Enhancing AI Ethical Reviews: A User Interface Approach with Ethix

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Abstract

This dissertation describes the design and development of Ethix, a tool for conducting ethical reviews for artificial intelligence (AI) projects. The report begins with an introduction to the tool, outlining its objectives and current state. It then moves into a discussion of the background, highlighting the relevance of ethics in AI, then discussing methods of ethical considerations, focusing on ethical review as a specific approach. The report explores the problem of engagement in ethical reviews, highlighting the importance of user interface (UI) and user experience (UX) design in improving engagement. The report goes on to analyse existing ethical review tools, including a previous edition of Ethix.

The Methodology section covers how the project was managed, how the tool was designed and how user studies were conducted to gather requirements and feedback on design. The report then presents details of the design of Ethix, discussing its UI goals, design principles and assumptions, and then demonstrates how the design satisfies user stories through a review of the tool's user interface. The report then evaluates the design and the project as a whole, and suggests potential further project development ideas.

Overall, this dissertation provides insights into the challenges and opportunities of ethical consideration in AI, and presents Ethix as a promising tool to address these challenges.

Research Ethics Approval

This project obtained approval from the Informatics Research Ethics committee.
Ethics application number: 866946
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The participants' information sheet and a consent form are included in the appendix.

Declaration

I declare that this thesis was composed by myself, that the work contained herein is my own except where explicitly stated otherwise in the text, and that this work has not been submitted for any other degree or professional qualification except as specified.

(*Adwoa Appiah*)

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Chapter 1

Introduction

Artificial Intelligence (AI) has become an inevitable part of our lives, permeating nearly every aspect of modern society. From the smartphones we use to the cars we drive; AI is integrated into our daily routines. Its ability to automate tasks, process large amounts of data, and make predictions has revolutionized industries and transformed the way we live and work. While there are numerous benefits to using AI, its widespread adoption also means that we have become increasingly dependent on it. Consequently, we are now more vulnerable to its potential downsides, and any harm it causes could have a significant impact. Therefore, as we continue to develop AI systems to fulfil their intended purposes, it's important to also consider: What are the potential consequences if the system is not created correctly or carefully? Who will be impacted if these issues arise? And most importantly, what can we do to prevent such problems from occurring in the first place?

When the ethical implications of an AI system are not considered, it can lead to negative consequences for a wide range of stakeholders. It can harm individuals, damage reputations and lead to legal consequences. It could also lead to a lack of trust in the system and its creators, which can be hard to regain.[23] One way of managing such risks is by conducting ethical reviews for these systems. However, due to the demanding and non-interactive nature of the process, it is often considered and treated as a boring, extra administrative task. This project surveys the current ethical review process of the Data for Children Collaborative (DCC) and explores the design of a software tool, Ethix, that aims to improve this process by improving engagement and collaboration while also being universally usable.

1.1 Ethix, the Tool

Ethix is a software tool designed to facilitate ethics assessment throughout software development. The tool would be a web app that would provide a platform for all stakeholders involved in the development of an AI system, such as the developers, ethics experts, data experts, etc to collaborate in the ethical review process, and make the process a natural part of development instead of a tedious administrative task.

Ethix is intended to be universally accessible. However, the research study of this project focused on the ethical review process of the Data for Children Collaborative (DCC). This is because the DCC's ethical review process is similar to that of many other organizations, making it a good representation of the broader landscape. Additionally, the DCC is a well-established international initiative with a strong track record of ethical research, providing an excellent opportunity to gather insights from experienced researchers.

1.1.1 The Objectives of the Design of Ethix

The design of Ethix aims to achieve three main objectives: to facilitate discussion and collaboration, encourage reflection, and most importantly, improve participant engagement in the ethical review process.

Firstly, facilitating discussions among stakeholders is critical to ensure that all perspectives are considered, and potential ethical issues are addressed [9]. Ethical issues are complex and multifaceted, and having a platform for stakeholders to discuss their concerns, values, and beliefs can help identify potential problems and how to mitigate them. Without such a platform, some stakeholders may not have a complete understanding of the ethical implications of the project, or may be hesitant to voice their concerns, which can lead to overlooking important ethical considerations [10].

Encouraging and facilitating reflection is essential to make the ethical review process more meaningful and effective. This is important because ethical review should not be reduced to a mere checklist exercise. Reflection allows for a deep consideration of all angles and potential consequences, which is crucial in making sound ethical decisions. [4] With no encouragement or platform for reflection during ethical reviews, important ethical considerations could be overlooked, leading to projects that are not ethically sound.

Lastly, the ethical review process can be perceived as dull or bureaucratic, and it can be challenging to engage participating stakeholders in the process [13]. Ethix aims to make the process engaging for participants by providing a user-friendly platform that simplifies the process and makes it more accessible [14]. Lack of engagement could result in participants approaching the process with mediocre efforts, which could lead to a poor review quality. [13]

1.1.2 Present State of Ethix

As of the report's completion date, Ethix exists as an interactive user interface prototype. The project focused on the design of the user interface for Ethix. This is because the user interface is the main way that stakeholders interact with the tool, therefore, it has a big impact on how users engage with the tool, their level of involvement in discussions, and the depth of their reflection.[12] Lipworth et al. (2015) [12] found that user-friendly interfaces can increase researcher engagement and willingness to participate in ethical review processes, and a poorly designed user interface on the other hand can lead to frustration, confusion, and disengagement from the ethical review process. Focusing on the user interface was therefore a crucial step towards achieving the design objectives

of Ethix. Further discussion on the impact of the user interface of ethical review tools on user engagement is found in section 2.5.1.

1.2 Contributions

The following is a list of formal contributions I have made to this project:

- Research and analysis of ethical review as a method of ethical consideration, its problem of participant engagement, the impact of the user interface design of an ethical review tool on participant engagement and the quality of ethical reviews, and finally, how to design an ethical review tool that improves engagement and encourages reflection in ethical reviews.
- A user study to investigate the research topics above and the ethical review process of the Data for Children's collaborative (DCC). The user study included a survey and 2 sets of interviews with 4 volunteers from the DCC. The findings from the study informed the requirements and design of the ethical review tool the project is about.
- The design of the user interface of an ethical review tool called Ethix, that aims to improve participant engagement in ethical reviews as well as encourage a collaborative and reflective approach to ethical reviews.

Chapter 2

Background

2.1 What are Ethics?

Ethics is what determines what is right or wrong, good or bad, and fair or unfair in human conduct. It is a set of principles and values that are used to govern how people ought to behave in different situations. For the purposes of this report, ethics is defined as:

> The principles and values that guide decision-making about what is right and wrong, in the design, development and implementation of AI systems

Following this, an ethical review can be defined as:

> The systematic evaluation of the ethical implications of an AI project and determining whether the project meets ethical standards and guidelines. This includes reviewing the project's goals, methodology, data sources, and potential impact on individuals and society to ensure that ethical considerations are taken into account throughout the development and deployment of the project.

These definitions will be assumed for the rest of the report. The next session discusses the relevance of Ethics in AI.

2.2 The Relevance of Ethics in AI

There is a moral dimension to AI that cannot be ignored. It is crucial that AI is developed and deployed in a responsible and accountable way that takes into account the potential impact on individuals and society as a whole. That is where ethics come in.

One key role of ethics in AI development is to ensure that the systems are designed in a way that is fair and transparent. AI algorithms can reinforce existing biases and discrimination if they are not designed with care [22]. It is essential that the ethical implications of the data used to train AI systems are carefully considered to avoid such

biases. Additionally, AI systems must be transparent and explainable to ensure that they can be audited for ethical compliance.

Another role of ethics in AI development is to ensure that the systems are developed in a way that respects privacy and data protection. AI systems often process vast amounts of personal data, which raise significant ethical concerns around how such data is collected, stored, and used. Ethical considerations need to be integrated into every stage of the development process, from data collection to model training and deployment, to ensure that privacy and data protection are not compromised [23].

Finally, ethics has a critical role to play in ensuring that the use of AI is aligned with social values and principles. As AI systems become increasingly integrated into society, it is essential to ensure that their use is aligned with social values such as justice, equality, and human rights. The development and deployment of AI systems should be guided by ethical principles that take into account the broader societal impact of these technologies.

In conclusion, the relevance of ethics in AI cannot be overstated. Developers must take into account the potential harm that AI systems can cause and ensure that their creations are developed with a conscience.

2.2.1 When Ethics are not Considered

When Ethics are not considered in the development of AI systems, the consequences can be severe. In some cases, individuals' privacy may be violated, and their personal data may be exposed. For example, in 2018, Facebook faced scrutiny when it was revealed that millions of users' personal data were harvested without their consent by a third-party app [6]. In other cases, companies may be held accountable for discriminatory practices, such as when Amazon's AI recruiting tool which was exposed in 2018 to be biased against women [24]. The consequences of such bias can be significant for the individual victims of the unfair exclusion from job opportunities, as well as their close relations.

Moreover, the consequences of unethical AI can extend beyond the realm of the individual or the company to the entire society. For instance, certain facial recognition technology has been shown to have bias against certain groups, which can lead to discriminatory practices by law enforcement agencies [6]. This can result in the violation of civil liberties and exacerbate social inequality.

In conclusion, when ethics are not considered in the development of AI systems, the consequences can be far-reaching and detrimental to individuals, companies, and society as a whole. It is therefore imperative that ethical considerations are integrated into the design, development, and deployment of AI systems.

2.3 Methods of Ethical Consideration in AI

There are several methods that can be used to assess the ethical implications of AI projects. One of the most common methods is ethical review, which involves a com-

prehensive evaluation of the ethical aspects of a project [17]. Ethical review typically involves a thorough analysis of the potential risks and benefits of the project, as well as an assessment of how the project aligns with ethical principles and guidelines [5].

Another systematic method is stakeholder analysis, which involves identifying and analyzing the various stakeholders that are impacted by the project. This can help ensure that all perspectives and concerns are considered in the ethical evaluation of the project [20].

Additionally, ethical impact assessments (EIAs) can be used to evaluate the ethical implications of AI projects. EIAs are designed to assess the potential impacts of a project on various ethical dimensions, such as autonomy, privacy, and fairness [7].

Finally, the use of frameworks and guidelines, such as the IEEE Global Initiative on Ethics of Autonomous and Intelligent Systems and the European Union's Ethics Guidelines for Trustworthy AI, can help ensure that AI projects are developed in an ethical manner [15]. These are just a few examples of systematic methods used to assess the ethical implications of AI projects. However, because collaboration with the DCC was pivotal to this project's research and ethical review is the DCC's main method of ethical consideration in their data based projects, the project also focuses on the ethical review method.

2.4 Ethical Review as a Method of Ethical Consideration

Ethical review is a method of ethical consideration that involves a structured evaluation of the potential ethical issues that may arise from a project, and the identification of strategies to address them. [17] It is typically conducted by a team of experts with diverse backgrounds and expertise, such as ethics, law and technology, to ensure that all ethical considerations are adequately addressed.

The review process typically starts with a comprehensive analysis of the system in question, in the early stages of the project, including its intended use, functionality, and potential impact on stakeholders. The review team determines the appropriate ethical guidelines and regulations that apply to the project, including institutional review board (IRB) requirements, and data protection regulations [5]. The team will then assesses the project's compliance with relevant ethical principles, legal requirements, and industry best practices. This involves reviewing the project's design, data collection, storage and usage, as well as analysis methods. When potential ethical issues are identified, the likelihood and severity of each issue is assessed to determine their level of risk. Strategies are then developed to manage and mitigate the identified issues. This may involve modifying the project design, introducing safeguards or limitations, or re-evaluating project objectives [17].

