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Engaging a project consortium in ethics-aware design and research

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Abstract. Ethics is an important perspective in project work. For a research and development project, ethics plays a key role when creating a shared understanding of societal goals and the intended long-term impacts of the project. It is an essential part of designing novel solutions and an integral part of conducting research. However, ethics is typically an area dedicated to ethics experts only, even though it would be important to embed it in the work of all project participants. In a European project on smart manufacturing, we have pursued to involve the whole project consortium to discuss and consider ethics in design and research throughout the project. This paper describes our ethical approach and the results of the engagement activities. Finally, we discuss the practical means we applied to create awareness and commitment towards ethics.

Keywords: Ethics, Design Ethics, Research Ethics, Co-creation, Industrial Work.

1 Introduction

The role of ethics is drawing more attention in research and design projects due to the application of emerging technologies, as well as emphasis on societal impacts and sustainability in the project goals and outcomes. The development and application of novel technologies, such as artificial intelligence, increases the efficiency of completing tasks, but also creates social concerns, for example, on the privacy of technology users, competences in using new tools and the true benefits of the tools.

While ethics is acknowledged as an important perspective of research and design work, it may be challenging to embed it into project work and make a project group or a consortium aware of and committed to ethical aspects related to research and design. Although technology ethics is widely discussed in literature, a lack of practical examples of design processes including ethics and engaging a project group or a consortium in considering ethics may hinder the adoption of ethics in project work.

This paper explores a process to engage members of a project consortium in ethical thinking across the project lifecycle. The goal of our work was to engage our project consortium to proactively discuss and consider ethics in the project work and to foster maintaining an ethics-aware mindset throughout the project. In this paper, we share the

results of our engagement activities and thus, aim at informing researchers, designers, developers and other practitioners to foster ethical thinking in research and design projects.

Our ethics-related work was conducted in a four-year, EU-funded research and development project, in which 20 partners develop novel software solutions to support smart manufacturing work. The partners of the project represent research organisations, technology developers and manufacturing companies. The engagement activities were targeted at all participants of the project, encouraging everyone to consider ethics in their own work. The emphasis of our ethics-related work was on design ethics, which is also the main focus in this paper.

The paper is structured as follows. First, we introduce the background on the role of ethics in design. We then describe the process and methods used in the engagement activities during the research project and present the results of the activities. Finally, we discuss the practical means we applied to create awareness and commitment towards ethics.

2 Related work

Although ethics is a relatively new perspective in design and research work, there are several design approaches that emphasise the role of ethics in design. Ethics can be considered in design, for example, by identifying and responding to the values of the target users [1], assessing the impacts of new solutions [2], or by creating and following ethical guidelines (e.g., [3]). The Ethics by Design approach [4] refers to forward-looking ethical thinking to address ethical aspects proactively in the design process. Ethics can also be addressed as one perspective of several aspects to be considered during the design and evaluation of novel solutions [5]. In addition, on a more general level, attention to ethics has been paid through associations and institutions that promote responsible behaviour [6,7].

While existing approaches and frameworks provide an understanding on ethical design, there is less knowledge on how to engage a project consortium in considering ethics in their own project tasks. Based on Value-sensitive Design [1], Shilton and Anderson [8] explore the roles and responsibilities related to ethics in design teams, highlighting the question of whether responsibility of ethics work should be borne by ethics experts or designers of a design team. To support a design team, ethics experts can work as *values advocates* [9,8], bringing knowledge of ethics literature and making bridges between abstract values and concrete technological affordances [8]. They can broaden the values considered in design [9] and spot ethical challenges during design [8]. However, this approach has been criticised for bringing a prescriptive list of values to a project [8,10] and, due to time commitment, required to integrate into design teams.

The challenges of ethics interventions by experts have led to fostering the *ethical reflection embedded in design* [8]: the aim of incorporating ethics directly into the work of designers or developers. The approach has helped developers to experience ethical concerns as personal and relevant [8] and highlighted the connection between social concerns and design decisions [11]. However, this approach lacks deeper expertise that an ethics expert could bring to the process. A solution for this is yet a different role of

bringing ethics to the project work: training ethics expertise to technical developers that Shilton and Anderson call *moral exemplars* [12,13].

To encourage a whole project consortium to consider ethics in their work, the ethical approach can be based on the ideology of *co-creation*, a widely and successfully used approach of involving different stakeholders in the design process [14,15]. Co-creation is defined as creativity that is shared by two or more people and can be applied throughout the whole design process [14]. Accordingly, co-creation refers to a practice of developing systems, products, or services through collaboration with the stakeholders [16].

