Jun 25th, 9:00 AM

Ethics, design, and creativity: A fruitful combination

Wouter Eggink
University of Twente, the Netherlands

Steven Dorrestijn
Saxion University of Applied Sciences, the Netherlands

Karin van der Heijden
Saxion University of Applied Sciences, the Netherlands

Ilse Ouwens
Cibap, Vocational School for Design, the Netherlands

Ethics, design, and creativity: A fruitful combination

Wouter Eggink[a],*, Steven Dorrestijn[b], Karin van der Heijden[b], Ilse Ouwens[c]

[a]Interaction Design group, University of Twente, The Netherlands
[b]Ethics & Technology group, Saxion University of Applied Sciences, The Netherlands
[c]Contextual Awareness group, Cibap Vocational College for Design, The Netherlands

*corresponding e-mail: w.eggink@utwente.nl

Abstract: In the context of the designers responsibility for the impact of technology, ethical considerations are important. However, these considerations are often seen as limiting innovation and the freedom of the designer. Is it possible, on the contrary, that ethics can also foster creativity in design? The research project Tech-Wise is about a practice oriented approach in ethics; developing tools to engage people with ethical deliberation on the impact of technology. One result of the project is a workshop format for stimulating ethical deliberation that can be tailored to particular technologies and design disciplines. We argue from the results of one particular instance of this workshop format that such an approach to ethics has a fruitful reciprocal effect. It can stimulate creativity in design by enriching the question about the purpose of an innovation, and the other way around enrich ethical reasoning by opening up to often surprising impacts of technologies.

Keywords: ethics of technology; creativity; impact of technology; ethical deliberation

1. Introduction: Ethics of technology, in action, for creativity

Designers have social responsibility by the very nature of their activities; bringing new products and services into the world of the user. As Papanek has stated so eminently:

> "It is important to remember that architecture and design are the social arts par excellence. It is possible to avoid theatre and ballet, never to visit museums or galleries, to spurn poetry and literature and to switch off radio concerts. Buildings, settlements and the daily tools of living however, form a web of visual impressions that are inescapable." (Papanek, 1995, p.174).

This responsibility calls for ethical awareness in the practice of design, as designers will be inevitably influencing the context of people and society for better or worse. Other than architecture, which is mainly influencing spatial context, design is considered with technologies that can influence people and society on any level. From concrete changes in how we see the world around us (when for instance buying new multi focal glasses for reading our laptop screen) to very abstract changes in how we think about life and death (when for instance developments in prenatal diagnostics are influencing our ideas about

health, disease, and reproduction (Verbeek, 2011a)). This responsibility also stretches from individual users, via the dynamics of social groups, to the bigger social structures of society (Eggink, 2014; Eggink et al., 2020).

Given this vastly stretching responsibility, ethics is often addressed as a way of dealing with this, setting the boundaries of what is a good thing to do and what not. In this sense however, ethics can also be perceived as limiting, trying to keep things as they are and merely warning for the changes that new developments can bring. For design, this often feels as limiting and compromising the creativity. It can appear as if one is not allowed to think of the undesirable, let alone present it to others. However, this is not necessarily so. One can imagine on the contrary, that by importing new and different values novel territories in the solution space can be explored. We think therefore, that with purposely addressing complex and controversial ethical issues with design, we can make the inherent dilemmas of technological development clear and visible. Thus paving the way for a critical assessment of these developments and moreover, for enabling creativity in dealing with the accompanying ethical questions.

In this paper, we will present an example of such integration of ethical deliberation in the creative practice of design, based on the experiences with a small workshop called "packaging the wonderberry".

