

Next level collaboration: towards responsible innovation for behavioural phenotyping in farm animals

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Abstract

Animal production is shifting towards systems in which larger groups of animals are subjected to more space and structures to display a wider range of behaviours. However, in these human-created groups, animal welfare can be affected by harmful social interactions, such as tail biting in pigs and feather pecking in laying hens. AI-based technologies offer opportunities to research the functioning of these groups and to develop novel genetic and environmental intervention strategies. This is the aim of the IMAGEN project funded by the Dutch Research Council (NWO). The project activities are situated in a societal context that is characterized by discussions on animal use, welfare, public health and environmental sustainability. Complex societal challenges like this can only be tackled by real collaboration between different disciplines. The IMAGEN project addresses this ambition by involving a multidisciplinary research team which also includes societal and industry partners. However, additional efforts are necessary to create awareness and knowledge about the ethical dimensions related to the project topics. To practise dealing with socio-ethical questions in research and innovation, we organised a workshop for all project partners. In this paper, we discuss the results of this workshop and our follow-up strategy which includes a tailor-made approach to reflection based on the questions and needs of the project partners. During the workshop it became clear that institutional ethics committees were not seen as sufficient to stimulate genuine reflection. For this, participants considered transparency, trust, an open working culture and good relationships among project members as crucial. Participants also argued for an approach in which ‘everyone’ is involved. However, who was meant by ‘everyone’ seemed more difficult to define. We identified a field of tension between university and industry partners. For universities, it was deemed easy to be open and achieve ‘something good’ through research while companies are guided by competitive advantage. With this practical approach to transdisciplinary collaboration, we facilitate the reflection on ethical challenges and the contribution to sustainable animal production throughout the project.

Keywords: facilitation, societal challenge, transdisciplinary research, workshop

Introduction

The growing emphasis on the welfare of animals kept in food production systems includes a shift from preventing mere harm to enabling animals to engage in behaviours that they experience as rewarding (Mellor, 2016). In agricultural practice, this has led to the implementation of systems in which larger groups of animals are subjected to more space and structures providing them with opportunities to display a wide range of (social-)behaviours. However, in these human-created groups, animal welfare can be affected by harmful social interactions, such as tail biting in pigs and feather pecking in laying hens (Brunberg *et al.*, 2016). More recently, AI-based methods have been adopted to study the functioning of these groups of animals and to develop novel genetic and environmental intervention strategies (e.g. van der Zande *et al.*, 2021). The IMAGEN project, funded by the Dutch Research Council (NWO), aims to advance these methods and intervention strategies and to apply them for behavioural phenotyping

in commercial pig and laying hen breeding. The project activities are situated in a societal context that is characterised by discussions on animal and technology use, welfare, public health and environmental sustainability. In a previous paper, we argued that complex societal challenges like this can only be tackled by real collaboration between different academic disciplines and other stakeholders (Giersberg *et al.*, 2022). The IMAGEN project addresses this ambition by involving a multi-stakeholder research team which also includes societal and industry partners.

IMAGEN is a typical example of a transdisciplinary project with the aim of achieving tangible societal impact and change in the medium and long term, as requested by many national and European research funding schemes. Transdisciplinary research does not imply a novel theory of knowledge or one specific method, it is rather characterised by more general normative aspirations (Kaiser and Gluckman, 2023). In recent years, several frameworks have been developed that embrace these aspirations, for instance by Carew and Wickson (2010) and Jahn *et al.* (2012). However, to researchers outside the community of those who study transdisciplinary processes, these frameworks often seem vague and lack a connection to their daily research tasks. This is particularly true for researchers from disciplines or fields which are grounded in radical positivism, such as animal and engineering sciences. In addition, external stakeholders often pursue different interests than the academic researchers or regard themselves more as research subjects rather than as equal research partners.

Transdisciplinary collaboration does not happen spontaneously, particularly not among research partners with different epistemological backgrounds. A common example is the challenge to integrate work packages dealing with ethical aspects of animal and innovation research into the overall project and to create functional outcomes together with the more technical work packages. The IMAGEN project is no exception to this challenge. Additional efforts of facilitation are necessary to co-create knowledge about the ethical dimensions related to the project topics and to incorporate this knowledge into further actions within the project. In this paper, we discuss the structure and the results of a workshop that we organised for all IMAGEN partners building on our previously presented stages of collaboration for societal challenge-oriented research projects (Giersberg *et al.*, 2022). We end with proposing follow-up strategies which include a tailor-made approach to reflection based on the questions and needs of the project partners.