One of the key advantages of ethical review is that it is an iterative process that can be modified as the project progresses [17]. This is particularly important for AI projects that may have significant ethical implications that are not immediately apparent. It can also help identify potential ethical issues early in the project lifecycle as the process usually starts as early as the project itself.

2.4.1 The DCC's Ethical Review Process

The Data for Children Collaborative (DCC) [1] is a partnership between UNICEF, the Scottish Government, and the University of Edinburgh that facilitates data-based projects by bringing together experts from various fields to collaborate on projects that use data to address challenges facing children.

The ethical review process begins with discussions about the ethical implications of the project, during the second of three workshops the DCC organises for each project. After these discussions, the DCC provides an ethics and safeguarding training pack [2], which is a comprehensive guidance document which contains an ethical assessment form, as well as essential information needed to complete the ethical assessment and the safeguarding training for the project. This serves as the main documentation of the project's ethical review and is completed with the progress of the project. The form is divided into three sections representing the three major points of reflection throughout the duration of the project. Different parts of the form are filled by different experts based on the relevance of their expertise to a particular aspect of the project or to the issue a question addresses.

The comprehensive and continuous nature of the DCC's ethical review process ensures that all aspects of the project's lifespan are accounted for, and allows for prompt identification and mitigation of ethical issues as they arise. The emphasis on training and guidance, also ensures that all parties involved are well equipped to make useful contributions to the review. However, the comprehensiveness also adds to process' complexity. The training pack for example, is a 40 page document which can be quite overwhelming to go through and complete. This could cause developers and stakeholders to regard the review as an extra administrative process they are required to complete, discouraging active engagement with the process. A researcher from the DCC mentioned in one of our conversations that, sometimes, from the nature of the answers on a form, one could tell that the form was filled as an administrative paperwork instead of a documentation of reflections on the issues raised. Also, the periods during which the Review Committee waits on the project team to return the form, and other way round where the project team waits for feedback from the Review Committee could create room for disengagement. The process could be significantly more efficient if the filling and reviewing of the form could be done in one space, such as on a digital platform, as there could be much quicker feedback, and a smoother collaboration in the filling of the form, as well as real time engagement between both teams.

2.4.2 The Problem of Engagement in Ethical Reviews

Keeping people engaged with the ethical review process can be challenging. Even with a solid framework in place and clear guidelines to follow, people can still be resistant to the process. Developers may feel that ethical considerations are not relevant to their work, while stakeholders may be focused solely on the end result and not the ethical implications of the project. Even the ethics team can face challenges in keeping everyone engaged, as they may not have the necessary influence or authority to drive the ethical review process forward.

One reason for this problem is that ethical considerations can be complex and time-consuming, requiring a lot of effort to stay focused. Participants therefore often find the process as a tedious task that slows down the development process [14]. Also, though developers and stakeholders would usually understand the legal and even social relevance of the review, they can still lack the understanding of its value, causing them to see the review as just an extra administrative task they are required to do.

With this challenge at hand, review teams would benefit from the assistance of a user-friendly software review tool that streamlines the process, rather than an unappealing and difficult-to-navigate one that rather adds to the work.

2.5 UI and UX of Ethical Review Tools

User interface (UI) design plays a crucial role in shaping user experience (UX) with software systems. According to Norman [3], the design of a good user interface must be based on the understanding of the user's needs, cognitive abilities, and limitations. This requires the designer to focus on usability, ease of use, and learnability of the system. Hassenzahl [18] also highlights the importance of aesthetics, suggesting that a visually appealing design can help to create a more engaging user experience.

When it comes to ethical review tools, UI and UX become especially important. Since these tools are often used by non-experts in ethics, it is important that the UI is intuitive and easy to use.[6] The AI Now Institute, in their report on the state of AI ethics, highlights that poorly designed ethical review tools can lead to important ethical considerations being missed, misinterpreted or overlooked, and that this can have serious consequences for the developers and end-users of AI systems. Therefore, UI design in ethical review tools should focus on enabling non-experts to easily engage with the ethical review process and ensuring that the tools add as little complication to the process as possible.

2.5.1 Case Studies on the Impact of User Interface on Engagement

Two case studies illustrate how the user interface design of ethical review software tools impacts participant engagement in the review process. The first study evaluated the user engagement of the Ethical Explorer, a decision support tool for AI ethics [25]. Ethical Explorer provides a visual representation of the ethical landscape, allowing users to explore different ethical dimensions related to the development and deployment of AI systems. The tool includes an interactive Ethical Matrix, which helps users identify and evaluate potential ethical issues. The study used a mixed-methods approach, including surveys and interviews, to evaluate the user engagement of Ethical Explorer. The results showed that users found the tool engaging, informative, and easy to use. They appreciated the visual representation of the ethical landscape and the interactive Ethical Matrix, which helped them identify and evaluate potential ethical issues. However, some users found the tool too abstract and suggested that it would benefit from more concrete examples. [25]

The second case study evaluated the user engagement of Ethical Review Manager

(ERM), a review management tool for ethical reviews [26]. ERM provides a platform for managing and monitoring the review process, allowing for real-time feedback and discussion. The study used a mixed-methods approach, including surveys, interviews, and observations, to evaluate the user engagement of ERM. The results showed that users found the tool useful for managing and monitoring the review process, but they were less engaged with the tool than they were with other review management tools. The researchers suggested that this may be due to the complexity of the tool and the lack of support for user customization. Participants also suggested that the tool could benefit from more intuitive navigation and better feedback mechanisms.[26]

These studies emphasize the importance of considering the user interface and experience when designing ethical review software tools. A well-designed user interface can enhance participant engagement and promote more thorough and effective ethical reviews. However, poor design can lead to disengagement and frustration among participants, ultimately undermining the effectiveness of the ethical review process. Therefore, designers and developers of ethical review tools must prioritize user-centered design principles to ensure that their tools are not only effective but also engaging and easy to use.

2.5.2 Don Norman's Design Principles

Don Norman's design principles are a set of guidelines that help designers create intuitive, easy-to-use interfaces that are tailored to the needs and expectations of users. Norman's principles are based on his extensive research and experience in the field of human-centered design, and they are widely influential in the field of user experience (UX) design. [3]

The principles are designed to help designers create interfaces that match users' mental models and expectations, making them easier to learn and use. They emphasize the importance of clear and consistent visual and interactive cues, such as affordances, signifiers, and mapping, that help users understand how to interact with an interface. [3] The following are examples of Norman's principles that were considered in the designing of Ethix:

- **Affordances**: The interface should clearly communicate what actions are available to the user and what they can do with the tool. This could include providing clear and intuitive icons or labels for different functions within the tool. For example, the UI should provide clear indications of how to initiate an ethical review or how to navigate through the different sections of the tool. [3]
- **Signifiers:** The interface should use clear and consistent design elements to communicate what actions will be taken when certain buttons or options are selected. For example, the use of color-coded labels or icons could indicate the severity of a particular action on a screen.[3]
- **Feedback:** It is important for the interface to provide immediate feedback when the user takes an action, such as confirming that a question has been flagged [3].

Overall, the goal of the UI design for an ethical review software tool should be to make

the review process as clear, transparent, and easy to navigate as possible so that the use of the tool does not end up rather becoming another problem to solve.

2.5.3 Nielsen's heuristics

Nielsen's heuristics are a set of general guidelines for designing user interfaces that are usable, efficient, and effective. They were developed by usability expert Jakob Nielsen in the early 1990s and have become a widely-used tool for evaluating and improving the usability of interfaces. The heuristics provide a framework for identifying potential usability issues and designing interfaces that are easy to learn, easy to use, and minimize the risk of errors. Some of the key themes that underpin Nielsen's heuristics include the importance of user feedback and communication, the need for interfaces to be consistent and predictable, the importance of user control and freedom, and the need to minimize cognitive load and prevent errors.[16] The following are examples Nielsen's heuristics that were relevant in the design of Ethix:

- **Visibility of system status:** The interface should provide clear and timely feedback to users about the status of their actions [16]. For example, the display of an ”answer saved” text whenever the user attempts to leave the question page and the system saves the answer automatically. This heuristic ties in well with Don Norman's feedback principle.
- **Consistency and standards:** The interface should follow established conventions and standards to make it easy for users to understand and use the tool [16]. For example, using consistent typography, layout, and colors throughout the tool can help make it more visually cohesive.
- **User control and freedom:** Users should be able to easily undo actions or navigate to different parts of the tool without penalty [16]. For example, providing a clear ”back” button or allowing users to save drafts and come back to them later can give users more control over the review process.
- **Aesthetic and minimalist design:** The interface should be visually appealing and uncluttered, with only essential information and controls displayed [16]. For example, using a clean, simple design with a limited color palette and clear typography can help prevent cognitive overload and make the tool more accessible to users.
- **Recognition rather than recall:** The interface should be designed to minimize the need for users to remember information or navigate complex menus [16]. This can be achieved by using clear labels and visual cues that help users quickly identify the information they need and navigate to different parts of the system.
- **Flexibility and efficiency of use:** The interface should allow users to complete the ethical review process as efficiently as possible, while still ensuring that ethical guidelines are being followed. This could include allowing users to save and resume the assessment at a later time.

Adhering to these principles guided the design process towards a more user-friendly interface that supports ethical review processes effectively.

2.6 Existing Ethical Review Tools

Ethical review tools can be put into three main categories based on the focus of their functionality. There are compliance tools, decision support tools and review management tools [11].

Compliance tools focus on ensuring that the projects adhere to relevant ethical guidelines and regulations by providing a framework for organising and documenting ethical considerations, ensuring that all ethical issues have been addressed, and generating reports that can be used for auditing purposes. These tools typically offer a checklist of ethical considerations, an assessment of risk, and documentation of how the project addresses the identified ethical concerns [8]. Ethical OS and Ethical Explorer are examples. Decision support tools are aimed at helping the review team make the right ethical decisions in all aspects of the projects. They can include ethical decision-making frameworks, case studies, and other resources to guide decisions. Examples of decision support tools include AI Ethics Canvas and the AI Ethics Guidelines Global Inventory [11]. Review management tools facilitate collaboration and communication between developers and ethics committees during the review process. They typically provide a platform for managing and monitoring the review process, and allow for real-time feedback and discussion. Examples of review management tools are Ethical Review Manager and EasyChair [11].

Considering Ethix's objectives of collaboration, reflection and engagement, review management seemed like the most appropriate way to approach its design. This is because, while compliance-focused tools may help keep things organised and ensure that things are checked off lists, they do not provide recommendations for ethical decision-making or facilitate communication and collaboration between developers and ethics committees, and therefore are not the most helpful when addressing complex ethical issues that require several discussions to manoeuvre [8]. Also, decision making focused tools can sometimes suffer from biases or blind spots and may not always be able to capture the complexity and nuance of ethical decision-making in real-world situations, which can lead to incomplete or inaccurate guidance. Review management tools on the other hand ensure that all relevant stakeholders and experts are actively involved in the review, and by facilitating real time feedback and discussion, it can help identify and resolve emergent issues more quickly and effectively. Despite the advantages, of review management tools, existing tools do not actively encourage reflection during ethical reviews. This is the gap that Ethix aims to fill.

2.6.1 A Previous Edition of Ethix

A project was done in collaboration with the DCC to design an ethical review tool similar to Ethix last year. The tool is EthicAll Review and its main objectives were to enable a smooth integration of the ethical review process into software development, and enhance collaboration between developers and ethics professionals during an ethical review. The project explores the flaws of how ethical reviews are conducted, questioning the efficacy of common ethics codes. The author then suggests that developers derive a priority list of specific ethical guidelines that are most relevant to their projects instead

of depending on general ethics codes for guidance. [19] This is reflected in the design of the tool with features, such as the ability to add new questions, limit the number of questions per project and access relevant resources to aid the answering of a question.

