

Towards an Open Data Vocabulary for Canvas Driven Innovation Ethics

Dave Lewis¹², Harshvardhan J. Pandit¹², Hannah Devinney²⁴, and Wessel
Reijers¹³

¹ ADAPT Centre

{dave.lewis|harshvardhan.pandit|wreijers}@adaptcentre.ie

² Trinity College Dublin, Dublin, Ireland

³ Dublin City University, Dublin, Ireland

⁴ devinneh@tcd.ie

Abstract. Discussing the role of ethics in Research & Innovation is an important aspect of the technological progress we make today, and therefore contributes to sustainable development goal on industry and innovation. In this context, the task of structuring such discussions of ethics with the business processes they relate to is difficult due to a lack of methodologies and existing use-cases. The Ethics Canvas offers a tool that uses a model based on the Business Model Canvas to structure discussions around ethical implications. We present a way to relate such ethical considerations with their business process using the semantic web. This will allow an investigation of how business models and ethics affect each other, and to structure discussions around this relation. The approach also allows discovering related ethical implications through the Ethics Canvas tool for a richer discussion surrounding ethics.

Keywords: Research & Innovation, Ethics, Canvas Model, Semantic Web

1 Introduction

The UN sustainable development goal for Industry, Innovation and Infrastructure [1] highlights the critical role of technology research and innovation (R&I) in enabling sustainable industrialisation and targets growth in R&I capacity and investment. However, as the pace of technological R&I accelerates, especially in digital technology and data-driven AI, the power of the resulting technology to negatively impact individuals and societies increasingly comes to the fore of public concern and debate. Concerns about the ethical issues that arise in R&I process therefore gaining more attention and must be addressed clearly and systematically if public support for R&I activities is to be maintained.

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digital technology and data-driven AI, the power of the resulting technology to negatively impact individuals and societies increasingly comes to the fore of public concern and debate. Concerns about the ethical issues that arise in R&I process therefore gaining more attention and must be addressed clearly and systematically if public support for R&I activities is to be maintained. Existing methods for practising ethics in technology R&I can be classified as: *ex-ante*, for emerging technologies at early stages of R&I; *intra*, during technology design and testing; and *ex-post*, as technology as R&I is mature and the technology is applied. From a comprehensive literature review R&I ethics approaches (2017) Wessel et al recommend that: ethical technological design should be integrated into the day-to-day work of R&I practitioners; with guidance for discerning the ethical nature technology design choices and how ethical principles can be balanced and different socio-technical alternatives considered; and stakeholder participation should be broadened guided by democratic principles.

Existing methods for practising ethics in technology R&I can be classified as *ex-ante* for emerging technologies at early stages of R&I; *intra* during technology design and testing, and *ex-post*, as technology as R&I is mature and the technology is applied. The comprehensive literature review of R&I ethics approaches [6] recommends that:

- ethical technological design should be integrated into the day-to-day work of R&I practitioners
- these should be with guidance for discerning the ethical nature of technology design choices and how ethical principles can be balanced
- different socio-technical alternatives be considered
- stakeholder participation should be broadened and should be guided by democratic principles

The rapid commercialisation of digital technology R&I demonstrates how implementing such recommendations cannot be addressed solely within the confines of policies for publicly-funded research. It must instead be based on an open and honest debate with commercial R&I practitioners about appropriate methodologies and possible regulatory actions needed to enable viable ethical practice that can balance commercial benefits of digital technology with the broader social good.

The focus on ethics is also significant for the funding of R&I. While publicly funded research is already served by institutional ethics guidelines, these are not applied systematically as knowledge is transferred to the commercial sector i.e. as a given technology transitions from a research to an innovation phase. This transition is increasingly the focus of public co-funding as governments strive to improve the economic and social impact of research through commercial innovation.

In parallel, Environmental, Socials and Governance criteria are growing in importance for commercial investors concerned about ethical impact of innovation investments. The process of technological innovation is in urgent need of good ethical practices in the form of accessible guidelines, usable tools and reliable governance structures. However, the creation and adoption of these is

highly based on the discussion driven by the practising community. One of the key challenges in this area is the investigation of concepts and topics relevant to a given topic of concern.

This paper discusses how such discussions can be driven using the Ethics Canvas, our tool for practising ethics in research and innovation. While the tool allows structuring the narrative in a collaborative manner, we envision expanding upon its intended use to discover relevant topics in the discussion of ethics. For this, we look towards semantic web to help discover related concepts and topics when discussing ethics.

2 The Ethics Canvas

We developed the Ethics Canvas⁵ as a novel method to address these challenges using a tool that encourages discussions pertaining to practising ethics in research and innovation. We evaluated existing approaches of responsible innovation [2,5] which are focused on the design of business but not on technologies involved in the innovation process.

To integrate a discussion of ethics into existing methods of discussions, we used the Business Model Canvas (BMC) [3] which allows collaborative discussions about the business processes and encourages a common understanding of how the business can create, deliver, and capture value. The Ethics Canvas helps structure discussions on how technology affects stakeholders and the potential it has for ethical considerations.

