or prototype. Entries are then evaluated by judges in terms of how the RI issues were identified and addressed, along with traditional hackathon parameters such as, functionality, efficiency and safety etc. In this way, the ethical hackathon forefronts RI issues as a resource for creativity in ICT innovation. We have run several ethical hackathon events with students in order to test and refine the model [9]. Our next step it to embed this approach in industry.

Anticipatory governance

Anticipatory governance can embed RI in HCI work by anticipating the consequences of innovation - positive and negative, intended and unintended – and ensuring that the direction of subsequent design and development is shaped to address them. A forthcoming HCC programme of study will adopt this approach in the case of social robots. While hopefully rare, accidents involving innovations such as driverless cars, social care robots and robot toys are inevitable – indeed some have already occurred – and risk undermining public trust. It is vital that post-incident investigations uncover the cause of accidents, so that steps can be taken to reduce the likelihood of them recurring. Our anticipatory work drew inspiration from the aviation industry: a trusted industry that has well-constructed accident investigation processes. In the new EPSRC-funded project ‘ROBOTIPS: Developing Responsible Robots for the Digital Economy’ [10] we will include RI-informed research, design and testing of an an ‘ethical black box’(EBB) for robots [11].

This is an innovative design feature that collects data about a robot's actions in real time and in context to allow the provision of important information when accidents occur. The EBB makes the robot's actions more transparent and forms a key part of a reconciliation process so that any individual accident does not jeopardise people's acceptance of social robots *en masse* [12]. In further keeping with RI principles, the testing of the EBB will incorporate engagement with multiple stakeholders.

CONCLUSION

Work conducted at the Human Centred Computing theme at the University of Oxford draws on RI perspectives in order to integrate ethical and societal considerations into the processes and products of research and innovation. In particular, our research projects develop and apply practical activities from abstract and normative RI guidelines and frameworks. Whilst these activities are not without challenges and potential limitations, they offer viable means to pursue responsible innovation in HCI. Through reciprocal engagement and dialogue between scientists and technology experts on the one hand, and policy and civil society on the other, the very trajectory of innovation may be influenced, enabling emergent issues to become a resource for creativity in development and design.

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