Sowing and growing — a workshop to facilitate collaboration

We developed and ran a workshop aimed at the practical implementation of transdisciplinary collaboration in a multi-stakeholder research team. In our specific case of the IMAGEN project, the workshop was designed to facilitate the integration of ethical reflection within the technically-oriented work packages together with all project partners. In particular, the workshop pursued the following objectives: (1) to create awareness and knowledge of the ethical dimensions of the different elements of the project, including technology, Artificial Intelligence (e.g. the development of tracking algorithms), animal breeding and use, and (2) to practice dealing with socio-ethical questions in research and innovation, involving multi-stakeholder perspectives.

As the pig- and laying hen cases play a prominent role within IMAGEN, we decided to kick-off the workshop with two pitches on the project activities related to these cases. This was followed by a brief introduction to the moral questions associated to the topics of IMAGEN (e.g. animal use) and the principles of Responsible Research and Innovation (RRI). Subsequently, participants were assigned to three groups, considering a heterogeneous composition in terms of people's backgrounds (academic, industry, NGO) and career levels (PhD student - professor or junior - senior level). Each group consisted of one facilitator (researcher from the ethics work package) and about five participants. Groups worked on a RRI self-reflection- and a Stakeholder Tokens task. After each group activity, a plenary wrap-up and reflection were held.

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Responsible research and innovation self-reflection tool

Parallel to their positive impact, science and technology often create new risks and moral questions, fail to solve the issues they are intended to, and raise controversies. RRI strives to bring research and innovation related issues to the fore, anticipate their consequences and engage society in the discussion on how science and technology can contribute to building the type of world and society we desire for future generations. In the context of ethics, RRI focuses on (1) research integrity: the prevention of unacceptable research and research practices, and (2) science and society: the ethical acceptability of scientific and technological developments. To facilitate conversation and reflection on RRI within the IMAGEN project, the 'RRI self-reflection tool — ethics' (RRI Tools, 2016) was used. The questions presented in the RRI tool were discussed within the group. The facilitator ensured that everyone got the chance to share their thoughts. One group member wrote down the answers, ideas and main points discussed in the group in the online-tool.

Stakeholder tokens exercise

Stakeholder tokens is a participatory and playful approach to stakeholder analysis adapted by Yoo (2021). In the context of the IMAGEN project, the aim was to let project partners work out and experience a holistic picture of the stakeholder network related to the innovations studied within the project. By seeking out a robust set of stakeholders, legitimizing their inclusion and reflecting on their dynamic relationships, the project partners are able to gain a deeper and more nuanced understanding of the societal context in which their investigations take place. First, each group decided on one specific technology that is researched, developed or tested within the IMAGEN project. This was written in the centre of a large sheet of paper. Second, the group created a list of relevant stakeholders by writing their names on stickers. The stickers were attached to tokens (= small wooden dolls). Next, tokens were arranged on the paper. Finally, project partners were encouraged to be creative when sketching the interrelationships among stakeholders: to draw lines, arrows or other illustrative elements. During the exercise, the facilitator could prompt participants to substantiate their choices to stimulate the reflection process.

Harvesting — outcomes of the workshop

In the following, the insights gained from observing the group activities are summarised.

Responsible research and innovation self-reflection tool

During the self-reflection activity, all groups considered different formats of ethical reflection within a research project. Discussions often started with formalised approaches to reflection, such as the legally required approval of an ethics committee for animal experiments. In one group, the wish for clear structures and procedures predominated. Project partners expressed the need for clear guidance, 'having rules', when taking into account the often conflicting aspects of animal welfare, environmental impact and data security and privacy. However, all groups agreed that while these institutionalised procedures fulfil a useful part of the reflection process, they are not sufficient in terms of RRI. One example mentioned was that of observational on-farm studies, for which formal authorisation is not always necessary. In this case, it would not be formally required to determine which measures had to be taken, if for instance feather pecking behaviour escalated in a flock of laying hens. However, as a responsible researcher one would still have to think about this scenario beforehand: at which point is it time to intervene? When does the welfare of the animals outweigh one's research interests? Several participants reported that the companies they are working for have an 'ethics department' or an 'officer who is responsible for questions concerning ethics'. These were mainly seen as contact points in case

a staff member has concerns or wants to report an issue. It was stated that regular discussions of ideas or projects do not take place, and that those officers are often not aware of research programmes such as IMAGEN. Complementary to institutionalised procedures and codes of conduct, participants considered transparency, trust, an open working culture and good relationships among project members as crucial to stimulate 'real reflection'.

A culture of openness was considered important to ensure that moments of reflection make a constructive contribution to the project. However, this welcomed openness brought with it a conflict for the industry partners of the project: how openly could they share technical detail without being at a disadvantage compared to their competitors? By this, a field of tension was revealed between academic and industry partners. At universities, it may be straightforward to move from 'publishing fancy things' to 'achieving something good through research', whereas companies are guided by competitive advantages. One participant suggested that it could also be advantageous for a company to be ahead of others when it comes to questions of animal welfare. However, it was argued for this to be true, attention to animal welfare would have to be a competitive advantage first.

