

Teaching aspiring industrial designers to understand value(s)

Magnier, L.B.M.; Kobus, C.B.A.

Publication date

2022

Document Version

Final published version

Published in

Teaching Design For Values

Citation (APA)

Magnier, L. B. M., & Kobus, C. B. A. (2022). Teaching aspiring industrial designers to understand value(s). In R. Rocco, A. Thomas, & M. Novas-Ferradás (Eds.), *Teaching Design For Values: Concepts, Tools & Practices* (pp. 142-169). TU Delft OPEN Publishing.

Important note

To cite this publication, please use the final published version (if applicable). Please check the document version above.

Copyright

Other than for strictly personal use, it is not permitted to download, forward or distribute the text or part of it, without the consent of the author(s) and/or copyright holder(s), unless the work is under an open content license such as Creative Commons.

Takedown policy

Please contact us and provide details if you believe this document breaches copyrights. We will remove access to the work immediately and investigate your claim.

TEACHING ASPIRING INDUSTRIAL DESIGNERS TO UNDERSTAND VALUE(S)

LISE MAGNIER

DELFT UNIVERSITY OF TECHNOLOGY
L.B.M.MAGNIER@TUDELFT.NL

CHARLOTTE KOBUS

DELFT UNIVERSITY OF TECHNOLOGY
C.B.A.KOBUS@TUDELFT.NL

ABSTRACT

This chapter describes 'Understanding Values', a course that teaches aspiring designers who aim to design for values to disentangle how different notions of value and values influence the design process, the design outcome, and how the outcome is evaluated. The course strives to make abstract values more tangible by asking students to analyse the values supported or hindered by an existing product-service system and how it brings or destroys value for a broad range of direct and indirect stakeholders. Various theories, methods and tools are brought forward to help them perform their analysis and come up with a more acceptable alternative value proposition. Students are also encouraged to conduct high-quality dialogues to reflect on their own values as designers, the ethics of design and the value tensions they experience during the course. These reflections in turn serve as input for the development of their own code of ethics.

**HUMAN VALUES, VALUE AS WORTH, VALUE TENSIONS, VALUE PROPOSITION,
ETHICS OF DESIGN**

1. INTRODUCTION

Human beings have always engaged in design to improve their lives, whether to enhance food provision, the quality and availability of shelter, or comfort in general. In other words, designing has enabled individuals to fulfil their needs, to survive, and to thrive. A specific kind of design focusing on designing products, industrial design, emerged with the Industrial Revolution. The goal of industrial design was to create value for users and consumers who would buy and/or use these products, thereby enabling organisations to capture economic value (Hesket, 2009). Arguably, our capitalist focus on economic value has helped to lift many people around the world out of severe poverty; however, it is now clear that this has also excluded many others, while leading to unprecedented climate change, pollution, and loss of wildlife and biodiversity.

WE CAN DO BETTER: DESIGNING FOR VALUE AND VALUES

Based on these observations, industrial designers are asked to do better. Critics and scholars urge us to reflect on what is destroyed in the act of creation (e.g., Papanek & Fuller, 1972; Tonkinwise, 2014; Bowles, 2018; Monteiro, 2019), and on what really deserves to be created as opposed to what can be opportunistically made available to users to capture economic value. As designers, we have to ask ourselves what impact our design outcomes will have on health, happiness, democracy, and ecologies. We have noticed that many of our students feel the same and want to do better; the question is, how can they translate their intentions into design decisions? Value Sensitive Design (VSD) or Design for Values (DfV) are approaches developed to consider (moral) values deliberately and continuously in the design process with the intention to improve design outcomes for a broader range of stakeholders. In this chapter, we do not intend to argue that creating value for users and enabling capturing value for organisations should be left out of the design process, because, after all, this endeavour can help the viability of the outcome. What we mean by doing better is that while designers strive to find interesting value propositions for users (possibly to capture economic value), they are also consciously and explicitly thinking about the values of – and value for – other stakeholders and the consequences of design outcomes on those not directly interacting with the outcomes.