2. Ethics and design

In the past decade, several scholars in philosophy of technology have proposed that ethics can be more constructive than merely drawing the red line (Ihde, 2002; Brey, 2010). Instead, ethics is presented as an activity of critical accompaniment of technology development. A clear example of this is the concept of ethics in technology by Verbeek (2006). Here, the thorough inspection of technological developments *when they are actually happening* is proposed as a basis for ethical considerations about these technologies. Later, Verbeek coupled this approach more concrete to design when he coined the idea of "technology design as experimental ethics" (Verbeek, 2013, p.83) where he argues that by carefully assessing, anticipating, and eventually *shaping* the influences of technology, designers can take responsibility for the inevitable changes (for better or worse) they will bring to the lives of people. Despite the merits of such ethical accompaniment, the crux remains that the ethical evaluation stays at the side. For designers this can feel as if the ethical evaluation is monitoring -and eventually taking control- of their development. One can critique therefore with Sonneveld that:

> "ethical reflection in design, considering values such as wellbeing, safety, autonomy, responsibility, and so on, is often a theoretical perspective: focussed on abstract users and abstract use situations (Dorrestijn, 2009; Verbeek, 2011b; Dorrestijn & Verbeek, 2013). Although illustrated with concrete examples, the theory remains theoretical, searching for a general position a designer should develop towards users." (Sonneveld, 2014, p.87)

One way to overcome this theoretical perspective on ethics "from outside" is to focus on the development of the designer as a person, and promoting the awareness of both personal and professional values (Hiort af Ornäs & Keitsch, 2016; Ledsome, 2019). We recognise this direction as highly valuable, however also want to advocate the development in the opposite direction; closer integration of ethical awareness in the creative practice of the designer. To do so, we will start with extensively discussing an example of such a creative practice.

3. "Packaging the wonderberry" workshop

The example that we will discuss here is a workshop that was developed in the context of the Dutch research project "Tech-Wise" (in Dutch "Wijs met Techniek", meaning both wise with technology as well as pleased with technology). This project explores ethics education from a tool-based, practical perspective (Heijden et al., 2021a). The aim of the project is to develop a package of creative materials, together with the various engineering disciplines, consisting of concrete ethical exercises and assignments that can be used as a continuous learning line throughout the curriculum. One of the outcomes of this project is a general format for a short workshop on ethics for engineers. The workshop format consists of four activities: orientation, research, select and design (Heijden et al., 2021b). Each activity can then be tailored to the specific discipline, the knowledge and skills, and the level of expertise of the participants. In the project we have also identified four important ingredients for an effective workshop; 1) an ambivalent (or controversial) technology; 2) an application close-by (or appealing to the interests of the participants); 3) a concrete (design) activity and 4) the 'right' questions to ask (Eggink et al., In Print).

In the "packaging the wonderberry" workshop the central technology (the first ingredient) is little pills that shift your taste. These pills, based on a natural ingredient from miracle berries, make that sour will taste sweet. This effect is then supposed to make you eat healthier because one would need less sugar. The pills are marketed accordingly (figure 1). One can imagine that this 'technology' is mildly controversial and that it at the same time gives opportunity for hands-on experimentation, coming close to the everyday experience of the participants (ingredient number two). We assumed it therefore very suitable for an engaging introduction into ethical deliberation. For the concrete design activity (ingredient number three) the participants are then asked to create a packaging for the product. One can easily predict that it makes a difference if one packages and presents these tablets in a medicine blister, a sachet for sweets, a bowl of fruits or as a party drug with a smiley embossed. Based on the presented packaging designs, the ethical implications can then be discussed. Considering this fourth ingredient, the right questions to ask, we will come back to that later in the section on questioning means and ends. We will first present the workshop and its results in detail.

Figure 1. Cover of the Miracle Berry diet cookbook *by Homaru Cantu (Merwin, 2013), a renowned innovative chef (Morris, 2018). It states on the cover: "Lose weight without sacrificing 'sweets'". Next to that a selection of existing Miracle berry capsule packagings on the market. In the workshop we made use of the "Miracle Frooties" bottom left.*

The complete set-up of the workshop looked like this:

- 13.30 - Welcome and Introduction.
- 13.40 - Sense based design warming-up exercise: the participants are handed out their 'own' lemon and then have to recognize it blindfolded. Then everybody can taste the lemon.
- 14.00 - handing out the pills and digesting (Do not chew!): while the participants are sucking away the pills they have to answer the question: "What am I doing, and why am I doing this actually?" When the pills were digested, the participants could taste from their 'own' lemon as well as other fruits and sweets (see also figure 2).
- 14.10 – Create a packaging in small groups, starting with a mind map or word cloud answering the question "What is this pill about?"
- 14.30 – Pitch the created designs.
- 14.45 – Explanation of insights from philosophy of technology.
- 15.00 - Reflection.