The highlight of the design of EthicAll Review is that it gives a lot of room for customisation, which gives the teams involved control over the management of the review. More importantly, it allows the tailoring of the ethical review process to a project. This is beneficial because each project is unique and comes with its own set of ethical concerns, and having a one-size-fits-all set of questions for all projects is not effective as it fails to address specific ethical issues that arise in a particular project.[19]

The first noticeable thing about the design however, is that the user interface for most of the screens are crowded and not very aesthetically pleasing. Consider the screen in figure 2.1 for example:

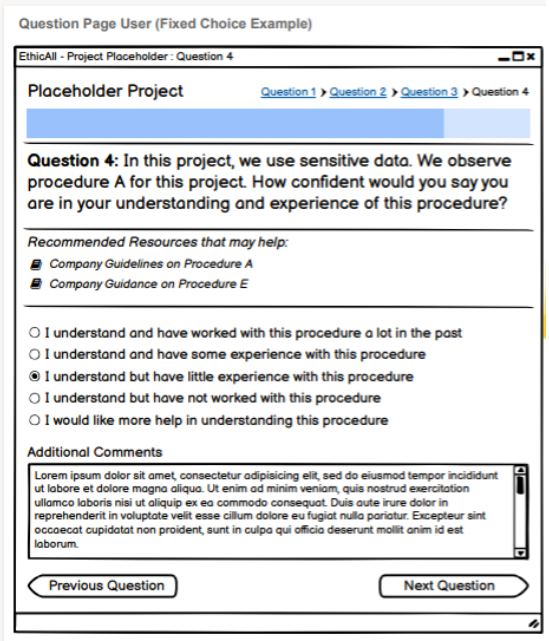


Figure 2.1: Example screen from previous project's design

It can be seen that the screen is full of texts in different sections of the screen with different font styles, sizes and colours. It is also hard to tell if the blue bar at the top is a progress bar or just an aesthetic addition to the screen. The crowded look can be distracting and make it difficult for users to navigate or focus on a task at hand. Also, the tool offers the flexibility of individual answers questions. However, this flexibility could could be more a hindrance than an advantage because the tool does not offer a way to integrate individual answers to become a collaborative answer for the project. This could mean extra effort for the team to pull answers together to settle on a collaborative answer. These two concerns hinder the tool's ability to achieve its objective of a smooth integration because instead of the tool helping to ease users into the review process, it makes the process even more challenging to get through.

Similar features between EthicAll Review and Ethix include different review stages,

a dedicated screen for each question, the option to refer to relevant resources and the ability to comment on answers. One of the major differences between the tools is that, EthicAll Review currently exists as a high level wireframe [19] while Ethix is an interactive prototype that simulates an actual user interface. Also, EthicAll Review gives room for individual answers, while Ethix only allows collaborative answers, so any edit to an answer is universal, however, users can track past edits of an answer. EthicAll Review assumes the management of multiple projects at a time, while Ethix assumes the management of one project at a time. Lastly, EthicAll Review's design assumes a user with multiple administrative permissions, hence it has the ability to create new projects, create new questions and assigns tasks. However, Ethix's design assumes a user with minimal administrative permissions who mostly engages with the assessment itself. Hence, no administrative use cases.

Chapter 3

Methodology

This chapter explains the methodology of the project. It discusses project management and the steps I took to conduct my study. I also explains how I gathered requirements and feedback on the design of Ethix.

3.1 Project Management

To ensure effective communication in managing the project, I held weekly meetings with my supervisor via Microsoft Teams. These meetings provided updates on the project's progress, feedback on work done, discussion of problems encountered and possible solutions. Quick clarifications and updates were also done in Microsoft Teams chat. A One Drive folder was set up for the sharing of files. However, Teams chat proved to be a much more convenient avenue for sharing files, especially for quick feedback, so most files ended up being shared this way.

3.2 Project Development

3.2.1 Deciding the development direction

I had initially considered continuing the project in section 2.6.1 and developing the tool further, by adding essential functionalities that would help achieve the project's objectives. However, after a conversation with a researcher from the DCC, discussing how challenging it can be to keep project teams fully engaged in the review process, I decided to choose the improvement of engagement as the main objective of the project,as that piqued my interest more. Also, one of the major findings from my background reading was the fact that the design of the user interface has significant impact on participating stakeholders' engagement since it the main point of interaction with tool. I then decided to focus fully on exploring ways to use the user interface to meet the tool's objectives.

3.2.2 Requirements Gathering

Initially, there were a few key features and requirements that could be derived from the concept of the tool itself. These features include:

1. **An intuitive and user friendly design:** The tool should have a design that is easy to understand and use, even for those who are not familiar with the tool. This is important because the review team may consist of individuals with different levels of technical expertise, and a complicated design can lead to errors or a lack of engagement with the tool. A user-friendly design can help ensure that the tool is accessible to all members of the team, facilitating collaboration and effective review. User feedback in section 5.1.2 confirmed that this requirement was fulfilled

2. **A neat and aesthetically pleasing design:** The tool should have a design that is visually appealing and easy on the eyes. A neat and organized layout can help users navigate the tool with ease, and can also contribute to a positive user experience. A visually pleasing design can also make the tool more engaging and enjoyable to use, which can improve team morale and overall productivity. The design fulfills this requirement as confirmed by user feedback in section 5.1.2.

3. **An interactive and responsive interface:** The tool should have an interface that responds quickly and seamlessly to user input, and adjusts and adapts to different screen sizes and device types, ensuring that the user experience remains consistent and effective across all platforms. This is important because delays or unresponsiveness can lead to frustration and a lack of engagement with the tool. An interactive and responsive interface can help ensure that the tool is efficient and effective, enabling the review team to work together smoothly and efficiently. The design was made interactive by the inclusion of feedback for actions such as saving an answer. However responsiveness wasn't achieved as the current design was made for only one screen.

4. **The ability to comment on answers:** The tool should allow users to provide feedback and comments on answers. This is important because ethical review is a collaborative process, and it is important for all members of the team to be able to provide input and suggestions. Comments can also help to clarify answers and identify areas where further discussion or investigation may be necessary. This requirement was fully realised and more information on the feature is given in 4.4.3.

5. **The ability to have answers saved automatically:** The tool should automatically save answers as they are entered. This is important because it ensures that no data is lost due to technical issues or user error. Automatic saving can also help to prevent duplication of work, as users do not have to worry about losing progress if they need to take a break or switch devices. This requirement was fully realised.

6. **The ability to view questions under a particular aspect of the project:** The tool should allow users to filter and view questions based on specific aspects of the project. This is important because different stages of the project may have different ethical considerations, and it can be helpful to focus on specific areas

of concern. Being able to view questions under specific categories or aspects can also help users stay organized and focused during the review process. For example, a user should be able to easily view all data related questions when the project has got to the stage of data collection and analysis and a particular data related issue needs addressing. This requirement was fulfilled by the addition of the question-by-section modules on the dashboard.

7. **The ability to access third party collaboration tools:** The tool should allow users to integrate with third-party collaboration tools, such as project management or communication platforms. This is important because it allows for a more streamlined workflow and can help ensure that all team members are on the same page. Integration with third-party tools can also facilitate easier communication and collaboration between team members. This requirement was not fulfilled and has been suggested as an extension of the current design in **??**.

8. **Video conferencing and chat options:** The tool should ideally offer options for video conferencing and chat. This is important because it enables team members to communicate in real-time, which can be especially helpful when discussing complex ethical considerations. Video conferencing and chat can also facilitate collaboration between remote team members, helping to ensure that all team members are able to contribute to the review process regardless of their location. This requirement was also not fulfilled and has been suggested as an extension of the current design in 6.1.2.

The next part of the requirements gathering stage involved a round of online interviews with 4 study participants. I first designed a pre-interview questionnaire to gather participants' general opinions on essential features and the impact of engagement on the review. The questionnaire was designed to be a basis for further discussion during the interviews. The interviews therefore mostly focused on discussing why answers in the questionnaire were chosen. Each interview was an hour long, and was video and audio recorded with the participant's consent. The main aims of the questionnaire and interviews were to better understand the DCC's ethical review process, as well as get real life experts' opinions on the suggested features, suggestions of features not previously considered, opinions on whether the engagement issue the project is trying to tackle is a real problem at all, and whether focusing on the user interface design was indeed the right way to tackle the engagement issue. The participants of the survey were all experts in the field of ethics review processes, so their insights were invaluable in designing the tool. Specific details of the questionnaire and interview discussions are shown in Appendices D and E, respectively.

3.2.2.1 Non-Functional Requirements

Even though the project only focuses on the user interface and so did not attend to much to non-functional requirements, a few relevant ones, considering the requirements above would include:

Compliance: The system must comply with all relevant ethical guidelines and regulations. It should have mechanisms in place to ensure that all ethical issues are addressed

and documented, and that reports can be generated for auditing purposes.

Performance: The tool should have fast response times and be able to handle a large number of users and projects simultaneously.

Security: The tool should be designed with strong security measures to protect sensitive data, such as personal information and confidential research data. This could include features such as user authentication, access controls, and data encryption.

Usability: The tool should be easy to use and navigate, with a clear and intuitive user interface. It should also be accessible to users with disabilities, such as color blindness or hearing impairments.

Data Management: The tool should be designed with strong data management features, including backup and recovery options, version control, and audit trails. This is important to ensure the integrity and reliability of the data stored in the tool.

Interoperability: The system must be able to integrate with other systems and tools, using standard interfaces and protocols. It should be able to communicate and exchange data with other systems seamlessly.

Not every single requirement could be met completely, however they all helped guide the project to proceed in a direction that reflected some of the desires of the user base. The lists here represent the formal list of requirements, however this is not to say that these are all the requirements that could potentially be discovered from the survey results. The questionnaire form and results are found in appendices D and E, respectively.

3.3 Making the Design

As mentioned in the Introduction section, Ethix currently exists as an interactive UI prototype. The prototype was created using Figma, a collaborative interface design tool. Figma was chosen as the primary design tool because of its versatility and ease of use, as well as its wide range of design elements and templates that could be customised to meet the specific design preferences. Figma also allowed viewing and testing of the prototype online without having to download any additional software. A demonstration of the prototype is found here

The design process began with an analysis of the requirements of the tool, which served as the foundation for the creation of the prototype. I then started the design itself by creating initial sketches to explore various design ideas and layout options. Once I settled on a suitable design, I transformed it into a set of low-fidelity wireframes, which gave an overview of the structure and organisation of the UI. I then followed with a more detailed process, where I refined and expanded upon the wireframes to create a more polished and complete design, which included colors, typography, icons, and images. I then created the interactive prototype by linking the different screens of the UI together using Figma's built-in prototyping features. This allowed for a more realistic experience of how the tool would function, as users could click through the different screens and see how they interacted with each other. I tested the efficacy of the design

draft on users by conducting a second set of interviews with the same participants as before.

3.4 Feedback Gathering

The objectives of the second set of interviews was to collect feedback from users on how well the design satisfied the user requirements, as well as point out any missing or overlooked details and take suggestions of how to improve the design to suit the users' needs from their own perspectives.

