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How to Move Towards a Common Understanding of Progress? A Transdisciplinary Exercise Involving 10 Young Researchers

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Abstract

Early career (doctoral and postdoctoral) researchers often lack experience with transdisciplinary research

despite their interest in tackling societal challenges with colleagues. Engagement in transdisciplinary research may not be an obvious choice because of limited support from their academic environment, difficulties of publishing, or a lack of suitable methods. In this work, we focus on the last. In order to evaluate several possible methodologies, we brought together a group of 10 young researchers from various disciplines to consider the question 'What is progress?'. They examined this question via essay writing, a workshop, and a full-day colloquium, using methods that were based on examples from literature. After this process, input from the participants was gathered by means of a survey. Here, we provide an evaluation of existing methods and introduce four new methods: orientation exercise, census, individual reflection, walking consensus. Our results show that such a transdisciplinary exercise can readily be performed by a group of young researchers if the process is methodologically well structured, opening up opportunities for integrating such transdisciplinary insights in early career research.

Key words

Transdisciplinarity, Progress, Sustainability, Actor constellation, Transdisciplinary collaboration

1. Problem statement

The scientific search for sustainable solutions for global challenges needs a collaborative approach. But how can researchers work together and engage with each

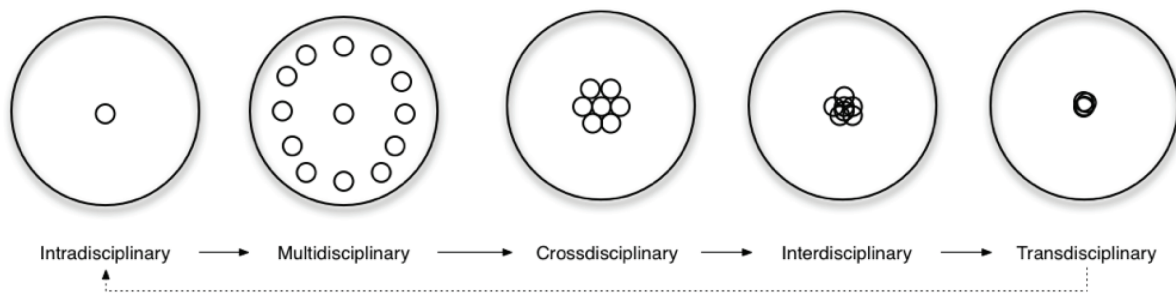


Figure 1. The differences between intradisciplinary and polydisciplinary approaches. *Source: Jensenius, 2012*

other to reach comprehensive results? There is a trend in universities and research centers around the world to join efforts in tackling global challenges such as climate change and social inequality, which are major issues facing our planet of such a magnitude that no single institution or organization can address on its own and that require the pooling and sharing of knowledge across institutions, disciplines, and continents.¹ In order to develop new scientific insights for providing sustainable solutions for global challenges, scientific research needs to become more mission- and system-oriented, responsible, and transdisciplinary.²

Different approaches exist for moving beyond a disciplinary approach to carrying out scientific research. A distinction can be made between intradisciplinary and what we label as polydisciplinary approaches (see Figure 1). Polydisciplinary can refer to multi-, cross-, inter-, and transdisciplinary approaches. Jensenius (2012) defines the different types of disciplinarity as following:

- Intradisciplinary: working within a single discipline.
- Multidisciplinary: people from different disciplines working together, each drawing on their disciplinary knowledge.
- Cross-disciplinary: viewing one discipline from the perspective of another.
- Interdisciplinary: integrating knowledge and methods from different disciplines, using a real synthesis of approaches.
- Transdisciplinary: creating a unity of intellectual frameworks beyond the disciplinary perspectives.

The field of sustainability is in essence approached as a transdisciplinary one, because transdisciplinary research refers to the emergence of a new discipline out of the transcendence of disciplinary boundaries. Additionally, according to Ramchandani (2017), transdisciplinary research involves non-academic agents as

(equal) participants in the process of searching for a solution to a societal problem. Transdisciplinarity ‘combines interdisciplinarity with a participatory approach’ (Ramchandani, 2017). It goes beyond synthesising new knowledge from existing disciplines and ‘relates all disciplines into a coherent whole’ (McGregor, 2004).