The workshop was held in a classroom of the participating school for vocational training (Cibap). For the creation of the packaging designs, several tinkering materials were available to the participants, including stickers, colourful magazines and some small pre-fabricated cardboard boxes (figure 3).

Figure 2. Workshop 'materials': left the different samples that were available for tasting. On the right one of the lemons that was served. Also visible on the plate is one of the miracle berry capsules that were handed out to the participants.
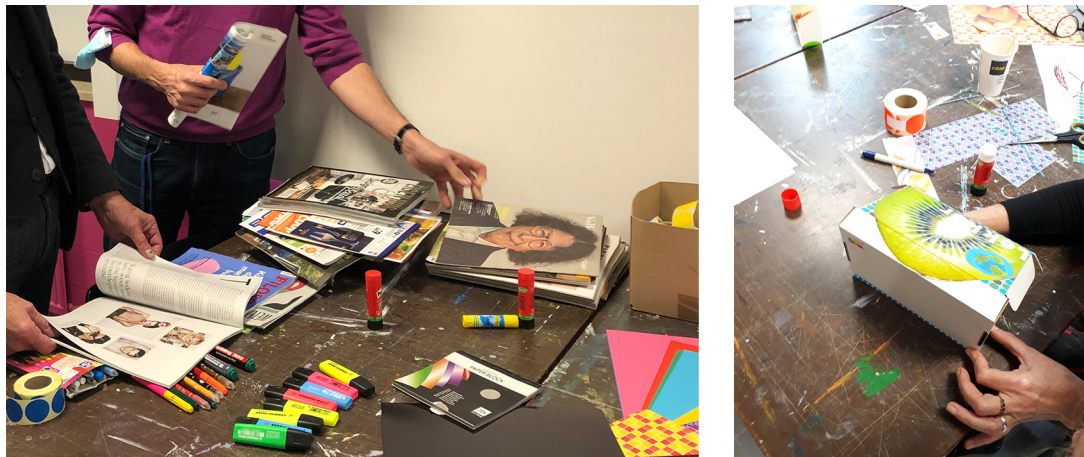

Figure 3. Participants selecting from the materials available (left) and crafting their designs with the prefabricated cardboard boxes.

4. Practical results

The workshop was held at an afternoon in a classroom of one of the associated educational institutes. Due to the enduring Covid situation, the number of participants was very limited. Nine people participated in the exercises, among which three members were organisers of the workshop. The other six participants were all professionals from different higher education institutes teaching classes for the creative industry. The workshop was executed on schedule until the discussion and reflection, which took some more time than expected due to the enthusiasm of the participants. In the end the whole session took two and a half hours. In the following we will subsequently discuss all the results of the sub-assignments accompanied by some examples. Also the resulting packaging designs will be presented, together with the explanation from the creators.

After explaining the purpose of the workshop and a short round of introduction, the participants were each handed out a lemon with the instruction to study it well. After blindfolding, four participants were asked to identify their 'own' lemon from the plate with all the lemons. From which three succeeded. After this warming up exercise, the miracle berry capsules were presented, their working was explained (deliberately without telling anything about their purpose) and all the participants were asked whether they would agree to take one. All participants agreed and while they were sucking quietly on their capsules they had to fill in the form with the 'sucking question' (figure 4).