UNDERSTANDING VALUE(S): A COURSE TO OBTAIN AN UNDERSTANDING OF THE VARIOUS NOTIONS OF VALUES INVOLVED IN DESIGN PRACTICE

Successfully designing for values requires an understanding of the notions of values involved in the design process. With this in mind, the renewed BSc in Industrial Design Engineering at TU Delft proposed the introduction of a course named 'Understanding Value(s)'. The course runs in the second semester of the first year of the curriculum. An overarching aim of the semester is to enable students to learn how to design products with a digital existence beyond their physical manifestation and/or how to design business models that comprise a cohesive combination of a product and a service: a product-service system (PSS). The knowledge imparted in our course aims to serve as a basis for reflections regarding the desirability (in the broadest sense) and viability of not only the PSS developed in the design project running in parallel, but also all the subsequent design projects the students will be involved in. Specifically, the course seeks to disentangle how different notions of value and values influence the design process, the design outcome, and how the latter is evaluated. We aim to explore value and values with literature originating from different fields: design, economy, psychology, sociology, anthropology, and philosophy.

To illustrate the course, we draw on our practical experience in design projects, and on our research and teaching experience in social venturing, circular design, and sustainable consumer behaviour, where understanding value(s) plays an important role. For example, research in sustainable consumer behaviour often highlights gaps between the environmental values of individuals and their environmentally supportive behaviours. These gaps are often explained by tensions in how individuals hierarchise their values (e.g., safety and sustainability) but also tensions between values and value (e.g., the price premium to which consumers must consent for a more sustainable alternative). A commonly experienced tension in the course on 'social venturing' involves capturing economic value and addressing a societal issue in parallel.

This chapter serves as a map for the course and may give pointers to the readers on how to apprehend the various notions of values for design education. We start by clarifying how the notion of 'value' differs from 'values' and outline our choice of mediation approach concerning design outcomes and their value. Following the structure of our course, we explore the meanings of value(s) from different stakeholders' perspectives and further clarify how we plan to help students uncover what is of value to whom and why. The learning activities, besides lectures, are developed to enable students to experience value tensions. Students are asked to engage in dialogue sessions, reflect in groups on an existing product-service system and modify the value proposition. The course culminates in a personal code of ethics, capturing the value tensions experienced and decisions on how to deal with these tensions. The blue boxes highlight some of the tools we provide to students

to identify and understand stakeholder values, map the value of an existing product-service system for different stakeholders and modify the value proposition of this product-service system to one that might be more morally acceptable, or argue why it should stay as is. The grey boxes illustrate the arguments brought forward using examples from our own research and practice.

2. VALUE AND VALUES, TWO CLOSE TERMS WITH SEMANTIC DIFFERENCES

VALUE(S) – GUIDING PRINCIPLES OR QUALITIES WITH WORTH?

People frequently use the words value and values in common language without explicitly explaining what they mean by these words. However, the plural and the singular version of the word can have distinct meanings. For example, in economics, the notion of value is most often used in its singular form, referring to the economic or utility value of an object. In contrast, those in the field of psychology generally refer to the notions of human values as part of one's personality; that is, they most often use value in its plural form, in the context of a set of values. In an analysis of how the notions of value and values play a role in the design process, Bos-de Vos (2020) distinguished between values as ideals or guiding principles and value as a descriptor of qualities with worth. Following this distinction, values are considered as abstract beliefs about what is of value in life in general, while value is a quality attributed to a specific design outcome.

RELATIONSHIPS BETWEEN VALUES AND VALUE

Notions of both value and values can play a role in the design process and are interrelated. Collaborating actors, who may bring different ideals and underlying motivations, co-create a product, a service, a system, or a combination of those, which aims to create value or worth for different stakeholders (e.g., clients, users, society). In the evaluation of the design outcome, value judgements regarding its desirability will be highly influenced by the values of the 'evaluator' (e.g., the company that commissioned the project from a design agency, the user, a government, or indirect stakeholders).

