

# Ethically Aware IT Design for Emergency Response: From Co-Design to ELSI Co-Design'

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## ABSTRACT

The latest EU funding framework, 'Horizon 2020', has moved consideration of ethical and societal implications of technology development to the fore. Yet, there is little guidance on how to do such research in practice, let alone how to innovate in ethically and socially sound ways. This paper addresses these issues in the context of a large scale EU funded project developing system of system innovations in IT supported emergency response. Building on collaborative design and a range of other approaches, the paper argues that just like 'usability', ethics cannot be invented or decided by experts, but has to be the product of engagement with the technology by directly or indirectly implicated publics. Facilitating such publics is a central element of what we call 'ELSI Co-Design'. The paper outlines the theoretical and methodological underpinnings of this approach.

## Keywords

ELSI, Co-Design, STS, Value Sensitive Design, Research Ethics, Horizon 2020

## INTRODUCTION

A concern for ethical, social and legal impacts of technological innovation and how to democratically address these has long been a topic of study. Such a focus is also becoming increasingly prominent in the current EU funding scheme 'Horizon 2020' which states:

Ethics is given the highest priority in EU funded research: all the activities carried out under Horizon 2020 must comply with ethical principles and relevant national, EU and international legislation (European Commission, 2014a).

Yet despite this new prominence, unlike 'research ethics' with its long established methods, ethics of technology is still in its infancy. There is no one size fits all approach or methodology for exploring the Ethical, Legal and Social Impacts or Implications (ELSI) of socio-technical innovations or for responding to and folding such considerations into the design process. Likewise, while in section 14 of Horizon 2020, 'Secure societies – Protecting freedom and security of Europe and its citizens', each of the calls includes the requirement of 'improved cooperation between science and society through ethical screening of the developed solutions' (European Commission, 2014b), there is little guidance on how this might happen in practice or who should be involved in such a process.

Such issues and how to address them become even more challenging in projects such as the FP7 BRIDGE project, a research and innovation project that aims to design IT systems to support inter-organisational collaboration in large scale emergency response. At the heart of the project is the development of middleware infrastructures, which will enable autonomous systems to interoperate and thus share information, synchronize processes and merge certain functions. It will not

be surprising that such architecture, due to its ability to track and monitor resources, aggregate and share data also raises many potential ethical, legal and social challenges. These include, for example: how to share and at the same time protect personal data and privacy? How to avoid situation awareness becoming surveillance? How to deal with changes in organizational structure, hierarchy and control, such situational awareness tools might bring about?

Such a project also raises many challenges for exploring these issues, including coordinating across multiple project partners, work packages and ‘systems of systems’ and many ‘users’, stakeholders or ‘publics’ impacted by the technology. And it raises challenges because addressing ELSI is not a one off endeavor, but an ongoing process of exploration, because the emergence of ethical, legal and social issues is a dynamic process. We argue that the renewed focus on ethics requires a systematic inquiry into what addressing ethical and societal implications might mean in the first place, let alone how ‘to innovate in ethically better ways’. We propose that ethical explorations must form an integral part of design processes. Yet what these ethical and societal implications are, and how to make innovations better is - like the socio-technical systems we ‘design - an object of collective and ongoing negotiation, which needs to be done *in situ* and hand in hand with end-users and other stakeholders. We argue that the ISCRAM community with its longstanding experience in innovation is well equipped for meeting these new ethics requirements and suggest a method of ELSI Co-Design, which builds on collaborative design, while at the same time making explicit already embedded ethical and societal concerns. In this paper we outline some of the approaches that have sought to address such issues, as well as the key features and methods of the ELSI co-design approach used in the FP7 BRIDGE and SecInCoRe projects.