Each interview was an hour long and the structure was that, the participant would try to perform a set of tasks I had given them while sharing their screen so that I could see how exactly the interactions would go, verbally report any difficulties they have as they go through the tasks, and then give any comments they may have on the visual and functional structure of each screen they encounter. The starting point for each of these tasks was the dashboard. The tasks participants were asked to complete were:

1. **Find the project overview and the project documents.** This was to check how easily a user would find their way to the details of the project to remind themselves of any forgotten details, check accuracy of details or find the project documents. The trouble however, with this task was that, one of the question-by-section modules on the dashboard was also named ”Project”. This module is for viewing all the questions related to the details of the project. Some participants therefore initially had trouble figuring out which ”Project” button was the right one for this task. This problem is highlighted in the second interview insight in 5.1.2 and the solution is discussed in 5.1.3.
2. **Start the review process.** This was to check how quick and easy it would be to start the review to see how well the **Start Review** user story in 4.4.1 was satisfied, as this would be a task that every user of the tool would perform at least once. to
3. **Find and take a look at the guiding ethical principles for the project.** This would be a task that users would perform from time to time either to remind themselves of the principles or verify how well the answers in the review adhere to them.
4. **Open a data related question.** This task was to test how useful the question-by-section modules on the dashboard would be to a user.
5. **Comment on a question.** This task was to check how well the **Comment on a question** user story was satisfied by checking how easy it was for the user to first recognize the comment icon, and then make a comment.
6. **Flag a question.** This was to check how well the **Flag question** user story was satisfied by checking how easy it would be for the user to recognize the flagging button and how quick and easy the flagging process would be overall.

3.5 Analysis on Research Approach

I had already chosen a focus for the project from my background reading and already made significant effort towards it by the time I was conducting the first set of interviews. Looking back, I realise that the nature of the questions in the pre-interview questionnaire reflected the fact that the context of my research had already been defined. The questions seemed to have been designed to look more for approval for the choice of project focus than to actually explore what would be the best way to address the issue of engagement in ethical reviews, or if it was even a significant enough issue to pay any attention to.

Also, the participants were from similar backgrounds, so the study did not represent all everyone in Ethix's target user base. People with little to no knowledge about ethics procedures could have provided valuable feedback on how to make the tool more accessible for them. This means that the requirements gathered and the resulting design also do not cater to the entire potential audience of Ethix. More studies would need to be conducted to create a balanced list of requirements that considers the needs of all potential users. However, the expertise of the study participants provide a very strong base for the tool. Their knowledge and experience in ethics and ethical review procedures gives Ethix a stronger starting point for future studies than it would have had without their inputs.

Chapter 4

The Design

This stage involved using the user feedback from the first surveys, user interface design principles and knowledge from common user interfaces present today, to create a series of designs for the respective screens of Ethix.

4.1 User Interface Goals

As established in the Background section, maximum participant engagement is essential in ethical reviews, and yet very challenging thing to achieve. Also, with the project team being the ones actually making every ethical or non-ethical decision for the project, it is important that they practise a culture of ethical awareness themselves. To foster this in the ethical review process, it is essential that the review is conducted in a reflective manner, to allow for more thoughtful consideration of values, principles and potential consequences of the project.

To achieve these, certain design choices were made, such as using clear and concise language, having neat and aesthetically pleasing layout of screens, using colours for more visual engagement and intuitive recognition, and incorporating interactive elements. The interface was designed to be easy to navigate, with clear and intuitive buttons. The goal was to make the ethical review process as streamlined and user-friendly as possible, while still maintaining a high level of attention to ethical considerations.

4.2 Interface Design Principles

The following design principles were incorporated in the Ethix interface:

4.2.1 Visibility

Every screen has a title, to give the user an introduction to what's on the the screen. All the screens have legible font sizes, making all information and labels easily readable. This was confirmed by all the participants during the feedback interviews. Buttons on each screen either have clear labels, appropriate icons accompanying them or a

description of what the button is about. The icons on the question screens however, do not have their names displayed as they would make the screen look crowded. However, as the user hovers around any of these icons, their names momentarily appear. The icons themselves are also intuitively recognizable. For example, the question guide icon is a question mark, which is a universal symbol for 'help'. So even without seeing the name of an icon explicitly displayed, the user is still able to tell that the icon must be about help available. .

The dashboard is also designed to give the user quick access to frequently performed tasks like checking the review summary, continuing the review from their last stopping point and viewing flagged questions. The dashboard also displays the option of looking for questions based on what aspect of the project they are related to. This feature was added to make it easier for users to look for specific questions without having to go through the review summary, which is a long list of different kinds of questions. These design decisions were made to ensure that users spend very little time looking for things, and require as few clicks as possible to perform tasks so that they do not disengage at any point from the frustration of not finding something or having to go through a long process to get things done every time.

4.2.2 Consistency

This principle, from Neilsen's Consistency and standards heuristic, was relevant to the design because to maintain engagement and a reflective atmosphere, it is important to ensure that users do not encounter dramatic surprises in their interactions with the system.

To ensure this, the design uses the same font style for every text on every screen. The screens also have a consistent layout with the side bar on the far left of the screen and the content on the right. Though some screens do not have the side bar immediately visible, the user always has the option of clicking on the hamburger menu icon, which is a commonly used icon for sidebars, to display the sidebar. Beside the menu button on each of these screens a back button as well. The design also has a consistent colour scheme across screens, which are slightly varying shades of dirty pink, pastel green and mustard yellow. These features were implemented to ensure that the user would easily familiarize themselves with the interface and more importantly, have a seamless experience transitioning from screen to screen.

4.2.3 Feedback

As explained in Don Norman's principles in 2.5.2, feedback on users' actions is essential for keeping users engaged as they help users to see their progress towards completing tasks and quickly spot errors if they receive unexpected feedback.

The design incorporates this principle by a short display of an automatic "answer saved!" feedback whenever a user attempts to leave the question screen, to let them know that whatever text is left in the answer box is saved before the transition to another screen. This gives the user the assurance that they have not lost their work in the case of accidentally clicking an exiting button. There is also a "question flagged!" feedback

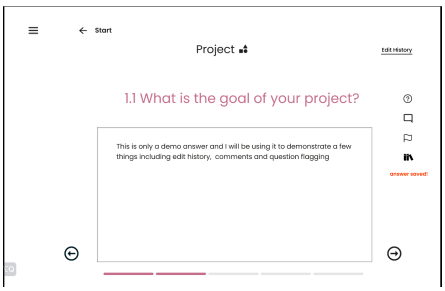


Figure 4.1: Feedback on user's answer being saved

when a user flags a question to give the user an assurance of the success of the flagging task. An illustration of this principle is shown in figure 4.1

4.2.4 Aesthetics

Aesthetics, from Nielsen's Aesthetic and minimalist design heuristic was one of the most important principles to consider because it significantly impacts overall user engagement and satisfaction. Aesthetics help to create an emotional connection between the user and the application, which can lead to increased user loyalty and retention[21]. In addition, an aesthetically pleasing UI can also convey a sense of professionalism and credibility[21], which can be especially important for applications that deal with sensitive topics like ethical review.

To achieve an aesthetic user interface, Ethix was designed with a simple and clean visual style, incorporating a mild colour scheme that does not detract from the functionality of the application, and typography that is easy on the eyes and complements the content on the screen. The design also uses visually appealing elements like demonstrative 3d images, to make the interface interesting to look at. It also uses clean lines and white space to create a professional and calm look so that users would feel comfortable in the environment to engage in a reflective activity.

4.2.5 Simplicity

Ethix was designed to be simple and intuitive as per requirement No.1 in 3.2.2, with easy-to-understand labels, icons, and visual cues that guide users through each interaction. The design presents a clean and uncluttered interface with a simple typography. Navigation is simplified by the use of a clear menu bar with easily recognizable icons, as well as a back button on every screen except the dashboard.

In addition, the design ensures that the user is not overwhelmed with too much information at once, to create a conducive environment for reflection. For example, each question has a dedicated screen, with the question text enlarged and standing out, the elements nicely arranged and automatically unlabelled to reduce the amount of text on the screen, and the side bar also automatically disappearing. This is to ensure the user has very few distractions and is able to give the question their full attention.

4.3 Design Assumptions

The current interface of Ethix was designed with the assumptions that:

- The user has already logged into their account. The login is an essential functionality. However, it is only a transitional screen and does not significantly affect the overall user experience with the review. This accounts for the lack of a login screen.
- The user has logged into the interface of just one project. The project focused on the user experience with just one project review, to allow enough time and attention to be invested in the features that directly affect the quality of the review itself.
- The user is part of a team that is working with the DCC on a typical data based DCC project that will affect children. The framework for the review process used in the design, including features like the division of the project into three stages, is based on the DCC's current ethical review model. This also accounts for the principles screen mainly having responsible data for children principles. The sample questions are also borrowed from the DCC's current ethical assessment form.
- The user does not have administrative permissions, hence they would neither create projects nor add or edit questions. One of the things that was discussed during the interviews was project management features for the DCC staff facilitating a project. However, the current interface is designed from the perspective of a regular project team member. This accounts for the lack of the ability to create projects, as well as add and edit questions.
- The user is not a supervisor of the project hence does not assign tasks. There are likely going to be more non-supervising users of the tool, so even though the design is currently biased, it still caters for the needs of majority of the target users.
- The user has basic knowledge of ethics. The user would have attended meetings and workshops organised by the DCC during which ethics would have been discussed.

4.4 How the Design Satisfies User Stories

4.4.1 Start Review

User Story: As a first time user of Ethix, I want to be able to easily initiate the ethical review process since it is the main reason why I'm using the tool. However, I also do not necessarily want to rush into the process because I would like the process to be reflective.

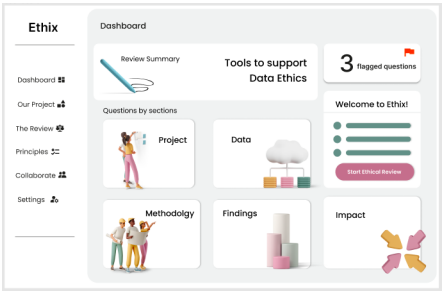
Description: The UI provides a clear and prominent button labeled, "Begin Ethical Reflection" under a "Welcome to Ethix!" text on the project dashboard, which is the first

screen the user sees when they log in. The position and size of the button makes it easily noticeable so the user will have no trouble finding it. Clicking this button triggers a pop up that prompts the user to first consider the Responsible Data for Children principles. This prompt comes with two buttons which give the option to either continue to the review anyways or take a look at the principles. The prompt instills the notion that the review is meant to be a reflective process and not just a question and answer session.

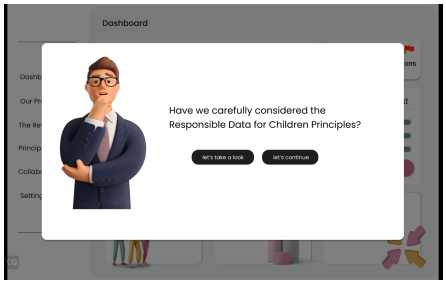
If the user chooses to continue to the review, they are led to an introductory screen that contains some guide on the review itself, how best to approach the answering of the questions, as well as tips on navigating the question screen. Once the user feels ready to start, they can click on the start reflection button which leads them finally to the screen of the first question of the review.