In addition, it is important to emphasise that the choices regarding the development of a design project, or how to embody certain values in a design outcome, are based on the values and ideas of those involved in the design process. As a result, these choices can neglect the values of those not involved, fail to tap into the full potential of the

design, and lack value for those left out of the process– or even destroy value. The research of Bos-de Vos (2020) brings forward that consciously thinking about ‘value’ and ‘values’ in all their meanings might assist designers in opening up discussions about values and interests, address tensions, and increase the probability that those involved can collectively work towards a broadly valued end result.

3. MEDIATION PERSPECTIVE ON DESIGN OUTCOMES AND VALUE- INFLUENCE ON TEACHING AND DESIGNING

DESIGN MEDIATES

In our course, we adhere to the view that design mediates how we exist in our world and how we experience our world (Verbeek, 2006). The mediation view also entails that values can be intentionally (or unconsciously) embodied in a design, but we cannot fully predict how people will experience and interact with that design. Therefore, how the design will promote or hinder certain values is a result of an interaction between the design and people (Friedman & Hendry, 2019). This view differs not only from the instrumental view on design, whose proponents contend that designs are value-free because they are only instruments in the hands of people (e.g., ‘guns don’t kill people, people do’), but also from the deterministic view, according to which values are inherently embedded in designs.

To illustrate the unpredictability involved in promoting or hindering values, we share a reflection on designing a smart energy system to make patterns of energy use at home more sustainable. We considered the protection of privacy from intrusion by the data collector (so that the energy provider would not be able to access data about energy usage which are strongly related to lifestyles and habits) but discovered in our first trial that the privacy of people living together might still be affected. Our system facilitated the surveillance of co-dwellers, which was not appreciated by adolescents who value their autonomy and privacy.

WHAT IS WORTH?

Coupled with the mediation view, we define value to exist in the relationship between object (in our case the design) and subject (the ‘evaluator’ of value). This means we have neither a subjective view on the value of design outcomes (a matter of taste) nor an objective view on value (inherent intrinsic value of a design). The value attributed to a design is often more concerned with the value of what it enables or

disables more than the design itself (Tonkinwise, 2014). In addition, value attributes are not static. Value changes constantly as products age, as people change and as their social contexts and societies change (Boradkar, 2010). Something that is considered to be of value by some people at a certain place and moment in time can lose its value – or be considered to be destructive to what is of value – in a different context, to different people, or even to the same people. For example, the symbolic value of a ring somebody was given by a romantic partner will change when the relationship ends.

CONSIDERING DIFFERENT TYPES OF VALUE ATTRIBUTES

In a chapter about the worth of things, Boradkar (2010) defines 11 types of value that individuals can attribute to things: economic, functional/utilitarian, cultural, social, aesthetic, brand, emotional, historical, environmental, political, and symbolic value. Such a taxonomy enables designers to put words on the different qualities with worth. Boradkar insists that while this taxonomy can help to map some of the basic drivers people use to evaluate the worth of things, the complexity of valuing things should not be underestimated. Often, different types of value can overlap (e.g., the symbolic value and the brand value of a smartphone often coincide), or people derive the general worth of an item from an aggregate of several value types.

ITERATE AND REFLECT

Our stance entails that we want to teach our students that a reflective, iterative process in design is important when considering value(s). This means that designing for value(s) is not very effective as an afterthought, because that makes it more likely that a drastic redesign (or even the cancellation of the launch of the design outcome) will happen when the design project is nearly finished, at which point all resources allocated to the design project have already been depleted. Students might experience the ineffectiveness of considering values as an afterthought in our course, as they will be assigned an existing product-service system to evaluate. We hope this experience is an argument to engage in conceptual and empirical inquiries at

an earlier stage in order to define design requirements. However, we would like to bring forward in our course that developing a list of requirements only in the early stages of the design process will not be effective either as we cannot fully predict how people will interact with the design outcome or how others will experience its value. Instead, to get designing for value(s) right, the process must be a constant iteration of conceptual (conceptualisations of relevant values and possible value tensions), empirical (investigation of the context in which the design is situated), and technical investigations (what to design) (Friedman & Hendry, 2019).