Project partners were unanimous about who needs to be involved in the reflection process. As indicated above, it became clear that institutional boards or committees were not seen as sufficient to stimulate genuine reflection. All groups argued for a transdisciplinary approach in which 'everyone' is involved. However, who was meant precisely by 'everyone' seemed more difficult to define. This question formed an ideal link to the following activity, the Stakeholder Tokens exercise.

Stakeholder tokens exercise

All groups regarded the animal as a central stakeholder in the project. In one group, it was also labelled first and placed in the centre of the sheet of paper. In addition, the project partners identified the following stakeholders: the IMAGEN project itself, researcher, technician, breeder, farmer, advisor, veterinarian, neighbour, data manager, data authority, government, the EU, political party, research funding body, NGO, ethicist, activist, retail, slaughterhouse, media and society. The earth was chosen as stakeholder by one group, as it was assumed that the activities of the IMAGEN project would have a certain ecological footprint. However, an assessment of the environmental impact of the activities is not included in the research programme. This point was also mentioned during the plenary wrap-up. Several participants stated that future programmes should take into account the environmental impact of the research activities and results.

The three groups used different ways to visualise the relationships among the stakeholders. One group, for instance, drew smaller, individual or larger, shared islands on which the stakeholders were placed, depending on their assumed affinity. In another group, the tokens were arranged in clusters according to their proximity or distance to each other. The breeder, the technician and the researcher for instance were perceived to interact closely and were therefore placed in a dense cluster together with the project itself. One participant stated that it was difficult to organise the stakeholders and their interrelations on a two-dimensional sheet of paper. Creating a 3D model would be a more suitable option. Interestingly, the ethicists was put at the edge of the broadest cluster. They were also the only connection to society and the media, which were both placed in a separate cluster, outside the project clusters.

Re-seeding — follow-up strategies to sustain ethical reflection

During the plenary wrap-up, project partners expressed several ideas and suggestions on how to proceed with the integration of ethical reflection into the IMAGEN project. They agreed that the workshop contributed to creating awareness, knowledge and understanding of the socio-ethical question related to

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the project topics. The activities also helped participants to be aware of and to acknowledge the plurality of stakeholders, their interests in and their views on these topics. A key concern was that the aspects discussed during the workshop need to be further implemented into the participants' daily work- and research practices. This would require critical, conceptual thinking. One's own values would need to be made explicit and one should not be discouraged by the argument that something is 'not feasible'. It was proposed to plan future activities to practice and deepen the reflection process by discussing cases relevant to IMAGEN.

As a follow-up to the workshop, we conducted a student project to, among other things, gain more detailed insights into (1) the participants' impression of the workshop, (2) the normative questions project partners face in their daily work on the IMAGEN project, and (3) desired formats for future activities to encourage ethical reflection. The project partners were interviewed individually on these aspects. In summary, the interviewees confirmed their positive feedback regarding the workshop. It was perceived as a constructive but also as a new approach that ethical reflection was involved in the research project from the beginning and in a tangible way. As practicing ethical reflection was perceived as something new, participants wished for more attention to be paid to it. The normative questions addressed by the project partners, if they identified any, were specific to their own professional niches. One breeder, for instance, was concerned about whether and how novel breeding strategies could be used to improve animal welfare, whereas an animal scientist was questioning their responsibility for animals in research. The fact that project partners do not immediately consider the questions that are important in the overall societal context of the project, shows that there is still room for improvement in the level of collaboration among the individual work packages. Several interviewees expressed the interest in acquiring skills to implement the knowledge obtained during the workshop into practice. In some cases, this was phrased in terms of concrete learning objectives, such as how to fill in an application for a permit of an ethics committee or how to lead discussions on socio-ethical aspects in research meetings or with citizens. This should be addressed in future activities by offering participants some guidance, but focussing on stimulating their own critical thinking.

The results of the workshop and the student project demonstrate that playful, hands-on activities in mixed groups with project partners from different backgrounds are appreciated in order to practise dealing with socio-ethical questions in research and innovation. For the IMAGEN team, it is also vital that the exercises are explicitly linked to the research activities of the respective partners. One aspect that should not be underestimated is the role of a facilitator. A facilitator is not only essential to organise activities that foster reflection, but also for ensuring the continuity of such joint development processes throughout the project and beyond the individual work packages. In the case of the IMAGEN project, our next step will be to plan an activity that builds on the workshop presented here by inviting the project partners to reflect on concrete cases in a creative way.

Conclusions

In this paper we present useful tools for the practical implementation of transdisciplinary collaboration in a multi actor research consortium. Practical exercises with which participants can relate combined with facilitation efforts are key to stimulating transdisciplinary collaboration in challenge-oriented research programmes. For the IMAGEN project, this approach means progress in reflecting on ethical challenges within the entire consortium and a contribution to sustainable innovation for animals in food production systems.

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