Figure 4. Example of an answer to the 'sabbelvraag' [sucking question]*, written down while sucking on the miracle berry capsule* [question: what am I doing and why am I doing this actually?]. *In this example it says: "I suck on a little pill from which it is said that it enables me to help the group eat all the lemons later on. Why? Am I doing this? Curious, I trust it, my impulsivity".*

Some other answers to the question "what am I doing and why am I doing this actually?". The answers are listed per participant and translated to English:

- [I am] trusting Ilse and Suzette; curious about what the lemon will taste like; Why?; experiencing the unknown and not failing the [group].
- [I am] sucking; trying something new; because I am curious; because I want to experience something; because I will have a story to tell [back] at home.
- I am obeying an assignment; suck on a pink pill; expect an effect; am recording what the pill tastes like.
- I take part in an experiment and I like [to do] that.

The answers were briefly discussed and then the mind maps were filled in individually (figure 5). Without discussing the mind maps, three groups of three participants were formed to create the packaging designs.

Figure 5. Example of result from the mind map exercise "What is this pill about?". Clockwise from top: "making normal abnormal"; "curiosity"; "changing the senses"; "switch off something we deem as normal. Taking away prejudice"; "who says that we are always right (?)"

Other things that were mentioned in the different mind maps were:

- Surprising/funny; taking away [the] sour; avoiding inconvenience; manipulate nature.
- Experience; ?; to influence; to change; mindfuck.
- Miracle; sweet-sour experiment; to take away prejudice.
- To 'improve' experience of taste; to manipulate taste; to change taste; 'malleability'; additive to be able to eat something 'gross' but healthy; communicate trustworthiness to be taken in.
- To influence taste; to avoid difficult things; (not having) to adapt; earning money from people's weaknesses; awareness.
- Taking up a mind-self experiment; Guinee pigs; observing; growth mindset versus fixed mindset; starting your research from your senses.

Most of the comments are obviously about change, transformation and manipulation. Other quotes mention experimentation and research. It is striking that most of the comments are neutral or negative. Only "surprising/funny" and the quote "to 'improve' experience of taste" are straightforward positive. Although in the latter, the word improve is placed between quotation marks, which in Dutch is a popular cultural reference to irony.

After some creative crafting the three resulting designs were demonstrated and explained by the participants. The first packaging was inspired by amongst others the quotes "additive to be able to eat something 'gross' but healthy" and "malleability". The designers presented the packaging as "World of Taste", which was meant for charity initiatives to solve starvation in underdeveloped countries (figure 6).

Figure 6. Packaging design "World of Taste" with the pills inside presented as different vegetables. The blue circle on the outside should represent the globe. "Lekker" means tasteful in Dutch.

The second packaging was inspired by the quotes "mindfuck", "taking up a mind-self experiment" and "surprise/funny". The designers presented the packaging as a precious gift box with a mysterious touch (figure 7). When pulling the golden tab, a huge blister containing just one pill would be revealed. When opening the box, an intriguing image should add to the experience of "something unknown".

Figure 7. Packaging design "Mind fuck". The capsule is presented as something special to mark the 'extraordinary experience' which is emphasized by the imagery on the inside. When you pull the tab, you take out a 'surprisingly' big blister with just one pill.

The third packaging was inspired by the quotes "avoiding inconvenience" and "to avoid difficult things/(not having) to adapt". The designers presented the pill as part of the brand "Live easy!", appealing to the idea that one can always eat very fast when lacking time. Even if your favourite food is not available. Just take a sniff from the flask-like dispenser and continue with whatever you are doing (figure 8).

Figure 8. Packaging design "Live easy!". With brand representation on the magazine cover, picturing a role model for the target group (found footage). On the packaging itself the ease of use is emphasized by stickers with commercial quotes.

6. Ethics as creativity

To make explicit how this exercise is linked to ethical deliberation, and subsequently to creativity, we take a step back -or zoom out if you wish- to discuss the theoretical concepts that are underpinning our approach.

It is impossible to explore all facets and all existing literature on the interrelations between ethics and creativity. We will limit ourselves to highlighting a few aspects, following the question how the approach on ethics and technology that we are specializing in does connect to creativity in design. Our approach to ethics and technology is about ethical reflection on the impact of technology. This means an intricate relation between ethical questioning and technology from the onset, ethical reflection in response to insight in the meaning and the effects of technology.