4. UNDERSTANDING HUMAN VALUES AND VALUE TENSIONS

HUMAN VALUES IN A DESIGN CONTEXT

In a design context, understanding the human values at stake is fundamental for two reasons. First, these values will influence the directions that collaborating actors/stakeholders co-creating the design are willing to take. Second, human values will influence how the design outcome is valued by users and others affected by the project. Therefore, we make an extra effort here to define human values. There are many definitions of human values, but they all share multiple features (Schwartz, 2012). Values are concepts or beliefs about desirable end states or behaviours that transcend specific situations, guide the selection or evaluation of behaviour and events, and are ordered in terms of their relative importance in a value system. Human values are learnt, socially shared principles that can help us balance and fulfil three universal types of needs for our survival: basic needs of individuals, needs for coordinated social interactions, and survival needs of groups (Schwartz & Bilsky, 1987). Van de Poel and Royakkers (2011) emphasise the social structuring character of human values and define them as 'lasting convictions or matters that people feel should be strived for in general and not just for themselves to be able to lead a good life or realise a just society'. Values are different from attitudes and preferences in that values are abstract ideals that are important to us in general while attitudes and preferences are more concrete and represent things that we like or dislike (Maio, 2016).

A TAXONOMY OF HUMAN VALUES

Several taxonomies of human values were developed to determine distinctive value clusters and values that are close to or oppose each other in different domains like religion, philosophy, and psychology. One of the most widely used and tested taxonomies was

developed by the social psychologist and cross-cultural researcher Shalom Schwartz. In 2012, he published a refined version of the value theory defining 19 values (see Figure 1), which has been tested worldwide (in 82 countries) and appears to be shared in different cultural settings (Schwartz et al., 2012). The values can be categorised into four higher-order values: conservation (i.e., self-restriction, order and avoiding change), openness to change (i.e., readiness for new ideas, actions, and experiences), self-transcendence (i.e., transcending own interests for the sake of others), and self-enhancement (i.e., pursuing own interests). In addition, the values placed on the left have a social focus (i.e., they revolve around others and established institutions) while those on the right have a personal focus. Furthermore, the values at the top of the circle express growth and self-expansion and are more likely to motivate people when they are free of anxiety, while the values at the bottom are directed towards protecting the self against anxiety and threat (Schwartz, 2012). It is also important to note that while these values are rather stable within individuals, changes in life stages (e.g., becoming a parent), and cultural transitions (e.g., moving to a new country, starting a job) can cause a change in their value system (Maio, 2016).

Though the basic human values are seen as part of an individual's personality, it is worth noting that cultural values or normative value orientations can be considered when exploring the value systems on which cultures – that is, nations, regions, religions, but also professions, organisations, or even teams – may differ (e.g., hierarchy, egalitarianism, harmony) (Schwartz, 2011).