If the user chooses to look at the principles first, they are led to the principles screen, which contains information on principles for the responsible handling of data for children. Clicking on a principle would open the screen for the principle itself, which contains more information on the principle. This principles screen also has a ”more information” button which when clicked, leads the user to more information about all the principles. The screen also has a bold ”continue ethical reflection” button which when clicked, will take the user through the process described in the previous paragraph

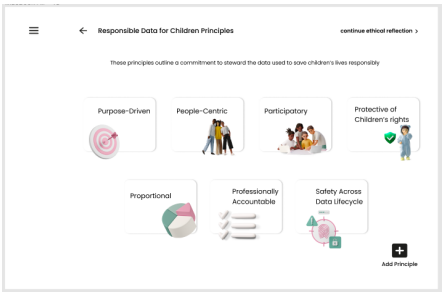
An illustration of the process is found in figure 4.2:



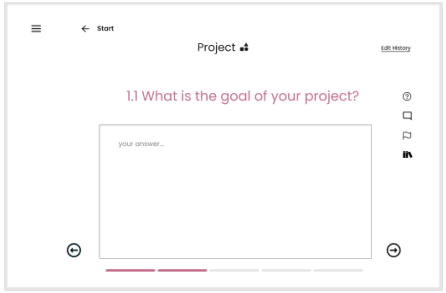
(a) Dashboard of review that is yet to start



(b) Prompt to take a look at principles



(c) User led to principles screen if they click on the ”let’s take a look” button



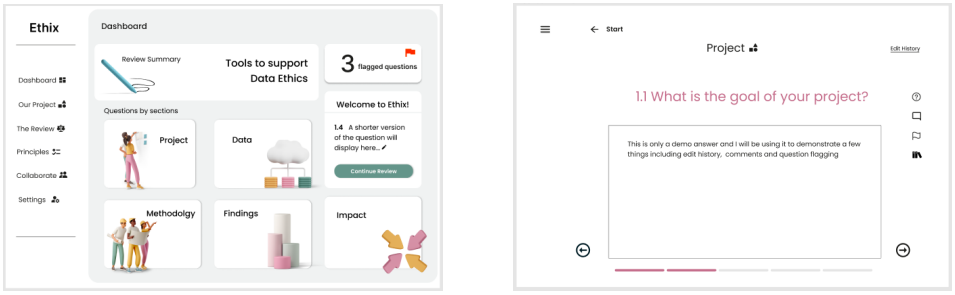
(d) User eventually led to question screen

Figure 4.2: Illustration of the Start Review user story

4.4.2 Continue review from exact point left off

User Story: As a regular user of Ethix, I would like to be able to easily find where I left off working on the review when I last logged in, and be able to continue working from there. Having to spend time looking for what I last did every time I log in will be frustrating and inefficient.

Description: The UI provides a clear and prominent button labeled ”Continue Review” at the same position as the initial ”Start Ethical Review” button, this time, directly under a short preview of the question the user last worked on. The button being at the same position as the initial start button makes it an easy spot. The preview of the question also gives the user the convenience of knowing what question they worked on without having to open any other screen. Clicking the Continue Review Button takes the user to the question they last opened. Find an illustration in figure 4.3:



(a) Dashboard of a review that has already started, with an apparent Continue Review button

(b) Question page opens when Continue Review button is clicked

Figure 4.3: Illustration of the Continue review user story

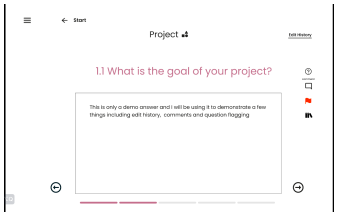
4.4.3 Comment on a question

User Story: As a member of the project team, I would like to be able to comment on answers, to be able to communicate concerns and clarifications to colleagues without having to leave the tool’s interface

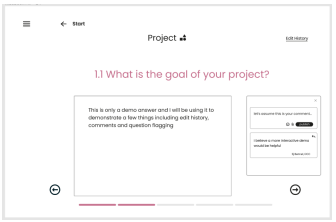
Description: On each question screen, there is a comment button on the right side of the answer box. The button is represented by the speech balloon icon, which is an icon that comments are commonly associated with, making the button recognizable. Even in the case that the user does not recognize the icon, hovering the pointer on the icon pops the name of the button on top of the icon, informing the user about what button it is. The button would have the number of unresolved comments, if there are any, in a red circle on top of the comment button. To draw users’ attention to take a look.

Clicking on this button opens a comment box on the right side of the question box, showing all previous comments on the question, along with the names and organisations of the commenters. At the top of the comment box is a text box for new comments. Below the text box are attachment and emoji buttons, which give room for more communication options, as well as a ”publish” button to eventually post the comment.

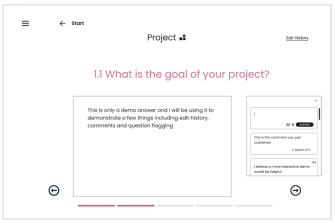
Find illustrations of the description in figure 4.4:



(a) Comment beside answer textbox. Name of icon appears while hovering



(b) Comment box appears beside answer textbox



(c) New comment added to list of comments

Figure 4.4: Illustration of the Comment on a question user story

4.4.4 Track previous answers for a question

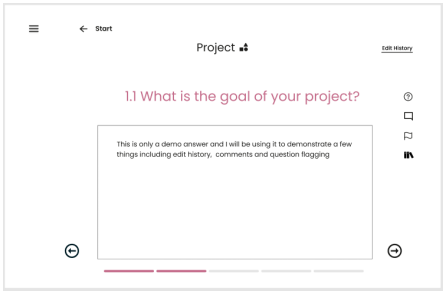
User Story: As a user working collaboratively with a team to conduct the review, I understand that people will have different ideas and so answers to questions can change with time. I would therefore like to be able to track the trail of previous answers for a question, to get insight into the thought process that led to the current answer.

Description: On the question screen, the UI provides an ”Edit History” button that is bold, underlined and placed in an uncrowded position, making it easily noticeable. When clicked, a box containing all previous versions of the answer and the names of the respective editors appears beside the answer box. The trail and answer boxes are almost the same size and placed exactly side by side, making comparison easy. The user will be able to scroll through the answers if they exceed the length of the trail box.

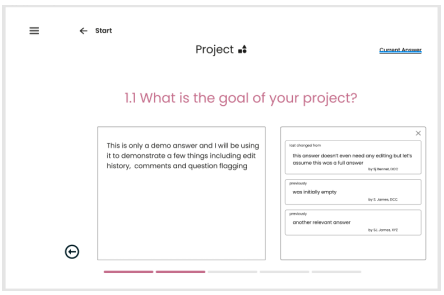
If the user wishes to return to the original question screen, they could either close the box by clicking on the x button at the top right corner of the box or click on the ”Current Answer” button which is placed at the exact same position as the previous ”Edit History” button. Find the illustrations in figure 4.5

4.4.5 Flag question

User Story: As a team member, I would like to be able to flag questions that I believe need extra attention either from myself or others on the team



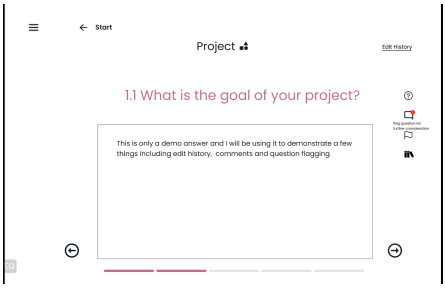
(a) Edit History button on top right corner of question screen



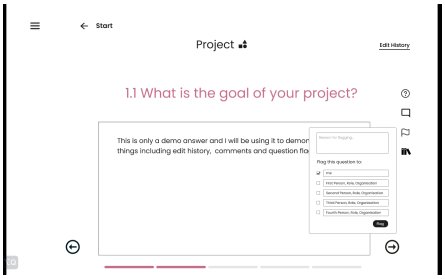
(b) Edit history box opens beside the answer textbox

Figure 4.5: Illustration of the Track previous answers user story

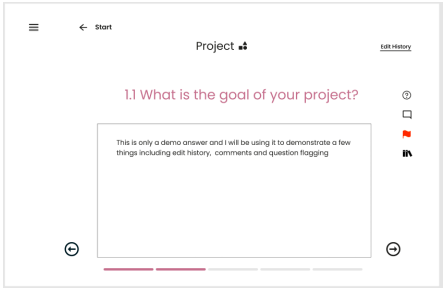
Description: The UI provides a button for flagging questions, represented by a flag icon, which makes the button intuitively recognisable. When clicked, a prompt appears beside the icon, asking the user to state their reason for flagging and select whom they would like to flag the question to, including themselves. After selecting the recipients, the user can click on the ”Flag” button to activate the flag icon either on their screen if they selected themselves or on other recipients’ screens. The activated flag button is a red, filled version of the original flag icon. The red colour of the flag also makes it noticeable and intuitively recognisable since red flags are popularly associated with caution. The number of flagged questions on all recipients’ dashboards are also updated accordingly. This is demonstrated in figure 4.6



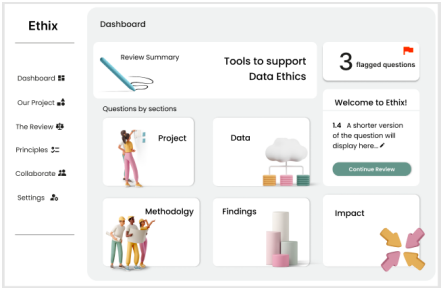
(a) icon name appears when hovering



(b) user selects whose attention to draw to question



(c) Flag icon activates on recipients’ screen for that question



(d) Flag questions count updated on recipients’ dashboard

Figure 4.6: Illustration of the Flag question user story

Chapter 5

Evaluation

This section discusses insights from the user studies and how they impacted the design. It also evaluates how the design meets the project objectives and how well it does so.

5.1 Evaluating the Design

5.1.1 Insights from First Set of Interviews

As mentioned in 3.2.2, the first set of interviews involved a pre-interview questionnaire and an online interview with each study participant. The following are some insights gathered:

It is important to consider ethics at every stage of a project, especially at the project planning stage. The tool should be flexible enough to be used at any stage of the project. In the questionnaire, participants were asked to choose which of five given stages - project planning, Data collection, Design, Training of Machine Learning models, Deployment, Maintenance - of data-based project are best to consider ethical implications and 75% of participants chose all stages, as shown in figure 5.1

Engagement is essential for a quality ethical review and to get participants fully engaged, the review process should be as smooth as possible so that it does not become another tedious professional task. When participants were asked which of 6 given options were a difficult part of involving ethics in data-based projects, the answer that got chosen by all participants was 'keeping participating personnel enthusiastic and

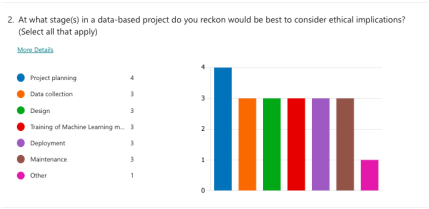
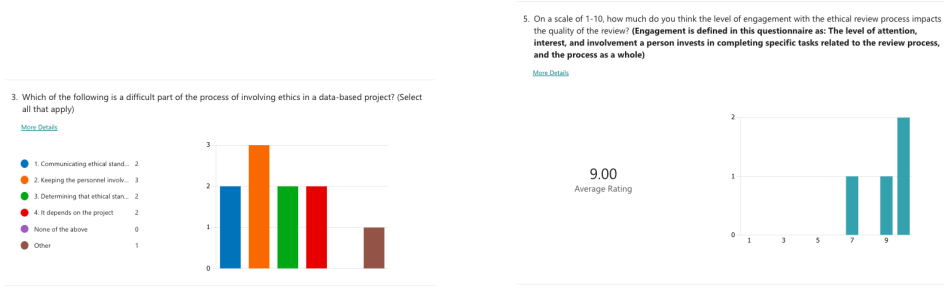


Figure 5.1: Participants chose multiple project stages at which ethics should be considered

engaged'. Also, when asked to rate to 10, how much the level of engagement with the ethical review process impacts the quality of the review, 75% rated 10 and 25% rated 9. On the form however, it shows a 7/10 rating, however, the responsible participant verbally clarified during their interview that they meant to choose 10 but were unable to choose on the form because of a technical difficulty, hence why it has been added to the number of 10/10 ratings. Results shown in figure 5.2.



(a) All participants selected engagement as a challenge

(b) Ratings on how much the level of engagement impacts the quality of reviews

Figure 5.2: Questionnaire results on engagement

Ideally, the tool should create more of a reflective, journaling atmosphere as opposed to an atmosphere of an impending task to be finished and checked off. This means that all members of a project should be able to edit answers and communicate through commenting. This encourages conversation and gives room for reflection and improvement on answers

Users should be able to track changes made on answers to enable them to see the team's journey to their current point. This also makes corrections and clarifications easy as evidence of any misunderstandings in the past would be seen.