## **COLLABORATIVE DESIGN AND DESIGN FOR COLLABORATION**

There have been many approaches for folding ELSI awareness into innovation. These approaches have had varying degrees and forms of stakeholder involvement and have been driven by a variety of motivations. Many are well-established elements of the design toolbox of the ISCRAM community with its awareness for the importance (and inevitability) of emergency domain experts acting as participants in the IT design process. In this section we outline a selection which

we think has the most to offer in terms of disclosing ethical and societal implications of design and that have informed our ELSI co-design approach.

### **User-Centred Design, Participatory Design and Co-Design**

Many approaches have sought to include ‘end users’ and other stakeholders in collaborative design. For example, user-centred design involves a broad spectrum of user-orientated design methods, in which the needs of the ‘user’ are central to the design process. Participatory design, with its roots in the struggles between workers and managers during the era of rationalization in manufacturing sought to actively involve workers to ensure their rights (Asaro, 2000). However, both approaches, and ‘co-design’ have evolved into diverse fields, informed by various political, theoretical and pragmatic arguments (Törpel, Voss, Hartwood and Procter 2009). These include vastly differing approaches to how ‘users’ or ‘stakeholders’ are taken into account, including being seen as consultees or active partners in the process. Other trends have included a shift from seeing ‘design’ as occurring separately from users and sites of use, to ‘design in use’ (Henderson and Kyng, 1991). The emergence of ‘systems of systems’, ubiquitous and mobile computing have also shifted design concerns from users in a ‘workplace’ to a broader concern for users in public spaces, services and homes (Asaro, 2000). Users are also seen as becoming part of the design team as ‘expert of their experiences’ (Sleeswijk Visser, Stappers, van der Lugt and Sanders, 2005). However, it is argued that ‘users’ must be given appropriate tools for expressing themselves, a notion which in the context of designing (technological) futures rings true, especially for uncovering ethical and societal implications.

### **Computer Supported Cooperative Work**

Computer Supported Cooperative Work (CSCW) developed during the 1980s, principally with the interest of designing computer-based technology to support cooperative group work (Schmidt and Bannon, 1992). CSCW has provided a range of theoretical and methodological contributions to exploring ELSI. Longitudinal studies examining the adoption of technology in workplaces have provided insights into the ‘co-development of work, organisation and technology in use’ (Törpel et al., 2009, p.21) and the understanding that technologies are not ‘readymade’ but ‘need to be embedded’ in existing practices and local contexts or circumstances (ibid , p.21). Ethnographic workplace studies (Luff, Hindmarsh and

Heath, 2000) have provided detailed studies of people's practices. One of the key insights of CSCW is that one cannot just understand people's practices as something planned, because they are also deeply shaped by situated logics. Therefore one has to design 'for' human practices rather than model and replace human practices. Here CSCW has affinities with participatory and co-design approaches, including a 'commitment to designing systems (both technical and organizational) that are informed by and responsive to people's everyday work practices' (Kensing and Blomberg, 1998, p.180) and an ethical concern for designing for humans. These ideas have been further developed through the notion of 'co-realisation' (Hartwood, Procter, Slack, Voss, Buscher, Rouncefield, and Rouchy, 2002), combining ethnomethodology with participatory design and hence new kinds of longitudinal engagement between users and designers.

### Engaged STS

Science and Technology Studies (STS) with its concern for 'democratising technological culture' (Bijker, 2003), provides a variety of further theoretical resources. STS scholars have experimented with and provided critiques of participatory practices at the science and technology/publics interface. For example, Wynne (2006) highlights how in exercises with invited participants 'pre-framing' of an issue can often occur, locking participants into existing agendas and 'normative commitments'. STS has also provided insights into the diversity of 'publics' and the fact that 'the public' does not in fact pre-exist, but is 'potential, and always in the making' (Felt and Wynne, 2007, p.19). This has also been informed by Dewey's (1991) argument that publics emerge in response to issues and that expertise is created through democratic processes of social enquiry and public deliberation around an issue. For Latour (2005) this involves a new form of 'object orientated politics', whereby 'matters of fact' become 'matters of concern' and there have been a range of theoretical and practical experiments around the formation of 'new collectives' (Latour, 2004) and 'collective experimentation' (Felt and Wynne, 2007), seeking to open up new spaces for negotiating politics and ethics.