From practical experience and some indicative surveys (Zenner *et al.*, 2016) we notice that pre- and postdoctoral researchers are ill-equipped to join the latest scientific evolutions in transition thinking and responsible research and innovation (RRI).³ The same may be true for researchers who are at a more advanced stage of their career. While many students and researchers are very interested in tackling grand challenges with regard to collaboration across disciplines and interaction with society, they find themselves lacking a methodological framework for doing so. Moreover, the context in which young researchers are trained emphasizes the importance of discipline-specific publications. As a result, young researchers are left with little time and are not incentivised to dedicate time to activities that go beyond their own discipline. Therefore, the practical exploration of different transdisciplinary methods can facilitate the inclusion of such transdisciplinary insights in different forms of research. Moreover, these methods might even aid the transition toward the scientific analysis of grand challenges, including challenges relating to sustainable development.

2. Question

Given the young researchers’ identified lack of experience with collaboration across disciplines and the context in which their work and evaluations take place, how can transdisciplinary collaboration be facilitated to build a shared understanding and discuss grand challenges, and which methods might be suited for this?

Many methods have been developed to facilitate a dialogue between and build a shared understanding among actors with different backgrounds and opinions, such as the Delphi and actor constellation.⁴ In the present study, the authors used those methods as a source of inspiration for organizing a transdisciplinary dialogue among early career researchers at KU Leuven. The aims of this paper are to report on the different methods used, and to evaluate their effectiveness in facilitating dialogue among young researchers. The following section briefly summarizes the different steps taken by the authors to set up a dialogue and to build the necessary shared understanding. Section four discusses these methods' effectiveness, based on the results of a survey conducted with the participants after a one-day colloquium. The final section summarizes our reflections and conclusions on the process that was used.

3. Methods

Our aim was to facilitate dialogue between and build a shared understanding among actors with different academic backgrounds and opinions. As it was our first time utilizing a transdisciplinary methodology, we opted for a broad topic which is accessible to scientists from different disciplines and ripe for discussion. By common consent, the central question selected was 'What is progress?'. During the process, this open question was fine-tuned into the more concrete question of what constitutes a 'good life' for all people, inspired by the article by O'Neill et al. (2018).

The initiative in organizing this project was taken by the YouRSS (Young Researchers' Society for Sustainability) core group. Two members carried out a pre-study and acted as the moderators throughout the program. These persons had some experience with cross-disciplinary research but were not experts. They selected suitable methods based on existing literature and online databases. Inspired by the existing methods, slightly altered or entirely new methods were introduced (e.g. orientation exercise, census, individual reflection, walking consensus). They also concluded that a multi-stage program would be preferable: a writing exercise, a preparatory workshop, followed by a full-day colloquium.

Multiple methods were used during repeated and evolving dialogue games throughout the process, rather than young researchers entering into a one-stop dialogue in which the topic is discussed in one long

and unstructured conversation (see Figure 2). The methods introduced are transdisciplinary because they exist outside the scope of existing frameworks of the respective disciplines. At the same time these methods have a low threshold and facilitate the participation of non-academic experts, leveling the field between academic and non-academic experts alike. The methods used were mainly inspired by and adapted from the transdisciplinary methods of the td-net Toolbox for co-producing knowledge.⁴

3.1 Preparation

Participants were recruited by means of e-mail and Facebook announcements to the YouRSS community, posters in various faculties of the University, and oral communication. This approach introduced selection bias, as only researchers with a strong interest in transdisciplinary research chose to participate. Initially, 11 participants subscribed, one of whom resigned after the first workshop due to time restrictions. The distribution among disciplines was not perfectly balanced: three people had a background in historical sciences (Figure 3). There was a good balance between humanities, social sciences, and STEM, but only one person from biomedical sciences was involved.

Upon subscription, the participants were asked to individually write an essay of 500-1000 words answering the (intentionally broad) question 'What is progress?'. These essays were bundled and sent to all participants before the start of the first workshop.

Box 1 Individual essays as a preparatory exercise

The essays helped to gain insights regarding the participants' viewpoints on the topic, both for the organizers (in order to prepare the first workshop) and for the participants. However, a downside of reading the essays before preparing the workshop and the colloquium could be that, from the beginning of the process, important viewpoints of disciplines which were not represented in the participant group were excluded.

3.2 Workshop

A first three-hour workshop was held after working hours. The objective of the workshop was threefold: (i) to familiarize ourselves with the conceptualizations of

Figure 2. Overview of the different steps taken in the transdisciplinary exercise.