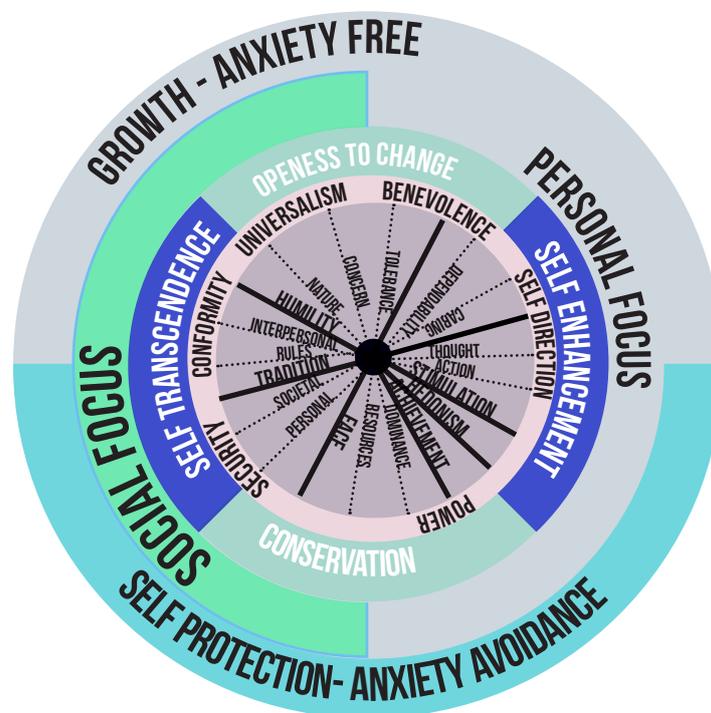


Figure 1: Circular motivational continuum of 19 values, adapted from Schwartz (2012).

VALUE SYSTEMS AND INHERENT TENSIONS

People generally share and agree on values; however, they can have divergent value systems and experience value tensions. A value system corresponds to the order and priority an individual, or a group of individuals, grants to their values (Schwartz, 2012). While individuals may share a certain set of values, the relative importance of these values will often be ordered and weighted differently. For example, most people will agree that equality (a universalist value) and personal health (a conservation value) are important values. However, when considered in the context of a whole set of values, people might order them differently, which will in turn lead to different value judgements and behaviours in certain situations.

We can experience value tensions at various levels: among individuals, in and between groups, in and between nations. It is important to note here that when we disagree amongst each other on what is worth pursuing or not, this does not mean we have a completely different set of values, but mostly that values are prioritised differently. People or nations that assign a high priority to conservation values in their value systems will especially value tradition and conformity to rules, which might create tensions with people whose value systems prioritise values related to openness to change and self-direction. The latter will value freedom and choosing their own goals, which might conflict with prevailing traditions and rules. Finally, tensions can also emerge between people who share the same or very similar value systems. Abstract values need to be operationalised in our decisions, meaning that they have to be translated into more concrete actions and people can disagree about the actions needed to pursue a value.

Values themselves are often too abstract to truly be in opposition. For example, sustainable and development are two words that are easy to put together – the resulting compound term sounds good to us, but when we want to connect decisions and actions to these two words, we notice that tensions arise. Pursuing those values simultaneously is easier said than done.

We also experience tensions regarding the operationalisation of our own values. For example, one can experience tension between a value with a personal focus such as hedonism and a value with a social focus such as care for nature. A typical example is someone who is torn between caring for nature and pursuing their hedonistic values by travelling by plane to a faraway destination, which would generate an unbalanced personal contribution to global greenhouse gas emissions and thereby harm nature (see <https://www.theguardian.com/travel/2019/jul/31/carbon-calculator-find-out-how-much-co2-your-flight-will-emit>).

When designing a service to reduce the number of severe bike accidents among Dutch seniors, we had to deal with a tension between the values of safety and autonomy. Our objective was to promote, amongst other things, helmets, mirrors, and three-wheel bicycles to improve safety for senior bike riders on the road. However, in interviews, we learned that many people did not want to be seen with these aids and considered it patronising when people around them would start suggesting them (autonomy). Although they did value their own safety, it was hard for them to acknowledge they were getting old (and therefore experienced reduced sight, hearing, and reaction time, while finding it harder to turn their head) and needed more aid to remain safe. Giving up their bike was not an option either, because riding the bike was connected to the values of freedom and autonomy. However, talking about getting older and remaining safe by using an aid was often taboo and went against their sense of autonomy.