This approach is very clear in the Product Impact Tool (see www.productimpacttool.org) which offers an overview of concepts and examples for understanding the impact of technology on different levels, or how technology is affecting us humans from all sides (Dorrestijn & Eggink, 2014). This tool is intended to be useful for analysing the effects of technologies, and to help to design for desired impact on society, but definitely also to stimulate ethical deliberation about technologies (Dorrestijn, 2020).

6.1 Questioning means and ends
In order to offer a more concise and accessible tool in which the connection between the impact and the ethics of technology is upfront we have more recently developed a concise tool in the form of deliberation questions about means and ends.

This tool is called Ethical Readiness Check (Dorrestijn, 2021). This title does explicitly mention the term ethics, unlike the Product Impact Tool title. Ethical readiness further refers to Technological Readiness Levels, to which it offers the ethical complement. Means and ends form a scheme, clearly related to technology and to ethics, which is very simple and familiar in the basis. However, ultimately the relationships between means and ends, between ethics and technology are very complex. Inspiration for our approach of using the familiar but rich scheme of means and ends stems from Bruno Latour (Latour & Venn, 2002) and Dietmar Hübner (2010).

The Ethical readiness Check consists of the following two basic questions in terms of means and ends of a technical innovation:

- Is the means for a good end?
- Is it the good means for the end?

These two questions can be unfolded and developed. For example: What is the goal? Are there conflicting goals and values? May there be a alternate goals, a double agenda? Is the technical means effective and fitting for the goal? What are the actual effects, also side effects, regardless the intentions?

This last question is about the effects of technology as is the topic of the Product Impact Tool. The Ethical Readiness Check with its series of questions about means and ends can therefore be seen as an simple entry to The Product Impact Tool, an entry moreover with a focus on the connection between impact and ethics.

Looking back at the workshop results it is interesting to see that the questions about means and ends renders some ambivalent -or surprising- insights. Ethically it is more accepted to "relieve starvation" (packaging one) than to stimulate "drug use" (packaging two) when we look at the ends. On the other hand, when we look at how the proposals intend to reach their goals it is not that ethically sound to 'help' people which do not have access to good food with providing them with the means to eat bad food. While one can argue that the "mindfuck" packaging is at least transparent about its purpose. And moreover, by presenting the pill in a single use packaging as something really special, it can also help limit excess use.

6.2 Creativity concerning means and ends

Creativity can be connected to our practical approach in the ethics of technology by showing the relationship to both sides of the simple scheme of means and ends. There is a relation to goals of innovation. And there is a relation to the means, to the meaning and the effects of technology. This comes to the fore in the wonderberry workshop, with first the experience and next the packaging assignment, and then the discussion afterwards.

A common sense understanding is that technology is defined by its functionality: technologies offer solutions for problems; a technology is a means for an end. In this understanding the focus is on finding and producing a solution. It can appear that technical

development is only about the means and that the goals or the needs to fulfil are given, or that goal setting is a task for ethics and politics.

However technologies do not simply have a well defined function. That is what wonderberry workshop is about. What is actually the purpose of this strange thing, that makes sour taste sweet? All it does is convert some connections in our world. This reminds of a characterization of the technological by Bruno Latour (2012) as that which bends, transforms, reverses an element in how all things connect to all other things in the world. That description differs from "functionality", as it does not refer to functionality for a well defined purpose, but alludes to a change of direction, regardless of purpose, in any direction. It is therefore an understanding of technology which emphasizes an aspect of surprise and of wonder.

Another analysis of technology which equally emphasizes that technology surprises us, is Marshall McLuhan's "laws of media" (McLuhan & McLuhan, 1988). Next to enhancing something (the intended function of a technology), every technology obsoletes, retrieves, and reverses. McLuhan offers an extended understanding of what is otherwise known as side effect. Moreover in McLuhan there is a constant and urging focus on how the surprising effects of the things that we make, in turn make us. Our cultural inventiveness and creativity is not ours, but emerges in the interplay of us and the technologies we make and surround us with. This reciprocal effect is at the heart of the workshop. On the one hand the different packaging designs were crafted from the wonder about the effects of the miracle berry as a technology. The crafted packaging designs in turn made three very different perspectives on the technology apparent for the participants.