(More than) Recruitment	Workshop	Colloquium	Valorisation
<p>Objectives:</p> <ul style="list-style-type: none"> Recruit young researchers to participate in the exercise Collect viewpoints on a topic from multiple disciplines <p>Activities: Essay (500-1000 words)</p> <p>Outcome: participants reflected upon their own viewpoints and were introduced to viewpoints from other disciplines</p>	<p>Time: 1 evening</p> <p>Objectives:</p> <ul style="list-style-type: none"> To become familiar with the conceptualizations of progress from different disciplines To collect points of disagreement To collect points of agreement <p>Activities:</p> <ul style="list-style-type: none"> Orientation exercise Actor constellation Census <p>Outcome:</p> <ol style="list-style-type: none"> participants were able to get to know each other's viewpoints and to align terminology and understanding of certain concepts which might be different between disciplines participants were able to gain insights into the group's attitude towards specific theses. It proved to be an effective method to distinguish points of agreement from points of disagreement within the group 	<p>Time: 1 full day</p> <p>Objective: to come to a shared understanding of what a good life for all means</p> <p>Activities:</p> <ul style="list-style-type: none"> Individual reflection Walking consensus Framework building <p>Outcome:</p> <ol style="list-style-type: none"> Participants reflected upon their own understanding of what a good life for all means Participants listened to everyone's viewpoints and perspectives Participants built and share frameworks 	<p>Time: 4-5 months</p> <p>Objective: To valorise the methods used during the whole process</p> <p>Activities:</p> <ul style="list-style-type: none"> Send out a survey to the participants to investigate their motivation and experience with the methodology used Analyzing and summarizing the results in this paper <p>Outcome:</p> <ol style="list-style-type: none"> Participants reflected upon the methods of and experiences with transdisciplinary research Participants valorized the methods used during the process and time dedicated to the whole process by writing a paper

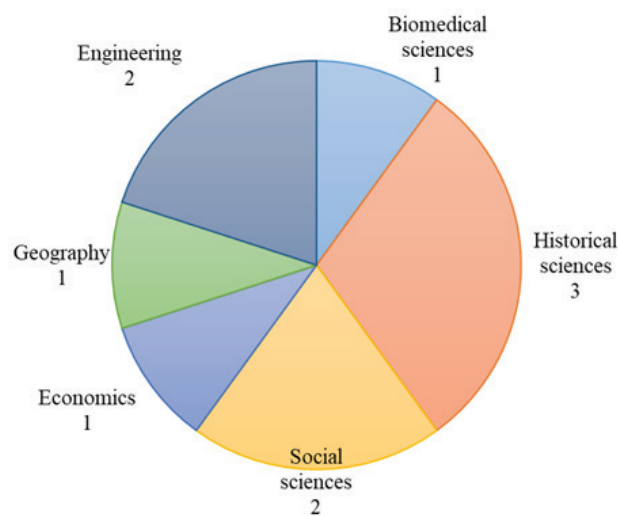


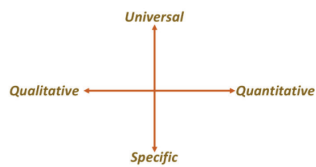
Figure 3. Distribution of participants according to discipline.

progress from different disciplines, (ii) to collect points of disagreement and (iii) agreement. Three tools were used: an orientation exercise, actor constellation, and census.

Orientation exercise

As an orientation exercise, the participants were asked to position themselves physically on a graph drawn on the floor of the venue. The x-axis represented the qualitative versus quantitative assessment of progress, whereas the y-axis represented whether the indicators of progress are universally accepted rather than context-specific. After the participants placed themselves on the graph, they were each asked to explain their choice, followed by a discussion. After the discussion, the participants had the opportunity to change their position on the graph.

Box 2 Orientation exercise



This exercise was particularly useful for getting to know each other's viewpoints and to align terminology and understanding of certain concepts which might be different between disciplines. As this exercise created a clear overview of the perception of progress of each participant, we advise using this exercise at the beginning of a transdisciplinary process. The exercise could also be repeated at the end of the process to have an overview of how the transdisciplinary collaboration influenced the group's ideas. A potential drawback of this methodology is the framing of the problem along a limited set of two dimensions. This approach risks narrowing the discussion down too much.