One of the main building blocks of co-creation is *dialogue*, referring to interactivity, engagement, and propensity to act [17]. Through dialogue, the different perspectives, and a productive combination of them [18], may lead to successful outcomes. Concerning ethics, co-creation may also prevent challenges of ethical guidelines or checklists feeling extraneous or irrelevant that has been observed in previous studies when practitioners have not been involved in the design of them [19,20].

3 Process and methods

The process of engaging the project consortium in considering ethics in their design and research work consisted of engagement activities and support provided when needed (Figure 1). The engagement activities included a workshop to identify potential ethical challenges in the beginning of the project, a workshop for introducing a set of ethical guidelines for the project and collecting feedback to it, and a questionnaire to review whether and how ethics had been considered during the project work. The participants of the workshops were researchers, developers, and project managers of the project consortium, consisting of twenty partners from nine European countries. The consortium included twelve research organisations, four manufacturing companies and four other companies, focusing, for example, on technology or business development.

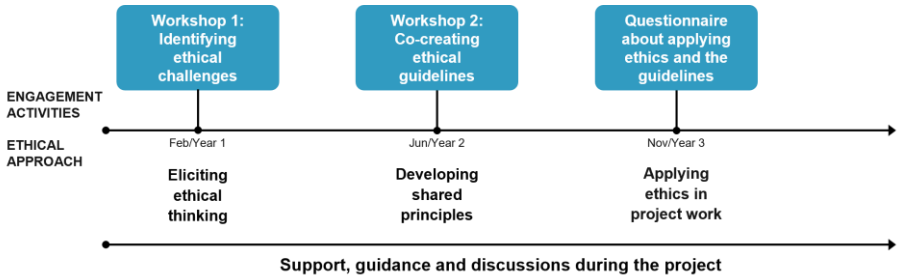

Fig. 1. Process of engaging the project consortium in considering ethics in their project work.

The first ethics workshop was organised as a part of the first project consortium meeting, organised as a face-to-face event. The aim of the workshop was to raise the project members' awareness of ethics and to identify potential ethical challenges related

to the project. The area of ethics was first introduced to the participants by giving them a short presentation on research ethics and ethical principles in design. The presentation on research ethics focused on the need to protect the privacy of the volunteer test users in accordance with the GDPR (General Data Protection Regulation) and on the need to use informed consent forms in user studies. Ethical principles in design were introduced with the examples of an earlier research project on human-centric smart manufacturing [5] and principles for trustworthy AI [21]. The participants were asked to form pairs or small groups, discuss ethical aspects related to research or development of ethically sound solutions, and as a result, write down one ethical challenge or question to be considered during the project and addressed in the ethical guidelines for the project. Twenty-four members of the project consortium participated in the workshop.

Before the second workshop, three researchers categorised the challenges identified in the first workshop under six ethical themes applied in earlier research [3] and, based on the categorisation, created twelve initial ethical guidelines. The second ethics workshop was organised as an online meeting, and all project members were encouraged to participate. The aim of the workshop was to obtain feedback on the initial ethical guidelines. After a brief introduction of the initial guidelines, the participants were divided into three subgroups with moderators to give feedback on the clarity and relevance of the guidelines and discuss topical ethical issues. At the end of the workshop, the participants conducted an exercise of writing down the personally relevant key take-aways of the workshop to foster considering ethics from the perspective of their own project work. After the workshop, the guidelines were modified based on the feedback and shared with the consortium to be iterated. Eighteen members of the project consortium participated in the workshop.

At the end of the third project year, as a third engagement activity, an online questionnaire was sent to the project consortium to review whether and how the ethical guidelines or other ethics-related methods had been utilised in the project activities. The questionnaire also included a question to describe ethical challenges faced during the project and a possibility to request support for ethics-related activities. Twenty-one members of the project consortium responded to the questionnaire.

Parallel to the three main engagement activities, ethics was supported through documentation, short presentations, and discussions with project members. To support design, ethics was included as one perspective in a design and evaluation framework, developed to guide the design activities and pilot experiments of the project [22]. Ethical research practices were supported by providing guidance and material for the use of the consortium, for example a template for an informed consent form. Furthermore, ethics was discussed in case of specific challenges when designing and piloting software components and tools developed in the project.

4 Results

This section describes the results of the ethics-related engagement activities conducted during the project. Each sub-section ends with a short summary of the role of the activity as part of the ethical approach from the perspective of the project consortium.

4.1 Engagement activity 1: Identifying ethical challenges

The first ethics workshop was organised to identify ethical challenges to be addressed later in the ethical guidelines for the project. The workshop resulted in eight potential challenges or questions related to developing and deploying new solutions or conducting research in an ethically sustainable way.