Technical developments do not always prove beneficially for us. All technology is ambivalent. This is actually a very old insight. It was a teaching of Bernard Stiegler (2013) that technology has always had the character of what in classical Greek was named *pharmakon*, meaning both "healing medicine" and "poison". Not only in the wonderberry pill workshop, but already in ancient philosophy was a pill the case for acknowledging the ambivalence of technology. In case of the wonderberry, can it help healthier eating habits and prevent diabetes or even help solve hunger in the world? Or would another tendency take over and would eating more, and unhealthier prevail because engagement with natural products and tastes would decline? This ambivalence was clearly exposed in the results of the workshop, as the first group made their packaging design from the first stance on healthier eating and the third group acknowledged the second stance in embracing the possibility to exclude unpleasant experience.

Technologies do not have an unambiguous function. They often surprise us with their effects. They do not follow a simple scheme of a means for an end. We are therefore faced with the task of determining a good purpose for many new found technical possibilities. However, the detour of directing attention to the impact of technology can help to better anticipate and prevent undesirable effects. And awareness of the variety of effects with

ambivalent meaning does confuse the idea of a given goal, but thereby help promote ethical deliberation on the desirable directions for technical innovation.

7. Discussion

Of course, our workshop is just a small case study with respect to the vast topic of ethics and design. However, we hope we have shown that with the right setting a fruitful combination of ethics, design and creativity is not impossible. Our approach to ethics, based on the theoretical underpinning from philosophy of technology is also not unique. Other approaches have made similar connections, like the dilemma driven design approach by Ozkaramanli (Ozkaramanli, Özcan & Desmet, 2017). However, in this approach the dilemma is at the basis of the ambiguity, which implies that there is always a dichotomy (or that the ambiguity can always be 'reduced' to a dichotomy). In that sense our approach is more versatile as it is not restricting the amount of perspectives one can take. Which was visible in the workshop with the three 'opposing' results. Another practical approach is value sensitive design, as for instance proposed by Smits (Smits et al., 2019). Here the designer is stimulated to actively engage with the values that are incorporated in a particular technology. Smits shows that by deliberately assessing the consequences of the design choices one can also address the unintended change of certain values during the design process. This way one can also deal with the inherent ambiguity of technology, however the values are still at the basis of the process. In that respect our approach is also more versatile as it allows for the values to emerge from the creative process itself. Last but not least, when looking at the results of the workshop, one can see the commonalities with critical or speculative design (Malpass, 2013; Lindley, Coulton & Akmal, 2018). We also feel a strong affinity with these approaches, while just like these, our workshop is about making the designs first in order to stimulate the reflection afterwards. In other words; first the doing and then the thinking!

8. Conclusion

The results of the workshop made explicit how the inherent ambivalence of technology means that a single technology may have multiple ethical impacts. Our theoretical reflection on these results learned that having an awareness of the ethical impact arising from a technology can inspire new creative directions. Moreover, the other way around such creativity can be useful for unpacking the multiple dimensions of ethical impacts.

Ethics in design can also be creative and fun.

9. References

Brey, P. (2010). Philosophy of technology after the empirical turn. *Techné: Research in Philosophy and Technology* **14**(1): 36-48.

Dorrestijn, S. (2009). Design and Ethics of Product Impact on User Behaviour and use Practices. In: (Eds.) *Proceedings of the 5th International Conference of Intelligent Environments: vol.4. Ambient Intelligence and Smart Environments*, Amsterdam, IOS. 253-260.

Dorrestijn, S. (2020). A Tool for the Impact and Ethics of Technology: The Case of Interactive Screens in Public Spaces. In: *Relating to Things: Design, Technology and the Artificial*. H. Wiltse (Eds.). London & New York, Bloomsbury**:** 151-172.