Actor constellation

The second part of the workshop consisted of an actor constellation exercise as described by td-net.⁵ While this is a commonly used method for identifying relevant societal actors to involve in a certain research project (Pohl et al., 2017), the exercise was used here to identify which factors had to be taken into account when researching progress. The central question was

'What contributes to progress?'. The candidates each wrote down three factors on post-its which, according to them, contribute to progress and positioned them around the central question. The closer to the question the more the factors contributed, and the closer to each other the stronger the factors are connected. After all post-its were positioned, a round of discussion was held after which the participants had the opportunity to relocate, remove, or add post-its. If a participant did not agree with (the position of) a post-it in the end constellation a red dot was pasted on it.

Box 3 Actor constellation



Due to its open character in combination with a visual representation, this methodology was very good for stimulating a broad discussion in a structured way. It was therefore a useful method for the first workshop. However, it should be very well structured by the moderators to have a useful, concrete outcome. Here, most factors were deemed 'equally important', leaving the group virtually undecided.

Census

As a last exercise, several statements were proposed to the group, after which the participants were asked to position themselves: the closer to the speaker, the more they agreed with the statement, the further away the more they disagreed. Subsequently the participants were given time to explain their viewpoint and have a discussion, after which they were allowed to change their position. Finally, the average 'agreement score' was written down for future reference. This exercise is loosely based on the Toolbox Approach exercise presented in td-net's toolbox, where participants are asked to first respond individually to statements, after which a group discussion follows.⁶ To add a visual dimension to the exercise we added the aspect of physically positioning oneself closer to or further away from the question.

The following statements were used (translated from Dutch):

- The university should contribute to progress.
- The university should see contribution to progress as its main task.
- The university contributes to progress.
- The university/academic research is the most important driver of human progress.
- We (= everyone) should strive for progress.
- Europe is an example for the rest of the world when talking about progress.
- There is a need for new indicators (instead of BNP) which quantify progress.
- A person can live a happy, meaningful life only in a modern and developed country.
- I prefer a meaningful and happy but short life over a long, healthy but boring life.
- Over 50 years we will adapt our idea of progress and pursue other goals than we do today.
- ‘Sustainable development’ is the best summary of progress today.
- The more you have, the more you want: thus, real progress is not possible.
- Some day we will reach an optimal society and further progress will not be needed.
- We booked a lot of progress in the last 100 years.
- Climate change is proof that progressive thinking is detrimental.
- With my research I contribute to progress.
- My colleagues contribute to progress with their research.

Box 4 Census



The census exercise, much like the orientation exercise, was perceived as an effective way of creating an overview of the participants' viewpoints. However, where the orientation exercise provided an overview of the position of the participants towards the general topic of progress, this census exercise provided insights into the group's attitude towards specific theses. It proved to be an effective method to distinguish points of agreement from points of disagreement within the group. It is, however, less suited to synthesizing viewpoints and come to an overall common understanding of a topic. Interestingly, this exercise provided more room for personal opinion, in contrast to the orientation exercise (Box 2), which was rather discipline-oriented.

Box 5 Introductory workshop

It was very effective to hold a short workshop before the actual colloquium. This was an exquisite opportunity to get to know each other's positions and allow the discussion to be conducted broadly, before narrowing it down during the colloquium with proper preparation. This approach is time-efficient as it allows for many different viewpoints, while also preventing 'runaway discussions' during the colloquium.

3.3 Colloquium

The workshop made clear that a question such as 'What is progress?' is a very interesting starting point and spurs discussion, but is too broad to reach a concrete output as a group. We decided that, in order to work towards a common goal, such a concrete output would be helpful. Therefore, after consideration of the discussions of the first workshop and inspired by a relevant article published in *Nature Sustainability* (O'Neill *et al.*, 2018), the topic was narrowed down to 'A good life for all within planetary boundaries'. During the

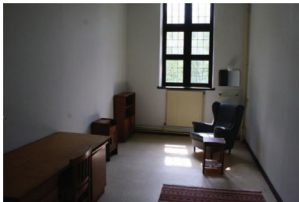
two weeks between the workshop and the colloquium, the participants discussed this article and its underlying assumptions online in a closed Facebook group. This discussion was summarized by the organizers into a schematic, visual framework.

Two weeks after the first workshop a full-day colloquium was held in a university building (the 'Stiltehuis') without internet access. The main objective of the full-day colloquium was to come to a shared understanding of what 'a good life for all' means. At first, a visual framework summarizing the online debate was reviewed and points of discussion were indicated.