### Value Sensitive Design

Value Sensitive Design (VSD), developed in human-computer interaction and information systems design, offers a 'theoretical and methodological framework

with which to handle the value dimension of design work' (Friedman, Kahn, Borning, and Hultgren, 2013, p.1). It combines concern for issues such as privacy, physical welfare, universal usability, informed consent, autonomy and trust, etc. in a systematic way throughout the design process. In this context 'value' refers to 'what a person or group of people consider important in life' (ibid p.2). Friedman et al. argue that VSD offers a unique contribution to the design of technology. In practice its methodology combines conceptual, empirical, and technical investigations, employed iteratively. The conceptual investigation asks which direct and indirect stakeholders are affected by the design, what values are implicated and how trade-offs among competing values should be negotiated. Empirical investigations include following the technological artefact throughout its various contexts of use, providing contextual and situated information that further specifies conceptual considerations. Other contributions include attempting to influence the design of technology throughout the design process and taking seriously indirect stakeholders that are often ignored. It also seeks to enlarge 'the scope of human values studied' acknowledging that values can play out differently within different contexts and points in time (Friedman et al., 2013).

### BRIDGE ELSI CO-DESIGN AS ISSUE FORMATION AND ASSEMBLAGE OF PUBLICS- THE MOVE FROM ETHICS TO POLITICS

The ELSI Co-Design approach developed and used in the FP7 BRIDGE and SecInCoRe projects, draws on these approaches and others, integrating ethnographic observations and insights from user engagement and co-design into specification, integration and experimental implementation of new technologies. The key features and methods of this approach are outlined below.

#### Key Features of the ELSI Co-Design Approach

##### *Bringing Ethical, Legal and Social Issues to the Forefront*

Although FP7 did not include the ethics requirements of Horizon 2020, the BRIDGE project has sought to explicitly address these issues and dedicated an ELSI work package to this task. This enabled the development and resourcing of the ELSI Co-Design approach, which we see as practices for turning matters of fact (does it work?) into matters of concern (is this really what we want?).

### *Disclosive and Situated Ethics*

Central to the approach was an understanding of ethics not as a pre-existing checklist of issues already known, but as an emergent phenomenon that is both situated and co-constituted. Drawing on a disclosive ethics approach (Introna, 2007) we hoped the process would reveal user needs, practices and concerns often unanticipated or unexpected, and disclose possible ‘good’ as well as ‘problematic’ socio-technical futures. In practice, this involved creating spaces around our technological prototypes to allow the emergence of issues and the assemblage of publics.

### *Facilitating and Assembling Publics for Co-Design*

Drawing on the wealth of collaborative design approaches we contend that just like ‘usability’, ethics cannot be invented or decided by experts, but has to be the product of engagement with the technology, by directly or indirectly implicated publics. Facilitating such publics is a central element of what we call ‘ELSI Co-Design’, and it involved an experiential and experimental approach where with stakeholders and (working) prototypes, we figure out qualities and features of the technology in an ongoing exploration. This approach allows for the kind of processes of engagement and negotiation we see appropriate for democratic design with the added focus of explicitly opening up ELSI issues.

### *Iterative Process throughout the Life of the Project*

Drawing on VSD and in line with the ‘agile’ design approach being used in the project, we undertook our ELSI explorations and co-design practices from the start of the project and explored issues iteratively through the project’s life. This iterative exploration involved openness to the emergence of new issues and new stakeholders. Issues were explored in varying contexts, focal points and intensities, but in roughly four phases or rather, since these were not linear, but iteratively organized, modes of investigation and design.