The tool should be as simple as possible so that users can easily familiarize themselves and also focus on essential activities instead of being distracted by non-essential features. Non-essential features here include video call and chat options, which would be nice to have for more communication and collaboration. However, 75% of the participants considered it non-essential as there are more than enough platforms on which team members already do that. A visual proof of this is shown in figure 5.3.

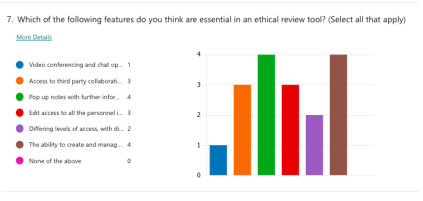


Figure 5.3: Participants' selection of essential features

Two themes that were particularly dominant in most of the interviews were reflection and simplicity. Reflection in particular seemed to be very important to the study participants.

They expressed the desire to have the review be more than a checklist activity or an assessment for approval or rejection. They wanted users to be able to actually reflect on the issues being raised and document their reflections as a team. This is what led to features like the ability to flag questions for extra attention, track previous trail of answers and refer to relevant guiding principles from any question screen.

Regarding simplicity, I got the understanding that features like the video conferencing and chat options and the ability to access third party tools are great and would ultimately be useful. However, they could also end up over-complicating the tool, so it would be better to focus on the more essential features related to the review itself.

5.1.2 Insights from Second Set of Interviews

The following are a summary of feedback from study participants after interacting with the first draft of Ethix:

The tool does provide some merit to an ethical review process and has a legitimate use case. The participants agreed that the tool is fit for purpose and meets its intended use case. They saw how having all the information that would otherwise be shared over a period of weeks with lots of back and forth communication, all in one place at the same time could make the review process much more efficient. They also saw value in the features and functionalities the tool provided, such as flagging, commenting and referring to guiding principles, to help conduct ethical reviews in a more reflective, engaging manner. While there may be areas for extension and improvement, the overall sentiment is that the tool could be a worthwhile addition to the process of ethical review.

The design is clean, simple, intuitive and fairly navigable for a first time user. The participants agreed that the screens were well organised, with buttons that are easy to spot and intuitive. There were screens however, that needed some explanation and directions for users to know what to do on them, reducing the ease of navigation for first time users. An example of such a screen is the Roadmap screen, as shown in figure 5.4. It was not obvious that the buttons were clickable as they did not look like traditional buttons and did not have instructive labels. This resulted in participants usually asking what to do next when they got to the screen.

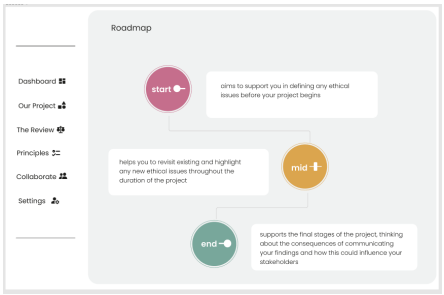


Figure 5.4: Original look of the Roadmap screen

The dashboard had helpful features but could benefit from less ambiguity and more shortcut features, especially for frequently performed tasks. Initially, there

were two features that were named ”project”; the ”Project” button on the side bar which referred to the details of the project that is undergoing the ethical review and a module in the section-based-question modules. When I asked participants to find their way to the details of the project from the dashboard, they were usually unsure which ”project” was the right one to click. There were also suggestions of adding a shortcut to things like viewing the review summary and going straight to a question a user is currently working on, as these are likely to be frequently repeated use cases.

More customisation of features could improve user experience and the quality of the review itself. The tool as of now has no customisable features aside the addition of principles. However, its functionality would be significantly improved with features such as the ability of supervising users to choose what ethical frameworks to work with, edit, add and remove questions, create and edit projects, change the tool's language and terminology and finally, customize reporting and documentation. This would ensure that users are able to tailor the tool more suitably to their projects and ethical issues.

Question flagging is a very useful feature. However, it would be even more helpful if users could flag questions to specific people. The flagging feature was initially intended to draw everyone's attention. However, participants believed that that would not be as efficient as notifying only the most relevant people. This is because flagging everyone could be unnecessarily distracting and at the end of the day, not everyone is well suited to address every issue.

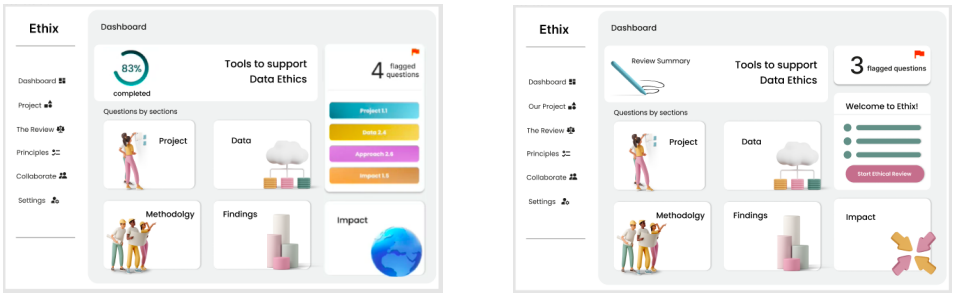
The tool could do without a progress bar on the dashboard as it gave the impression of the review being an impending task to be completed. Participants believed that the review should be more like a journaling experience such that users would be encouraged to revisit past reflections at any point in time. However, despite how helpful it is see the progress of the review, a progress bar instills the idea that the completed portions of the review are perfect and need no attention, which ends up discouraging further reflection.

5.1.3 Changes after Study

The following changes were made to the design after feedback from the second set of interviews:

Clarification of ambiguity, removal of progress bar and addition of more shortcut features to the dashboard As can be seen in the figure 5.5, the name of the project button on the side bar was changed to ”Our Project”, which gives a clearer idea that that is for the overview of the current project. Also, the question flagging section was reduced to a smaller rectangular button to give room for the ”Start Ethical Review” button, which changes to ”Continue Ethical Review” once the user initiates the review process. Lastly, the progress bar was replaced by the ”Review Summary” button to give a quick and easy access to the summary of the review's questions and answers.

A prompt to select whom to flag question to and reason for flagging was added to the question flagging feature As mentioned in 5.1.2, the flagging use case needed a few specifications such as whom exactly to flag question to. A text box to write the reason for the flagging was also added, to give the recipients a quick brief of what the



(a) initial dashboard (b) Current dashboard

Figure 5.5: Comparison of dashboard before and after study

issue is without having to try and figure it out themselves or reach out to the flagger to clarify.

Addition of helpful instructions on less intuitive pages. A line of instruction to ”select a project stage to reflect on review progress and view relevant questions” was added to the Roadmap screen as participants initially could not tell what exactly to do when they got to this screen. An illustration of the new Roadmap screen is shown in figure 5.6

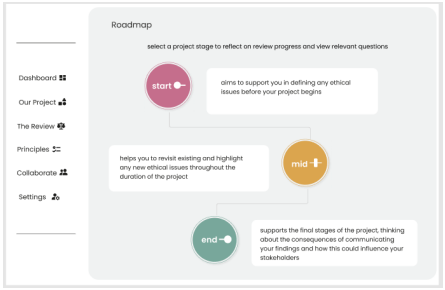


Figure 5.6: Caption

5.2 Meeting Project Objectives

This is a reflection on how well the design has met the objectives stated in section 3.2.2:

Conscious effort was made in selecting the features and designing the visual elements of the tool to try and achieve the tool’s objectives of improving engagement and encouraging reflection. This can be seen from the simple, aesthetic and intuitive design, which promotes ease of use and enhances the user’s experience. To promote engagement, the tool includes features such as the ability to flag and comment on questions to make the process involving and collaborative, the use of descriptive images to accompany elements to clarify their meanings and make them more interesting to look at, an introductory tutorial before the start of the review to set expectations and make sure users know how to navigate the review screens before they start, and lastly, the convenience of being able to quickly find questions based on what aspect of the project they relate to without having to go through the whole review summary.

To encourage reflection, there are features such as a pop up at the beginning of the review to remind users to refer to the project's ethical principles for guidance, a dedicated screen for each question, with certain elements automatically hidden, to reduce distraction and help users focus on one question at a time, the ability to track the trail of previous answers for a question to see and understand how things have evolved, the ability to refer to the principles relevant to a specific question from the question's screen, to keep users mindful of them as they answer questions and finally, the ability to reflect on the progress of the review at each stage of the project.

The features mentioned above help meet the tool's objectives to a fair extent. However, they don't necessarily fulfil the tool's optimum potential to meet the objectives.This is because;

- First of all, the tool is designed from the perspective of a non-supervising and non-administrative user, leading to the exclusion of customisation features such as the addition and editing of questions and the selection of a preferred ethical framework for the review. This means the tool already lacks some essential features and does not address the needs of a significant sect of its users.
- Also, despite how useful the feature of grouping questions by sections seems, a number of the study participants felt it was not necessarily essential, which means there might be a sect of users who may find it redundant and end up losing trust in the tool's usefulness. This could ruin the reflective atmosphere the tool aims to create for such users and reduce their engagement with the system and the review ultimately.
- Additionally, some users might find the accompanying images more distracting than helpful, which could impact their engagement negatively.
- Furthermore, the division of the review into three stages might not necessarily work well with every project team that uses the tool, either because of the mere preference of the team or how well it suits the project itself. This could make the use of the tool more of an inconvenience than a help and could be a stumbling block for users' trust in the tool, and even cause them to abandon it for a more suitable tool. A feature that allows the customisation of ethical framework could therefore be useful.

Overall, I believe the tool's design, if implemented would be a significant improvement on the traditional ethical review procedure, including one that involves the reading and filling of a 40 page word document. However, there is a lot of room for extension and improvement for the tool to fully meet its objectives.

Chapter 6

Conclusions

6.1 The Potential future of Ethix

The following points address some areas in which the project could be further developed as an alternative to continuing with the expansion of the tool's design.

6.1.1 Project Development Areas

6.1.1.1 Survey Expansion

The surveys for this project were carried out on a small sample size consisting of people from similar backgrounds. While the input received from these participants was valuable, there was a lack of diversity in the perspectives gathered. To obtain a well-rounded view, input from various stakeholders, including developers, ethics professionals, project managers, and potential users or clients of ethics-sensitive software, should be sought. Although some of these groups were difficult to survey due to time and resource constraints, future surveys could be planned more formally and well in advance. Although the survey provided useful information, a wider stakeholder input would have made it more beneficial.

6.1.1.2 Accessibility Features

In order to make Ethix accessible for all potential users, it would be necessary to consider implementing some basic accessibility features. These features would enable the tool to be used by a wider audience. The accessibility features could include improvements to the tool's ease of use and language simplicity, a comprehensive tutorial, colorblind settings, screen reader compatibility, text-to-speech and speech-to-text options, among others. Although this list is not exhaustive, it is important for the tool to adhere to ethical principles and provide features that ensure all users have equal access to it. Consultation with accessibility experts would be beneficial in achieving this objective.

6.1.1.3 Prototype Application Development

The development of a prototype application of the tool would provide a more realistic environment for testing the effectiveness of the tool in achieving its objectives. This would involve creating a functioning, interactive version of the tool that users could actually engage with and use to conduct ethical reviews. By doing so, more meaningful feedback on the effectiveness of the tool's design and features in achieving its objectives can be gathered. Additionally, this opportunity could be used to explore potential additions or modifications to the tool that would further improve its effectiveness, such as integrating the tool with other project management software.