The potential challenges related to developing and deploying new solutions included issues such as monitoring employee performance and collecting data of employees. As a more general notion, the issue that machines should assist people, and not take over their work, was raised. The potential challenges and questions related to research ethics included specific questions on ethical procedures, such as the criteria when an ethical committee needs to be contacted before conducting a user study or procedures on processing personal data. As a more project-related issue, the issue of publishing results of other partners was raised.

From the perspective of the ethical approach, the first workshop served as a starting point for considering ethics during the project. It engaged all the participants of the consortium meeting to discuss ethics and provided common ground for co-creation of the ethical guidelines for the project.

4.2 Engagement activity 2: Co-creation of ethical guidelines for the project

The second ethics workshop was organised to co-create ethical guidelines for the project. The workshop resulted in feedback to the initial ethical guidelines that were introduced to the workshop participants and refined after the workshop.

The resulting twelve ethical guidelines were connected to six ethical themes identified as important in previous research [3]: privacy, autonomy, dignity, reliability, inclusion and benefit to society, two guidelines for each theme. The guidelines addressed the aspects of designing ethically sound solutions and piloting or deploying the solutions at work in an ethically sustainable way [23]. For example, the guidelines related to privacy emphasised respecting of workers' privacy when collecting data at the workplace and making workers aware if data is collected. In the guidelines on reliability, workers' safety and informing them of the reliability of new solutions were highlighted. Related to benefit to society, the guidelines stated that technological solutions should assist workers, supporting focus on value-adding work, and they should not cause harm to anyone, to their users or stakeholders. The complete list of guidelines is presented in [23].

From the perspective of the ethical approach, the second workshop and the co-creation process of the ethical guidelines served as the main activity for engaging project members in ethics. It provided understanding of ethical values relevant to the project, a possibility to have an impact on the guidelines and a forum for discussing topical ethical questions. After the workshop, the ethical guidelines were refined, and the project consortium had the possibility to comment on them. Based on the comments, suggestions of practices to apply the guidelines in project work were added to give the project consortium concrete examples of the guidelines.

4.3 Engagement activity 3: Questionnaire on application of ethics

As the third ethics engagement activity, the members of the project consortium were asked to respond to an online questionnaire on applying ethics and the ethical guidelines during the project. The ethical guidelines of the project were included in the questionnaire.

According to the questionnaire, almost all respondents (20/21) had considered ethics in their project work. Thirteen respondents had either followed or applied the ethical guidelines of the project, and eight respondents had considered ethics with other means (Figure 2). Only one respondent considered ethics irrelevant in his/her project work.

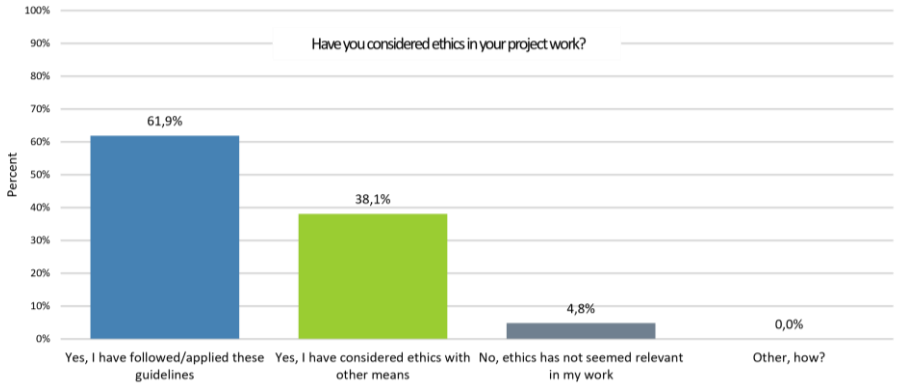

Fig. 2. Responses (N=21) to the question, "Have you considered ethics in your project work?"

Concerning the ethical themes of the ethical guidelines, the respondents identified privacy, reliability and benefit to society as the most relevant themes for the project, followed by autonomy and inclusion (Figure 3). The free-form descriptions of considering ethics were in line with this, particularly emphasising privacy that was addressed in most of the free-form responses (9/17 responses).

Considerations on privacy were related to procedures on collection of personal data, such as minimising it or deploying ways to collect anonymous data, for example in the case of tracking workers. Related to reliability, a need to inform stakeholders on the reliability and limitations of the developed solutions was emphasised, including identification and documentation of liability and responsibility issues. Benefit to society was highlighted in responses describing work for fostering safety and well-being of workers. Autonomy had been considered especially in tasks where humans and robots interact, in giving freedom to workers to organise their task flow, and when involving workers in design and development activities. Inclusion was mentioned to be considered in design and trials not excluding workers with different capabilities, skills and disabilities.