### *A Mixed Methods and Future Orientated Approach*

Drawing on a wide range of resources, we adopted a toolbox or mixed methods approach, recognizing that different approaches could feed in and inform each other in constructive ways. We also recognized that it would never be possible to

know the full scope of uses or implications of the technology, but in using scenarios and other experiential tools we tried to explore possible futures and make these futures tangible.

### **ELSI Co-Design in Practice**

In this final section we outline our methods for ethical co-design. These were conducted throughout the life cycle of the project in roughly four phases.

#### *Ethnographic Domain Analysis*

Drawing on CSCW and STS traditions, ethnographic domain analysis tried to capture the practices, procedures, organization, skills and concerns of domain experts. The domain analysis gathered expertise about the domain, which was then systematized into rich user stories and broken down into more abstract ‘user needs’ and ‘ethical concerns’.

#### *Co-Design Workshops (Scenario driven and prototype based):*

Co-design workshops played a prominent role. Here, mostly domain experts (end users) gathered in order to play through scenarios, using real or mock-up prototypes, i.e. elements of the BRIDGE system of systems. Unlike domain analysis, these sessions featured a strong futuristic element, in that they allowed participants to imagine ways of doing things differently. At the same time, they also allowed for conflicts or concerns to get expressed or even discovered in the first place.

#### *Ethical Requirements Sessions*

Based on findings from domain analysis and co-design (and after almost 3 years of exploration) we built another kind of laboratory, where we confronted technical elements and the inner workings of the system with the stories, scenarios and concerns we had collected but also with a more formal canon of (emergency) ethical qualities. In these ethics sessions (there were also legal and architectural sessions), two kinds of spokespeople engaged with each other: the systems developers represented the “concerns” of the socio-technical system, while the domain analysts represented the ethical canon and the concerns the team had learned about from various stakeholders. In its representative nature based on

‘spokespersons’ rather than having directly and indirectly concerned parties at the table, this mode moved away from our ‘direct democracy’ approach and resembled more closely representative democracy or an expert public. While being uneasy with this to a certain extent, this was due to the pragmatic necessity of formulating technologically sound and ethically aware systems requirements.

#### *Long Term Engagement*

The last phase or mode will again strive for more inclusiveness in taking the prototype in its most mature stage back into its potential future habitat, where domain experts will engage with it over a longer period of time. Hopefully the amount and kinds of people and social entities who will come in contact with the systems will be multiplied, thus multiplying the opportunities for issue as well as ‘publics’. Design is here seen as an open-ended process where products should be adaptable to new situations, and this phase opens up what Ehn calls ‘design for design’ (2008). In this process, just as co-design negotiates and re-specifies practices in interaction with emergent technology, the same is happening for ethics and technology adapting, revising and co-articulating each other.

#### **CONCLUSION**

This paper began by outlining the intensified focus on ethics within Horizon 2020 EU funding requirements. However, there are no regulatory standards, or ‘one size fits all approaches’ or checklists that can be easily adopted. As such, there is space and a need for methodological innovation in how we might open up design processes to address ethical, legal and social issues. There have been attempts to do this in the past and the FP7 BRIDGE project has drawn on different traditions to develop our own experiments in what we are calling ELSI Co-Design. In this paper we have outlined key theoretical and methodological underpinnings of this approach with the aim of engendering further discussion and experimentation.

The work presented here is still in development and much further work is needed to reflect on the impacts of this process, what worked, didn’t work and what the challenges were. This includes the many practical, logistical and communication challenges within a large scale, systems of systems project. But it also raises many other issues, including, what ‘publics’ did we create and allow space for within

the project and who was excluded? How might we better include indirectly implicated publics and who might these be? How does a commitment to address ELSI actually play out in practice with other demands and cultures within the project? We argue that practices of co-creation, where both publics and matters of concern are results of negotiation and contestation are pre-requisites for socio-technical systems, which can not only be made ‘acceptable’, but become a constructive part of who we are.

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