6.1.2 Feature Extension Ideas

Some additional features that would enhance the functionality of Ethix and help achieve its objectives, aside from the ones already mentioned in previous sections include:

- The ability to change the terminology used by the program. This would allow the replacement of discriminating or disrespectful terms which are used in the review, to ensure that the review itself is conducted ethically.
- The ability to create different kinds of ethical review tasks during ethical reviews and beyond them, other than just questions. For example, a feature that allows users to consider case studies of ethical topics relevant to the project would create a more interactive experience and give users the opportunity to consider things from a more practical perspective.
- The ability to customise which people get which questions in an ethical review. As mentioned in the DCC's review process in 2.4.1 for example, different questions are answered by different people depending on how suitable their expertise makes them. Therefore, a feature that only gives editorial allows specific question assignments could make the process more efficient.
- The ability to bring in participants who observe ethical reviews and can comment on them without partaking in them. This would ensure a wider stakeholder input without necessarily disrupting the process with too many edits.
- The ability to assign topics to questions and have ethical reviews focus on topics, rather than particular questions. This approach can help to ensure a more comprehensive review as it can help reviewers better identify and analyze patterns, trends, and potential ethical issues across multiple questions.
- The ability to provide resources and ethics queries outside of defined projects. This would provide a platform for reviewers to raise ethical queries or concerns that may not be directly related to the project being reviewed. This would enable a more comprehensive and holistic review of ethical considerations, helping to identify potential issues that may not have been considered otherwise.
- Calendar integration to plan ethics review related events such as meetings or discussions. Alternatively, the application could link to existing workplace calendars,

such as the Microsoft Outlook calendar. This would make collaboration and the planning the review timeline more efficient

- The ability to access third party collaboration tools such as project management and communication tools. This would allow for easier and more efficient collaboration between stakeholders involved in the review process.
- Video call and chat options for more convenient communication and collaboration.

6.2 Final Thoughts

In summary, the development of Ethix presents a significant opportunity to address ethical considerations in the development and deployment of AI systems. Ethix's contribution to ethical review processes lies in its ability to enhance engagement, reflection, and collaboration among stakeholders. By doing so, Ethix provides a means to promote ethical considerations and responsibility in AI development and deployment.

However, Ethix's success in ensuring responsible AI use depends on its implementation and effective use by organizations. Therefore, integrating Ethix into the existing ethical review process, and providing proper training to stakeholders, is essential for its effective utilization. Besides, it is important to note that Ethix is only a tool to facilitate ethical considerations and not a substitute for critical thinking and ethical decision-making.

As AI technology continues to develop and impact society, it is vital to consider its ethical implications and promote responsible AI development and deployment. Ethix represents one piece of the puzzle towards achieving this goal. However, organizations need to take additional measures to promote ethical AI use, such as creating an ethical culture, supporting transparency, and promoting ethical leadership.

Therefore, to ensure that AI is used responsibly, organizations need to continuously reflect, collaborate, and make ethical decisions that promote societal welfare. The challenge remains in creating an ethical framework that ensures AI development and deployment aligns with ethical standards that benefit society.

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Appendix A

Ethics

No personal details of participants were collected; instead, they were given unique participant numbers which were used for the questionnaire and both sets of interviews.

Appendix B

Participants' information sheet

Participant Information Sheet

Project title:	Tools to support Data Ethics
Principal investigator:	James Garforth
Researcher collecting data:	Adwoa Appiah
Funder (if applicable):	None

This study was certified according to the Informatics Research Ethics Process, RT number 866946. Please take time to read the following information carefully. You should keep this page for your records.

Who are the researchers?

Adwoa Appiah – Student Investigator

James Garforth – Principal Investigator – Project Supervisor

What is the purpose of the study?

The focus of this study is to gather user requirements, needs and desires for an early prototype form of an ethical review application. This ethical review application can be used to ensure ethical principles are adhered to throughout the development process of an AI project. This helps ensure that ethical principles are well incorporated into the developed system. Through these studies, the needs and features that the application should incorporate will be outlined. Then, the initial designs will be reviewed, and participants can influence the direction of the development of the tool. After a prototype is created, a final review will be conducted.

Why have I been asked to take part?

You have been recommended as an ethics subject expert and have experience in working with others to deliver ethical review and ensure ethical standards are adhered to. You have been chosen as your input has been deemed very valuable for developing an ethical review tool such as this one.

Do I have to take part?

No – participation in this study is entirely up to you. You can withdraw from the study at any time without giving a reason. Your rights will not be affected. If you wish to withdraw, contact the PI. We will keep copies of your original consent, and of your withdrawal request.

What will happen if I decide to take part?

If you agree to take part (thank you for doing so):

- All contact and communication will be online, on the Microsoft Teams platform or other video conferencing software. There will be no travel requirements.
- You will be interviewed two times over the course of this second academic semester at different points in the project timeline. (March 2023.)

o All of these interviews will be recorded, video recording will be preferred however we can reduce to audio recording if requested.
o Each will be accompanied by a remote task, the details of which can be found below.
o All interviews will have notes taken during them based on participant answers. These will be shared with the participant and can be amended according to their wishes. These will be among the data stored for the experiment.

- The first interviews are planned to each be an hour long, and they are planned to be individual interviews. You will be asked to complete a pre-interview questionnaire to get your opinions on the various aspects of interest, to be discussed during the interview. This will ideally be completed before the interview and reviewed by the student investigator (Adwoa Appiah) before the interviews are conducted.
- For the second interview, you will be presented with a mock-up design for the tool. You will be asked to use this tool with the interviewer (Adwoa Appiah) present. There will be time to use this mock-up, and then an interview following as a form of feedback session. This is intended to all take place as one “session”, and each part should last around 20 minutes and then an hour at most. These will also be individual, and video recorded.
- Your data will be pseudo-anonymised. We will collect your results, and then assign you a *random* ID. This ID will be then stored in a password protected document, which only the student researcher and P.I. will have access to. This is the only way your ID can then be linked to your identifying information, i.e., your name. Any published work will refer to data gathered by ID only, and none of your identifying information will be used in published work.

Are there any risks associated with taking part?

There are no significant risks associated with participation

Are there any benefits associated with taking part?

There is no monetary compensation, however your input and answers to this study will be used to help design a tool which can be used in the future to help better incorporate ethics into the development of AI systems.

What will happen to the results of this study?

The results of this study may be summarised in published articles, reports and presentations. Quotes or key findings will be pseudo-anonymized. Identifying information will never directly be used in published reports or published work – a unique ID will be used. We will also remove any other information that could be used to identify you. The data you provide will be processed under your unique participant ID will be linked to your identifying information by a password protected document which only the student researcher and PI will have access to. The student researcher will use this to help better analyse your response and arrange proper follow-up for the next interview if appropriate. The identifying information will never be shared outside of the student researcher, you and the PI, and will never be used in publication. Your data may be archived for a maximum of 4 years.

Data protection and confidentiality.

Your data will be processed in accordance with Data Protection Law. All information collected about you will be kept strictly confidential. Your data will be viewed by the researcher/research team.

All electronic data will be stored on a password-protected encrypted computer, on the School of Informatics' secure file servers, or on the University's secure encrypted cloud storage services (DataShare, ownCloud, or Sharepoint) and all paper records will be stored in a locked filing cabinet in the PI's office. Your consent information will be kept separately from your responses in order to minimise risk.

What are my data protection rights?

The University of Edinburgh is a Data Controller for the information you provide. You have the right to access information held about you. Your right of access can be exercised in accordance Data Protection Law. You also have other rights including rights of correction, erasure and objection. For more details, including the right to

lodge a complaint with the Information Commissioner's Office, please visit www.ico.org.uk. Questions, comments, and requests about your personal data can also be sent to the University Data Protection Officer at dpo@ed.ac.uk.

Who can I contact?

If you have any further questions about the study, please contact the lead researcher, Adwoa Appiah, adwoa.appiah@ed.ac.uk.

If you wish to make a complaint about the study, please contact inf-ethics@inf.ed.ac.uk. When you contact us, please provide the study title and detail the nature of your complaint.

Updated information.

If the research project changes in any way, an updated Participant Information Sheet will be made available on http://web.inf.ed.ac.uk/infweb/research/study-updates

Alternative formats.

To request this document in an alternative format, such as large print or on coloured paper, please contact Adwoa Appiah, adwoa.appiah@ed.ac.uk.

General information.

For general information about how we use your data, go to: edin.ac/privacy-research

Appendix C

Participants' consent form

Participant Consent Form

Project title:	Tools to support Data Ethics
Principal investigator (PI):	James Garforth
Researcher:	Adwoa Appiah
PI contact details:	James.Garforth@ed.ac.uk

By participating in the study, you agree that:

- I have read and understood the Participant Information Sheet for the above study, that I have had the opportunity to ask questions, and that any questions I had were answered to my satisfaction.

  - Please do not feel burdened to take part and feel comfortable to address the student researcher with any issues you may have before consenting.

- My participation is voluntary, and that I can withdraw at any time before the first interviews without giving a reason. Withdrawing will not affect any of my rights. If I withdraw after the first set of interviews, I understand the data that I have already given will not be deleted.

- I understand that publications will not directly refer to my data by name or other identifying information – instead referring to any data provided under separate ID values. However, the student researcher will have access to data that allows them to identify my data from this ID for analysis purposes. This link between my data and my ID will not be published, and only the student researcher and PI will ever have access to the necessary information that will link my response ID to my identifying information. (I understand my data will be pseudo-anonymised.)

- I consent to my pseudo-anonymised data being used in academic publications and presentations.

- I understand that my pseudo-anonymised data will be stored for the duration outlined in the Participant Information Sheet.

  - Identifying information will remain in the data stored for the project, however this will only be accessible to the student researcher and PI and will not be used in published work.

- I understand and agree to completing the remote tasks that will accompany the two interviews to the best of my ability. I have had any questions answered based on any confusion that resulted from the study process presented in the Participant Information Sheet. (If you struggle to understand anything, please contact the student researcher who will be happy to help if anything is unclear.)

- I understand that by consenting to this, I consent to the interviews being audio and video recorded and these recordings being stored for reference. I also consent to my

interviews having written notes taken on them, and consent to the keeping and processing of these notes.

- I understand that by consenting to this, I understand why I have been selected and am comfortable participating in the study knowing these reasons. (Please review PIS for further detail on why you have been chosen.)

Participant number: _____

Please tick yes or no for each of these statements.

1.	I agree to being audio and video recorded.	**Yes** ☐	**No** ☐
2.	I allow my data to be used in future ethically approved research.	**Yes** ☐	**No** ☐
3.	I agree to take part in this study.	**Yes** ☐	**No** ☐

Name of person giving consent	Date dd/mm/yy	Signature
_____	_____	_____
Name of person taking consent	Date dd/mm/yy	Signature
_____	_____	_____

Thank you!

Appendix D

Pre-Interview Questionnaire

Tools to support Data Ethics (Pre-Interview Questionnaire)

Thank you for agreeing to participate in this study. This questionnaire relates to a planned ethics checking software, EthicAll Review, that is being designed by a student researcher, Adwoa Appiah, focusing on the user interface. The main thing this questionnaire and the follow up interview seek to investigate is the impact of engagement (defined later in the form) on the ethical review process and the quality of the review outcome, and if the user interface design of the tool could make any difference in engagement and its consequential impacts. The other aspects of interest are, how to improve collaboration among the teams involved in the ethical review process and how to facilitate a smooth integration of the process into the project itself.

Please fill out the questionnaire, answering all of the questions provided. If there are any questions which confuse you or you feel you need clarified, please feel free to contact the student researcher at **adwoa.appiah@ed.ac.uk**. Whilst there are no optional questions, do not feel pressured to answer any question for which you feel you cannot provide a meaningful answer to or for which the answer you want to provide does not suit the means in which you can answer. Any clarifications or additional comments can be made in the last section of this document, and we can discuss this in the follow-up interviews.