Individual reflection

Subsequently, each participant was sent to a separate room with the instruction to read the article by O'Neill *et al.* again, but this time with a specific focus. Half of the group focused on the question 'What is the ultimate cause which we, as humanity, should strive for?'. The other half pondered the question 'What are the analytical shortcomings of the article?'. After thirty minutes, the individual findings were discussed in a plenary session. For each of the two questions, one person was assigned as the 'secretary'. He/she was not allowed to participate in the discussion but had two privileges: the secretary decides when the discussion is finished and has the last word. It was his/her responsibility to write down a synthesis of the discussion.

Box 6 Individual reflection



With this method, participants were forced to structure their thoughts before being influenced by a group discussion. It was therefore a good exercise to start with, as it preserves the large diversity of viewpoints. By assigning a secretary for the group discussion afterwards, a structured answer to each question was obtained, rather than a set of individual answers.

Walking consensus

During the second part of the colloquium, the participants were divided into pairs. Each duo discussed the question 'What is a good life for all and how can it be reached?' while walking in the venue's garden. The pairs had to come to a consensus in ten minutes, after which new pairings were formed. Each participant had to discuss the previous consensus with his/her new partner. In total the pairings were reformed three times. Finally, the overall consensus was written down in the presence of the whole group. This exercise was inspired by the Delphi method,⁷ in the sense that an iterative process was used in order to come to a group consensus. The Delphi method is well described and often used in transdisciplinary research for problem framing and first analysis (Mahajan, 1976).

Box 7 Walking consensus

This iterative exercise was very effective in building a shared understanding throughout the whole group. By splitting up into smaller groups, everyone's voice was heard and everyone was forced to understand the perspective of their discussion partner. In addition, as it was a walking exercise the mind was stimulated and it was a welcome variation on seated discussions.

Framework building

At the end of the colloquium all participants were asked to individually design a framework visualizing a 'good life for all and how to reach it' based on the framework presented at the beginning of the day and new insights gained during the colloquium. Afterwards, the frameworks were presented to the group and feedback was given.

Box 8 Framework building



A visual schematic is a good way to summarize the day's findings. Ideally, this would have been an iterative exercise, in which feedback was

taken into account to produce a new framework, followed by another group discussion. However, due to time constraints this was not possible. Thus, this exercise resulted in a set of schemes, sometimes closely related. We would, therefore, advise repeating this exercise several times, preferably forming ever larger groups after each round. This could lead to a limited set of only one or two frameworks.

At the end of the project, all participants were asked to anonymously fill out a form evaluating the methodology of the project.

3.4 Survey of participants' motivations and opinions vis-à-vis the methods used

Prior to the start of the project, participants were asked why they wanted to join (Figure 4). Nearly all participants expressed a general interest in the project and/or in transdisciplinary research. Most of them also mentioned the interaction of different perspectives and the feedback

they could get on their own viewpoints. The same question was asked after the colloquium. The responses were similar, with one exception: more people now recognized the topic to be relevant for their own research. This indicates that the methods used at least simulated the connection between the broad challenge on progress and the research interests of the individual researchers.

At the end of the project, a survey was sent to all participants and was filled out by all (n = 10). The responses show that all unanimously agreed the used methodology to be a requirement for transdisciplinary collaboration (Figure 5). None of the respondents thought a conventional discussion would have been sufficient. 8 out of 10 'agree' or 'strongly agree' that the methodology led to better insights. Moreover, 6 out of 10 'strongly agree' that it was fun doing research this way.

All respondents also positively evaluated the format of the colloquium (Figure 6). They all (strongly) agreed that a full-day colloquium is an efficient way of working which leads to deeper insights. The location also appears to have been very important (4 out of 10 'strongly agree'). 8 out of 10 would join another such colloquium if given the opportunity.

The opinions were more diffuse when participants were asked about the ease of collaboration (Figure 7). 4 found it hard to truly understand the others ('agree'), others did not. 8 (strongly) agreed they had learned a lot through the collaboration, but 2 people responded 'neutral' to this question. 4 agreed the interaction should have been more interdisciplinary, 4 responded 'neutral,' and 2 did not agree. 2 participants who agreed with this statement also replied 'agree' to the question, 'It was hard to truly understand each other'. This indicates that those people expect a better understanding through more intense collaboration. Remarkably, only 2 people did not find it hard to find time to spend on the project, whereas 3

indicated 'disagree' although they were supported by their daily colleagues and supervisor in spending time on it. Conversely, 5 'strongly agree' that they were supported by their colleagues and supervisor. This result confirms earlier survey findings about the need for time and support beyond the regular, disciplinary cadres and beyond the specific methodology used (Zenner *et al.*, 2016).