5. DESIGNING FOR VALUES

AN ITERATIVE PROCESS: FROM ABSTRACT TO CONCRETE AND BACK

As discussed above, abstract values need to be operationalised, or in other words translated into more concrete actions, and for designers this means translated into a design. Effectively designing for values is an iterative process. We might start with a specification of value-related goals and further define concrete means to get there. In the early stages of the design process, this might entail translating values into design requirements, going from values to a set of norms, and then creating even more design requirements, as suggested by van de Poel (2013). However, as we cannot be sure that others will agree on how values are to be translated into requirements, or into design outcomes, we can also go from concrete to abstract in our evaluations. Then we move on to the attributes of our design outcome, whereby we ask others about the perceived consequences and related values (see blue box on laddering). In practice, students can perform laddering interviews and see how attributes and experienced benefits/harms connect to values. In this activity, they might uncover that we can disagree on the 'goodness' (or 'badness') of specific attributes, while the reasons for making these judgements are related to the same values. Alternatively, they might find out that people agree on the 'goodness' (or 'badness') of an attribute, but for different reasons.

LADDERING

An interesting technique for designers to evaluate how abstract user values are supported or hindered and how they are related to the definitions of the worth of design outcomes is 'laddering'. Laddering has been used since the end of the 1980s to uncover means-end chain models (Reynolds & Gutman, 1988). This technique originally comes from the domain of personality psychology (Hinkle, 1965) but has mostly been used in marketing and advertising, and more recently in user experience design (Abeele & Zaman, 2009). In the marketing field, it has been mainly used to get from product attributes to the underlying personal values influencing purchase (i.e., the means-end chain). According to the Means End Chain theory, there is a hierarchy of consumer perceptions and product knowledge that ranges from attributes to consumption consequences or benefits to personal human values. By continuously asking in an interview 'why is that important to you?', one can go from specific appreciated product or service attributes to benefits and, finally, to personal values. For example, handlebars could be positioned on a bike (attribute) in a way that makes it possible to mount a child seat there (benefit) and thereby contribute to a sense of freedom, a value that is worth pursuing. However, it is important to note that while sometimes attitudes and preferences for certain attributes and benefits are driven by values (e.g., one may have a positive attitude towards the shape of a bike helmet because it resonates with their values of personal security), this is not always necessarily the case (e.g., one can dislike eating melon without it having anything to do with their values).

While performing laddering interviews with car owners, one of the interviewees stated that he was happy that he drove an electric car. We asked him why that was important to him. He replied that he loved new technology and always wanted to be at the forefront of using new technologies (stimulation). This reason is different from the reason why our government promotes electric vehicles: to reduce emissions for liveability in city centres, electrify energy demand to become less dependent on fossil fuels for sustainability, and independence from unstable nations.

DESIGNING FOR VALUE TENSIONS

In the design field, we have been particularly interested in how to design for value tensions on all levels (e.g., Ozkaramanli, Desmet & Özcan, 2016; Dorst, 2015; Tromp & Hekkert, 2018; Friedman & Hendry, 2019). In dealing with value tensions, van de Poel (2009) distinguishes between optimising and non-optimising design methods. When optimising – or maximising – we are looking for the best solution. The ambition is then to make abstract values measurable and testable in order to compare outcomes and/or to define a ‘super value’ overarching all other values, such as human happiness (following the utilitarian view of Bentham and Mill (Troyer, 2003)). Happiness is then considered the ultimate purpose of society and human life. It would mean we choose to design for the outcomes that cause happiness for the greatest number of people and, as a corollary, decrease pain for the greatest number. However, the meaning of human happiness is still vague. So, we would have to define happiness more accurately, which would entail revisiting the underlying values. Furthermore, in practice, it would also require us to create a complex model with value indicators aggregating how much happiness and pain a design project may cause. We would thus base our decision on the result of this model to define the best solution, even though value indicators are often incomplete and misleading. Another pitfall of maximising happiness for the greatest number lies in the fact that it may fail to protect minorities against oppression. Lastly, such an approach also fails to take non-human well being into consideration.