Dorrestijn, S. (2021) *Ethical Readines Check*. Enschede: Saxion University of Applied Sciences, 1. https://www.stevendorrestijn.nl/downloads/Ethical_Readiness_Check_concept.pdf.

Dorrestijn, S. and W. Eggink (2014). Product Impact Tool Workshop; mastering affect and effect in human-product relations. In: J. Salamanca, P. Desmet, A. Burbano, G. Ludden and J. Maya (Eds.) *Proceedings of the International Conference on Design & Emotion; Colors of Care*, Bogotá, Ediciones Uniandes. 467-469. http://www.stevendorrestijn.nl/tool/.

Dorrestijn, S. and P.-P. Verbeek (2013). Technology, Wellbeing, and Freedom: The Legacy of Utopian Design. *International Journal of Design* **7**(3): 45-56. http://www.ijdesign.org/index.php/IJDesign/article/view/1512.

Eggink, W. (2014). Where's My Robot? Integrating Human Technology Relations in the Design Curriculum. In: E. Bohemia, A. Eger, W. Egginket al (Eds.) *Proceedings of the International Conference on Engineering and Product Design Education; Human Technology Relations*, Enschede, The Design Society. 87-92. https://www.designsociety.org/publication/35864/.

Eggink, W., S. Dorrestijn, K.v.d. Heijden and I. Ouwens (In Print). Tool-based Ethics Education for engineers; Wonderberries and Wisdom tiles. In: D. Andrews, E. Bohemia, H. Grierson and R. Brisco (Eds.) *Proceedings of the International Conference on Engineering and Product Design Education*, London, The Design Society.

Eggink, W., D. Ozkaramanli, C. Zaga and N. Liberati (2020). Setting the stage for Responsible Design. In: S. Boess, M. Cheung and R. Cain (Eds.) *Proceedings of the biannual Design Research Society conference (DRS) Synergy*, Brisbane (Australia), Design Research Society. 713-730.

Heijden, K.v.d. , et al. (2021a) *Wijs met techniek; ethisch (leren) reflecteren op de impact van techniek*. Deventer: Tech Your Future **401-0047** https://www.techyourfuture.nl/impactinterview-wijs-met-techniek.

Heijden, K.v.d., I. Ouwens, S. Dorrestijn and W. Eggink (2021b). Teaching Track For Ethics of Technology in Engineering Education. In: H.-U. Heiss, H.-M. Järvinen, A. Mayer and A. Schulz (Eds.) *Proceedings of the Blended Learning in Engineering Education: challenging, enlightening – and lasting?*, Technische Universität Berlin, European Society for Engineering Education (SEFI). 1561-1570. https://www.sefi.be/wp-content/uploads/2021/12/SEFI49th-Proceedings-final.pdf.

Hiort af Ornäs, V. and M. Keitsch (2016). Ethics in Design Curricula - Teaching Approaches. In: E. Bohemia, L. Buck, K. Eriksenet al (Eds.) *Proceedings of the 18th International Conference on Engineering and Product Design Education*, Aalborg (Denmark), The Design Society. https://www.designsociety.org/publication/39133.

Hübner, D. (2010). „Ethik und Moral" / „Typen ethischer Theorien" / „Aspekte von Handlungen" / „Stufen der Verbindlichkeit". In: *Forschungsethik. Eine Einführung*. M. Fuchs, T. Heinemann, B. Heinrichset al (Eds.). Stuttgart, Weimar**:** 1-39.

Ihde, D. (2002). *Bodies in technology.* Minneapolis: University of Minnesota Press.

Latour, B. (2012). *Enquête sur les modes d'existence: une anthropologie des modernes.* Paris: La Découverte.

Latour, B. and C. Venn (2002). Morality and Technology. *Theory, Culture & Society* **19**(5-6): 247-260. https://journals.sagepub.com/doi/10.1177/026327602761899246.