Overall, nearly all respondents found the project to have added value (Figure 8), with the caveat that 3 out of 10 would consider the project a success only after a publication resulted from it. There was no clear correlation between the respondents' answers about time commitment, support from colleagues, and a resulting publication.

These responses indicate that transdisciplinary research is valuable and requires specific methods to stimulate interaction. For the topic investigated here, the full-day colloquium turned out to be a good format for collaboration. However, the participants are not unanimously positive about the ease of collaboration and the extent of transdisciplinary interaction. Finally, the largest obstacle to be overcome for this kind of project appears to be time. It was very hard to plan joint meetings and achieve a consistent input of effort on this project. At least for some of the participants, this seems to be (in part) due to the limited support they got from their direct academic environment. About half of the respondents feel that their time commitment should result in academic return in the form of a publication. We note that these results are obtained with a group of young researchers who were open to transdisciplinarity from the start. The evaluation could be entirely different when students, tenure-track academic staff, or established professors were involved. Also, it stimulates a further inquiry into transdisciplinary methods that are particularly time-efficient.

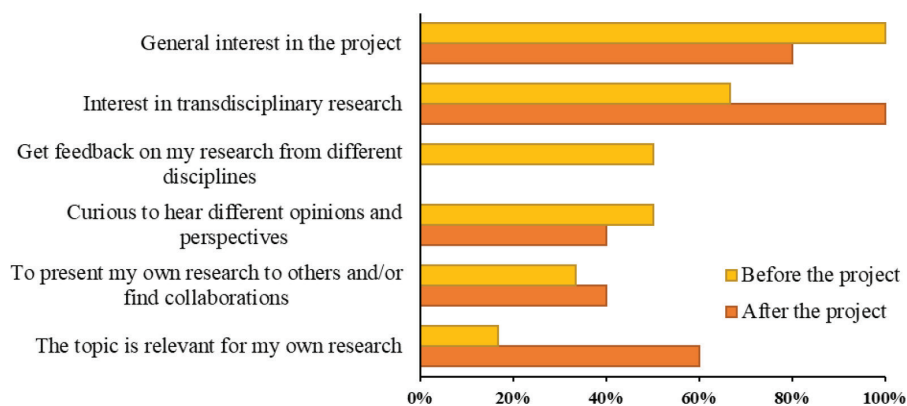


Figure 4. Answers given by participants to the open question “Why do you want to join this colloquium?”. This question was asked both before the start of the project (n = 6) and after the colloquium (n = 5).

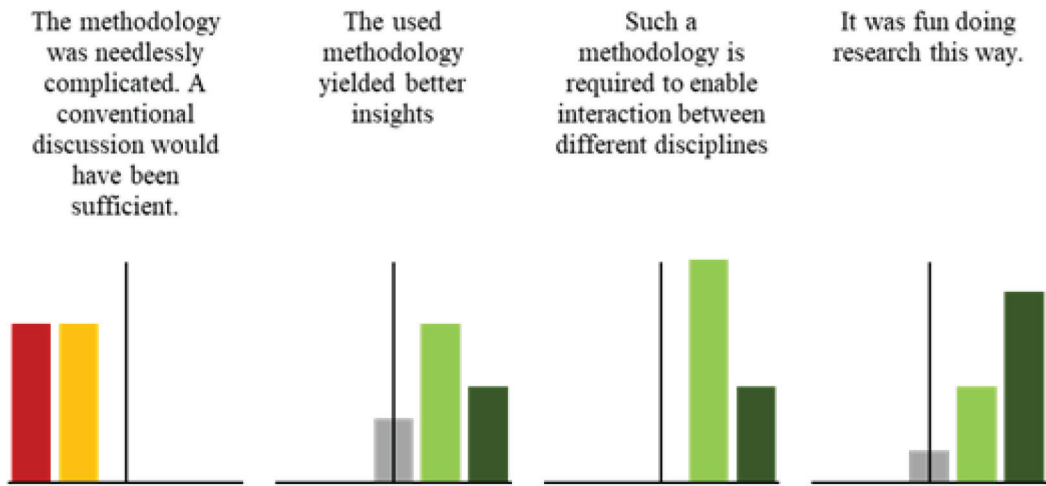


Figure 5. Participants' evaluation of the methodology used during the colloquium, at the end of the project. (red = 'Strongly disagree'; yellow = 'Disagree'; grey = 'Neutral'; light green = 'Agree'; dark green = 'Strongly agree')(n = 10)