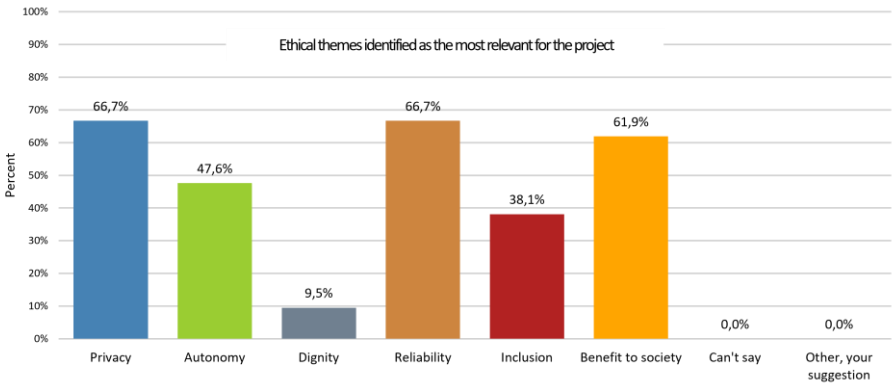

Fig. 3. Responses (N=21) to the question, "Which ethical themes do you find the most relevant for our project?" The respondents were instructed to select maximum three ethical themes from the six themes of the ethical guidelines.

In addition to describing how ethics had been applied, the respondents also described the ethical challenges that they had faced during the project. The challenges included, for example, the risk of excessive data collection with sensors or wearables and facing worker concerns on losing their job. The latter had been addressed by informing workers on the potential benefits of the new solutions and involving them in the development work.

From the perspective of an ethical approach, the questionnaire served as a reminder of the ethical guidelines and a trigger to reflect on ethics related to one's project work. In addition, it worked as a channel for support in ethics-related issues, as the need for it was inquired.

5 Discussion

Our aim was to engage the project consortium to consider ethics in their project work, and thus promote ethical thinking and design throughout the project. In line with the Ethics by Design approach [4], we aimed at encouraging positive and proactive ethical thinking, starting from the beginning of the project. Even though it is impossible to predict all issues related to the adoption of emerging technologies in advance [24], ethical design choices can be encouraged by paying attention to ethical values or principles considered as important by the project consortium. In the context of industrial work, for example colleting sensitive information on workers (e.g. [25]) or more generally, aiming at enhancing well-being of workers (e.g. [26]) are topics that require addressing ethical aspects when designing and piloting new solutions. While the goal of our work was to facilitate the development of ethically sustainable solutions, raising awareness of ethics in the project consortium also supports the wider aim to foster responsible and ethics-aware working in the technology industry [6,7].

Our work on engaging the project consortium in considering ethics has elements of the roles of working as design advocates [9,8] and fostering the ethical reflection embedded in design [8]. The engagement activities can be perceived as ethics

interventions, but they also aimed at including ethical reflection to the design processes and guiding project members in considering ethics. Instead of training a few developers to work as moral exemplars [12,13], our approach was based on the idea of co-creation [14,15], to create shared understanding on ethics and encourage project partners to consider ethics in their work.

During the engagement process, we aimed at involving the whole project consortium to ethics work and creating awareness and commitment to ethics through practical means and methods: explicitly welcoming everyone to attend to ethics-related activities and using several methods, such as pair work, group work and discussions, to elicit ethical thinking. Attention was paid to using positive expressions when introducing the area of ethics and the engagement activities. Instead of identifying problems, we aimed at creating ethically sound solutions. To make the area of ethics easier to comprehend during the project, research ethics and ethics-aware design were separated in the workshops and ethics-related material. In addition, clarity was pursued by summarizing the results of the co-creation process into short guidelines with descriptions and examples.

In our research and development project, we have aimed at supporting industrial work with novel technological solutions. The results of our ethics work provide an understanding on ethical aspects relevant to this context. While the ethical guidelines co-created in the project focus on industrial work, and thus can best be applied in industrial contexts, our ethical approach and the process of engagement activities are also applicable in other research and design contexts. The engagement activities presented in this paper focused on the project consortium. In the future, also involving shop floor workers in a similar process could bring new perspectives to considering ethics or highlight different ethical values. In addition, it would be interesting to focus closer on design practices and the impact of ethics on the actual design decisions.

6 Conclusions

This paper presented the ethical approach and the results of the engagement activities to involve the project consortium to considering ethics in a European research and development project. The project consortium was engaged in ethics through workshops to identify ethical challenges and to co-create ethical guidelines for the project, as well as by providing guidance and support. The results provide understanding on ethical aspects related to designing novel tools to support industrial work. However, the main contribution is on increasing understanding on the ways to encourage project partners' ethics awareness and commitment to ethics.

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