Ledsome, C. (2019). Learning to be a Professional Designer. In: E. Bohemia, A. Kovacevic, L. Bucket al (Eds.) *Proceedings of the 21th International Conference on Engineering and Product Design Education*, University of Strathclyde, Glasgow, The Design Society. 1-6. https://doi.org/10.35199/epde2019.67.

Lindley, J., P. Coulton and H. Akmal (2018). Turning Philosophy with a Speculative Lathe: Object Oriented Ontology, Carpentry, and Design Fiction. In: *biannual Design Research Society Conference (DRS), Catalyst*, Limerick (Ireland), Design Research Society.

Malpass, M. (2013). Between Wit and Reason: Defining Associative, Speculative, and Critical Design Practice. *Design and Culture* **5**(3): 333-356. http://www.designstudiesforum.org/journal-articles/between-wit-and-reason-defining-associative-speculative-and-critical-design-practice/.

McLuhan, M. and E. McLuhan (1988). *Laws of Media: the New Science.*: University of Toronto Press.

Merwin, H. (2013). Homaro Cantu on Miracle Berries, Chewing Tin Foil, and the Best Peanut-Butter Cookies Ever. *Grub Street*. New York: Vox Media. **2021**.

Morris, K. (2018). The life and death of Homaro Cantu, the genius chef who wanted to change the world. *the Guardian*: Guardian News & Media.

Ozkaramanli, D., E. Özcan and P. Desmet (2017). Long-Term Goals or Immediate Desires? Introducing a Toolset for Designing with Self-Control Dilemmas. *The Design Journal* **20**(2): 219-238. https://doi.org/10.1080/14606925.2017.1272831.

Papanek, V. (1995). *The Green Imperative*. London: Thames and Hudson.

Smits, M., B. Bredie, H.v. Goor and P.-P. Verbeek (2019). Values that Matter: Mediation theory and Design for Values. In: E. Bohemia, G. Gemser, C. de Bont, N. Fain and R. Assoreira Almendra (Eds.) *Proceedings of the Academy for Design Innovation Management, Research Perspectives In the era of Transformations* London, Academy for Design Innovation Management. https://designinnovationmanagement.com/adim2019/.

Sonneveld, M. (2014). Positive Ethics in Design Education. In: E. Bohemia, A. Eger, W. Egginket al (Eds.) *Proceedings of the International Conference on Engineering and Product Design Education; Human Technology Relations*, Enschede, The Design Society. 87-92. https://www.designsociety.org/publication/35923/.

Stiegler, B. (2013). *What Makes Life Worth Living: on Pharmacology.* Cambridge: Polity Press.

Verbeek, P.-P. (2006). Materializing Morality: Design Ethics and Technological Mediation. *Science, Technology & Human Values* **31**(3): 361-380. https://doi.org/10.1177/0162243905285847

Verbeek, P.-P. (2011a). *De grens van de mens; over techniek, ethiek en de menselijke natuur*. Rotterdam: Lemniscaat.

Verbeek, P.-P. (2011b). *Moralizing Technology, Understanding and Designing the Morality of Things*. Chicago: University of Chicago Press.

Verbeek, P.-P. (2013). Technology Design as Experimental Ethics. In: *Ethics on the Laboratory Floor*. S. van den Burg and T. Swierstra (Eds.). Basingstoke, Palgrave-Macmillan**:** 83-100.

About the Authors:

Wouter Eggink is assistant professor in the chair of Interaction Design. He is coordinator of the master program Human-Technology Relations, and researches the mutual benefits of philosophy of technology and design research, for which he coined the term "the Practical Turn".

Steven Dorrestijn is a philosopher of technology and chair of the ethics & technology group. He developed the Product Impact Tool and the Ethical Readiness check. His research focuses on people's practices when accommodating new technologies in their lives.

Karin van der Heijden is researcher and lecturer in the ethics & technology group. She is mainly concerned with (care) ethics, ethical reflection and moral agency in the social domain and/or focused on technological innovation.

Ilse Ouwens is master lecturer in the program of contextual awareness, (developing) teaching to stimulate the sensitivity of future creative professionals for their natural, social, and living environment.