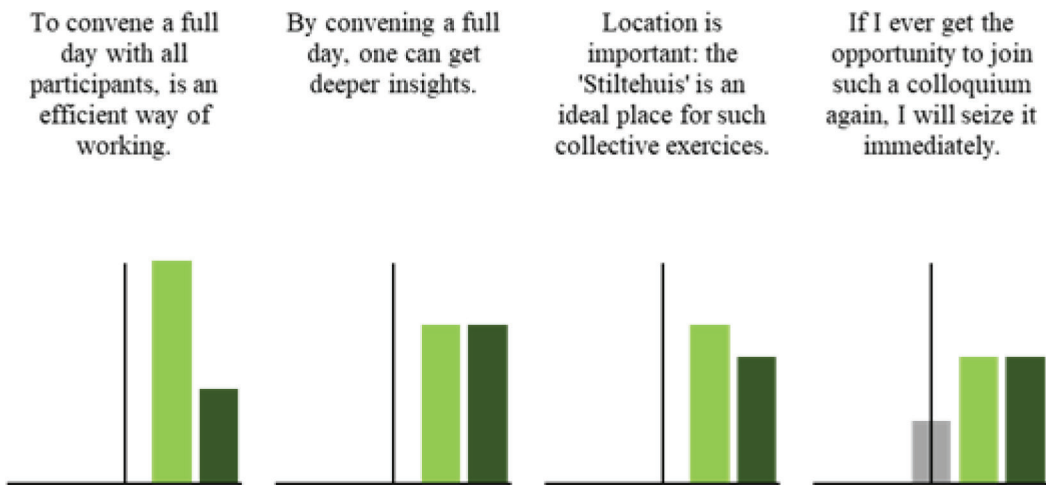


Figure 6. Participants' evaluation of the colloquium, at the end of the project (red = 'Strongly disagree'; yellow = 'Disagree'; grey = 'Neutral'; light green = 'Agree'; dark green = 'Strongly agree')(n = 10).

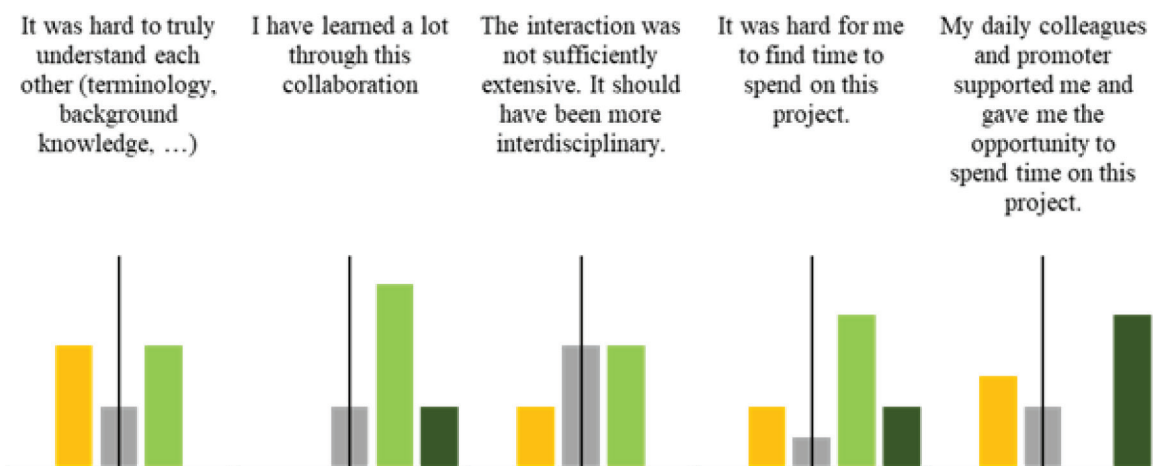


Figure 7. Participants' evaluation of the collaboration, at the end of the project (red = 'Strongly disagree'; yellow = 'Disagree'; grey = 'Neutral'; light green = 'Agree'; dark green = 'Strongly agree')(n = 10).