Currently at version 1.9, the Ethics Canvas has evolved over time to better capture and reflect discussions. It consists of nine thematic blocks that are grouped together in four stages of completion. The first stage (blocks 1, 2) requires identifying the stakeholders involved based on the technology under consideration. These are then used to identify potential ethical impacts for the identified stakeholders in stage two (blocks 3-6) and non-stakeholder specific ethical impacts in stage three (blocks 7, 8). Stage four (block 9) consists of discussions structured around overcoming the ethical impacts identified in the previous stages.

The ethics canvas can be printed or used as an web application that can be used without an account and can be downloaded. Certain features such as collaborative editing, comments, tagging, and persistence are made available through an account. The source of the application is hosted online and is available under the CC-by-SA 3.0 license. We are working on the next iteration of the canvas and intend to exploit semantic-web technologies to provide a cohesive experience around discussing ethics. We welcome ideas, suggestions, and collaboration regarding the same.

⁵ <https://www.ethicscanvas.org>

3 Driving Discussions

We take the example of the Ethics Canvas designed to discuss a scenario based on Nosedive, an episode of the British television series Black Mirror [4]. The scenario presented in this paper of achieving a situation of aggressive user-profiling based on today's real-life scenarios uses the Ethics Canvas to discuss its ethical implications. The canvas itself used for this example is available online under the CC-by-SA 4.0 license.

While the Ethics Canvas acts to structure the discussion of the ethical implications, it does not assist in the investigation of what these implications are. For example, the scenario consists of an online service collecting a very large range of personal information and providing personalised analysis of this data as a service. Discussions surrounding how this can cause ethical issues is entirely dependant on how the collaborators use the Ethics Canvas. There currently exists no tool or resource that one can look up ethical considerations from.

However, there is a possibility of using the various arguments discussed in other related canvases on the Ethics Canvas platform. Such an approach would, in theory, allow the user to investigate similar ethical considerations to the ones they are currently investigating in their own canvas. This is quite similar to looking up how similar businesses operate and using their experience within the context of understanding the challenges of a new start-up.

In the context of the considering ethical impacts, the discussion would involve both the Ethics Canvas and the Business Canvas to provide a comprehensive view of how innovation and ethics affect each other. Therefore, linking the business model canvas with its relevant ethics canvas is an important part of our approach.

This can be done based on the structure of the two canvas models. Both the business and ethics canvases are structured into blocks, and have individual ideas or segments populating each block based on context. Linking the related blocks or ideas between the two should provide a good context for how the two affect each other. ‘

4 Semantic Exploration

We look towards using semantic web to define the metadata for the canvas and its contents. The premise for this approach is to make finding related information easier based on concepts within the canvas. These can be both explicitly defined by the user or implicitly identified by an underlying algorithm.

In case of the Nosedive based example, explicit metadata could be the identification of types of personal data being used, the mechanisms for its collection and usage. Based on this, similar canvases that use the same data could be identified. Then, these could be used to provide the user with an already established set of discussions surrounding the ethical implications of the scenario they are trying to investigate.

We expect to use *SKOS*⁶ ontology to define terms and concepts used within the canvases. This would provide a vocabulary of terms and concepts that can be used to link related canvases together. The current model of Ethics Canvas already features a similar feature called *tags* which allows defining a set of words that are then highlighted across the canvas to show context. Such *tags* can be used to create a vocabulary using *SKOS*, which can then be used to suggest such tags based on contents within the canvases.

Additionally, such terms and concepts allow the Ethics Canvas to be linked to the Business Canvas, thereby providing an objective and quantifiable way to see how they both evolve and their relation to each other.

We plan to test this approach based on the existing collection of canvases produced by students who first designed their ideas using the business model canvas, and then deliberated its implications using the ethics canvas. We plan to use this to establish a semantic-web based component as part of the ethics canvas tool offered online so as to provide relevant ideas from other canvases.

5 Conclusion

This paper discusses the problem of discussions related to the UN sustainable development goals in the context of research & innovation (R&I). The paper specifically focuses on the problem of structuring ethical implications in a way that is related to the business services they are based on. The use of the previously published Ethics Canvas tool to structure such a discussion is important to investigate ethical investigations. Our approach, presented in the paper, is to use semantic web to link the related ethical implications with the relevant business ideas through their respective canvas models. This would allow investigation of how decisions and discussions affect the business models and ethical considerations about them.

In addition, a semantic web vocabulary of concepts would also allow finding related canvases based on similarly tagged ideas within them, which can be used to present such related canvases with the intention providing more information for enriching discussions about a particular ethical implication. We plan to test this approach based on a collection of ethics and business model canvases and to incorporate their results to enhance the Ethics Canvas tool and website.

Acknowledgements

This work is supported by the ADAPT Centre for Digital Content Technology which is funded under the SFI Research Centres Programme (Grant 13/RC/2106) and is co-funded under the European Regional Development Fund.

⁶ <https://www.w3.org/TR/skos-primer/>

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