It would be ideal if answers to this questionnaire could be submitted at least 24 hours before the follow-up interview. Your participant ID will be communicated via email by the student researcher.

Thanks again for your participation, your input and time are greatly appreciated.

1. Please enter your given participant ID

2. At what stage(s) in a data-based project do you reckon would be best to consider ethical implications? (Select all that apply)

- [ ] Project planning
- [ ] Data collection
- [ ] Design
- [ ] Training of Machine Learning models
- [ ] Deployment
- [ ] Maintenance
- [ ] Other

3. Which of the following is a difficult part of the process of involving ethics in a data-based project? (Select all that apply)

- [ ] 1. Communicating ethical standards and what they mean effectively to the development team
- [ ] 2. Keeping the personnel involved in the ethical review process enthusiastic and engaged in the process
- [ ] 3. Determining that ethical standards have been applied effectively in the project
- [ ] 4. It depends on the project
- [ ] None of the above
- [ ] Other

4. Can you think of any features that an ethical review tool should have to be able to address the difficulties (one or more) mentioned above? - Please state the relevant problem number (from the previous question) and write the answer beside it

5. On a scale of 1-10, how much do you think the level of engagement with the ethical review process impacts the quality of the review? **(Engagement is defined in this questionnaire as: The level of attention, interest, and involvement a person invests in completing specific tasks related to the review process, and the process as a whole)**

1	2	3	4	5	6	7	8	9	10

6. On a scale of 1-10, how much do you think the design of the user interface for the tool would impact engagement with the process?

1	2	3	4	5	6	7	8	9	10

7. Which of the following features do you think are essential in an ethical review tool? (Select all that apply)

- [ ] Video conferencing and chat options for communicating with all teams involved
- [ ] Access to third party collaboration tools to facilitate project management and communication
- [ ] Pop up notes with further information and tips on questions to facilitate reflection and further clarifications
- [ ] Edit access to all the personnel involved
- [ ] Differing levels of access, with differing permissions (For example, an administrator could change and update questions, or flag interest in answers from non-administrators, whereas a regular user could only answer and save sets of answers to questions.)
- [ ] The ability to create and manage projects where you could add people and review answers as a collective, users could potentially see other users answers to the same project, questions could depend on the project, users could be assigned projects etc.
- [ ] None of the above

8. Any clarifications or additional comments?

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Microsoft Forms

Appendix E

Questionnaire Results

Tools to support Data Ethics (Pre-Interview Questionnaire)

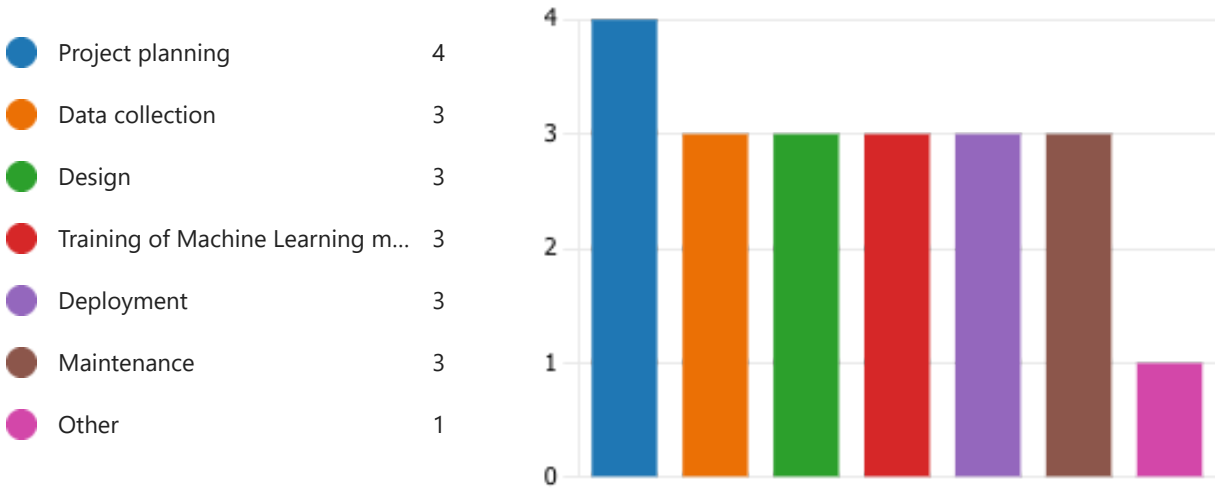
4	06:18	Active
Responses	Average time to complete	Status

1. Please enter your given participant ID

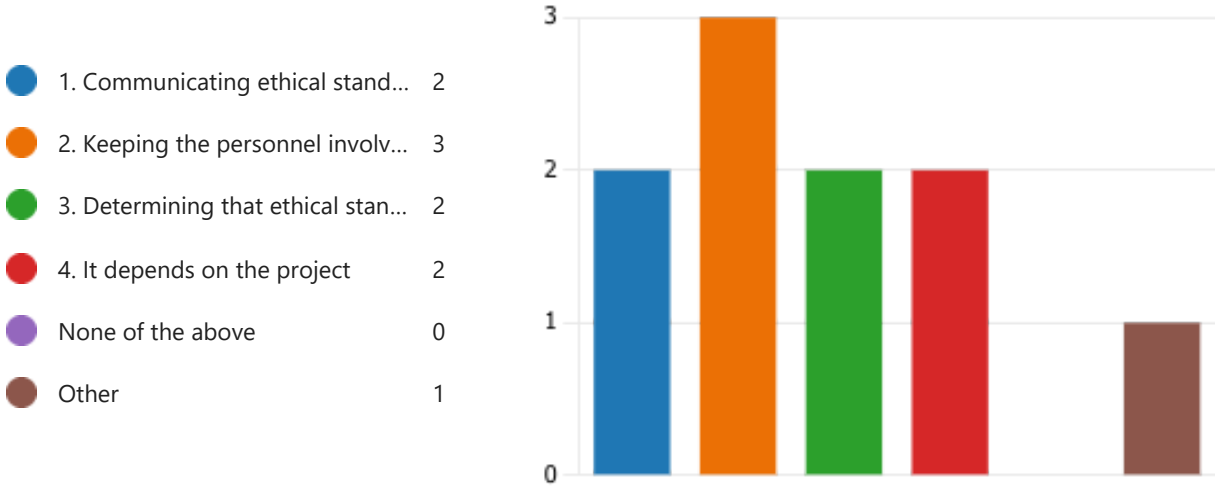
4
Responses

Latest Responses
"ER4"
"ER1"
"ER1"

2. At what stage(s) in a data-based project do you reckon would be best to consider ethical implications? (Select all that apply)



3. Which of the following is a difficult part of the process of involving ethics in a data-based project? (Select all that apply)



4. Can you think of any features that an ethical review tool should have to be able to address the difficulties (one or more) mentioned above? - Please state the relevant problem number (from the previous question) and write the answer beside it

4
Responses

Latest Responses

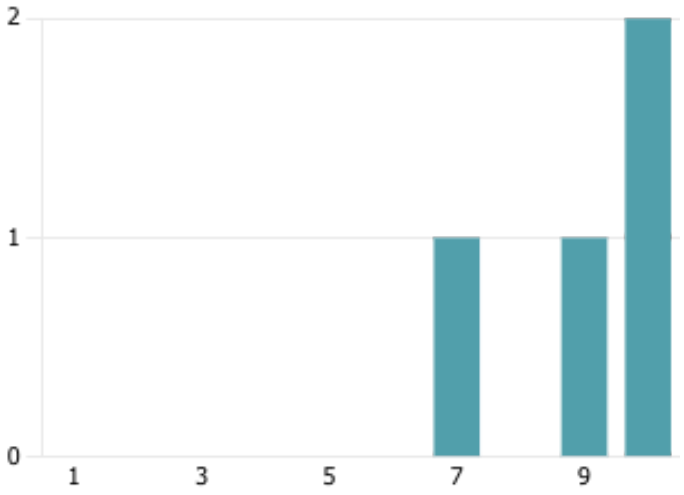
"Stakeholder mapping to include indirect stakeholders - gro...

"I think such a tool would benefit from human interaction - ...

"Problem 3 - capturing impact of ethical mitigations"

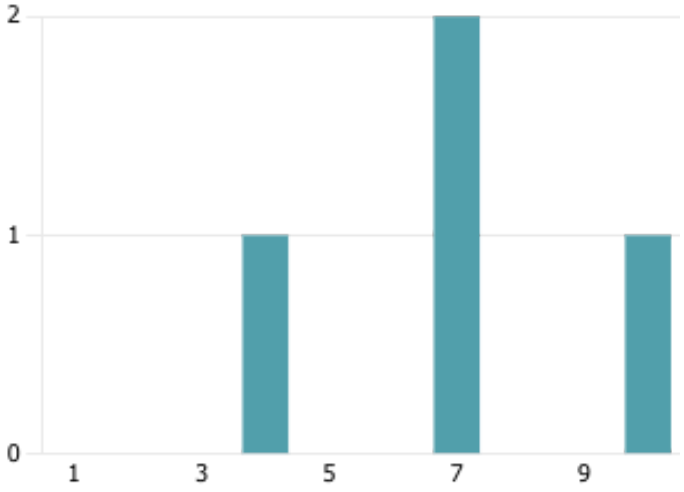
5. On a scale of 1-10, how much do you think the level of engagement with the ethical review process impacts the quality of the review? **(Engagement is defined in this questionnaire as: The level of attention, interest, and involvement a person invests in completing specific tasks related to the review process, and the process as a whole)**

9.00
Average Rating

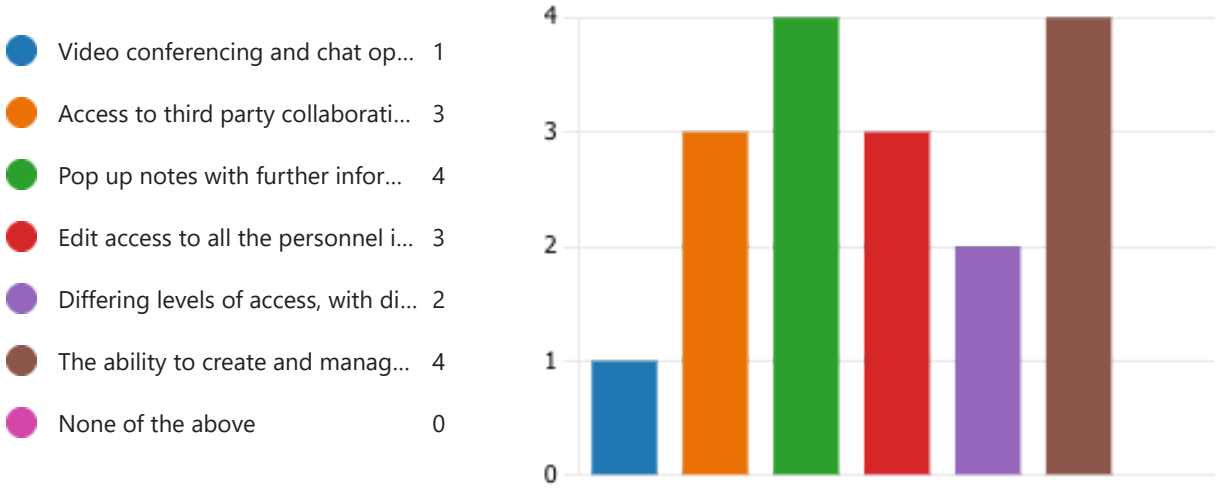


6. On a scale of 1-10, how much do you think the design of the user interface for the tool would impact engagement with the process?

7.00
Average Rating



7. Which of the following features do you think are essential in an ethical review tool? (Select all that apply)



8. Any clarifications or additional comments?

1
Responses

Latest Responses

"Important part would be shared access with an audit trail o...