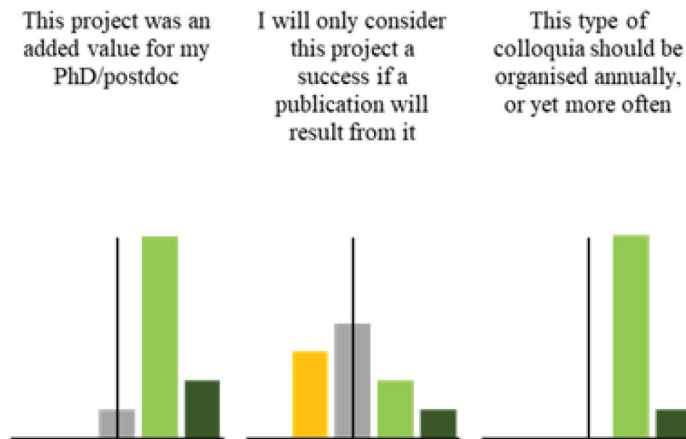


Figure 8. General evaluation of the project by its participants, at the end of the project (red = 'Strongly disagree'; yellow = 'Disagree'; grey = 'Neutral'; light green = 'Agree'; dark green = 'Strongly agree')(n = 10).

4. Reflections and conclusions

Our project shows the potential of transdisciplinary research for tackling large, complex problems. Ten young researchers jointly organised a transdisciplinary exercise on the topic of progress, despite their lack of experience or training in transdisciplinarity. The participating doctoral and post-doctoral researchers indicated the value of this transdisciplinary experience, even though they were restricted in time and background knowledge. We found that it was very useful to hold a short workshop prior to the full-day colloquium in order to downscale the scope of our topic. This helped us understand each other's viewpoints and identify points of discussion. Moreover, the use of the paper by O'Neill *et al.* (2018) was deemed a good way of narrowing down the scope of the topic for the colloquium.

The paper also shows that the presented methods, while effective, are not yet well known by researchers in general, and young researchers in particular, and that their disciplinary training is not aimed at incorporating potential transdisciplinary perspectives and participating in transdisciplinary activities/research. This shows that a clear need for additional training exists for the current generation of researchers to address complex issues that transcend disciplinary boundaries such as climate change, social inequality, and sustainability.

The issues of time and knowledge constraints combined with the proven importance of transdisciplinary approaches and the enthusiasm of young researchers at our university leads us to suggest the introduction of transdisciplinary methodologies in master's courses or at other levels in our university. Transdisciplinary initiatives have proven to be successful at several other

universities and institutes on the level of courses for master's students (ETH Zürich),⁸ and summer schools for doctoral and postdoctoral researchers (Steps Centre).⁹ Some universities have even developed entire training programs (Bosch Stiftung)¹⁰ and transdisciplinary departments (ETH Zürich).¹¹

In conclusion, given the identified need for transdisciplinary research on complex topics such as progress, this article shows that, although there are some barriers that need to be overcome, there is also potential for transdisciplinary projects within the doctoral and postdoctoral research community at our university. The methodologies tested proved a clear bonus to the exploration and pursuit of transdisciplinary research, although it remains important that these methods are sufficiently time-efficient, especially in circumstances where there is not enough institutional support for or interest in tackling grand challenges.

5. Notes

1. Worldwide Universities Network, <https://wun.ac.uk/wun/globalchallenges>, accessed 15/10 2018.
2. Interdisciplinarity (academic collaboration across disciplines) is one indispensable aspect. However, in many cases transdisciplinarity (also involving non-academic experts ('practitioners')) is required.
3. According to the European Commission RRI means that 'societal actors work together during the whole research and innovation process in order to better align both the process and its outcomes, with the values, needs and expectations of European society' (EC, 2012). In a broader sense RRI is defined by Stilgoe *et al.* (2013) as 'taking care of the future through collective stewardship of science and innovation in the present'. Both definitions are derived

from deliverables of the FoTRISS project (<http://fotrris-h2020.eu/>, accessed on 04/02/2019).

4. An overview can be found in td-net's Toolbox for co-producing knowledge (https://naturalsciences.ch/topics/co-producing_knowledge, accessed 04/02/2019).
5. https://naturalsciences.ch/topics/co-producing_knowledge/methods.
6. https://naturalsciences.ch/topics/co-producing_knowledge/methods/td-net_toolbox/idaho_toolbox.
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