Though an optimisation approach for a super value like human happiness might be valuable in setting grand ambitions, non-optimising methods might be more apt for the job of dealing with value tensions to make some progress. One of those non-optimising methods is ‘satisficing’ (Simon, 1957). Satisficing helps us to continuously adapt and deal with vagueness and value pluralism. It entails that we look (iteratively) for solutions that are ‘good enough’ considering thresholds related to relevant values. This also means we need to judge what is ‘good enough’ when dealing with value tensions, which entails that we need to understand the values at stake: what do these values imply in this context for different stakeholders and why are these values important in this context for different stakeholders? Different conceptualisations of the values at stake and considerations about whether they are worthwhile pursuing in this context may lead to alternative options to address the value tensions. Hence, the identification of stakeholders is important when designing for values. To this end, our students will be asked to identify the stakeholders – in their broadest sense – of an existing product-service system.

6. IDENTIFYING STAKEHOLDERS

WHO VALUES WHAT?

In our course, we will build up complexity by considering the value of the PSS for different stakeholders, starting with the users, the organisation, and its value network. We then add the stakeholders beyond the direct and the intended ones to our consideration set, exploring how the PSS affects societies, the ecologies in which they live, and the concepts that are important in these societies.

USER VALUE(S)

The user can be defined as the person who uses the design outcome (in our course the PSS). One of the most common design approaches, 'user-centred design', considers the user the main beneficiary of the design outcome and therefore the ultimate judge of value of the design outcome. Designers following this approach therefore perform user research and design throughout an iterative process to optimise user experience and, by doing so, increase the probability that the design outcome will be valued by the user (Norman & Draper, 1986).

DESIGNING FOR DILEMMAS

In the context of user-centred design, designers can explicitly address value tensions felt by a user. Ozkaramanli, Desmet, and Özcan (2016) bring forward three specific directions for doing so. The first is resolve where the design outcome enables the user to pursue two opposing values simultaneously. The second is moderate where the design helps the user to prioritise pursuing one value over the other. The last direction they mention is trigger, where the design outcome aims to draw attention to the tension without facilitating the pursuit of one of the opposing values. The idea of addressing value tensions explicitly is that designers can heighten the perceived value of design outcomes.

How much money a user (or a consumer) is willing to pay is considered a fundamental index of user value, but so too are the time and effort invested during the use phase (Zeithaml, 1988). However, as mentioned before, how value is attributed

to a design outcome is far more complex. We cannot fully predict how users attribute value or how their value system couples with the outcome. Symbolic user value, for example, relates to the more abstract meaning that individuals attach to their products/services. This value is sometimes disconnected from their utility or from the meaning that was once designated by the producer. For example, some individuals chose the brand Fred Perry to express their belonging to far-right ideologies. The brand itself had to withdraw some of its shirts from the market and publicly express its disagreement with far-right values. In this course, students will first define the intentional value proposition based on publicly available information on the PSS and compare the value proposition to how users possibly attribute value and which values the attributes are associated with. When redesigning the value proposition, they can consider the users' value tensions that they might have uncovered in their analysis.

To exemplify how user value can change over time, our research about consumers' replacement behaviours revealed that in addition to a loss in functionality, a common cause of premature replacement was 'satiation': a phenomenon in which people enjoy a product less the more often it is used. In this case, the emotional value that individuals assigned to their product decreased so much that people would deem their products worthless even though they did not demonstrate any loss in performance. Thus, in design for product longevity, designers should strive to develop strategies to keep the perceived value as high as possible for a long period of time (e.g., not only via a timeless design style, design for product care, and repairability, but also by decreasing the rhythm of new product launch) and to heighten the perceived value of the old product (e.g., via upgradeability).

ORGANISATIONAL VALUE(S)

To be successful, for-profit, non-profit, and public organisations need to remain of value for others. For-profit organisations mainly do so by continuously creating new value for their existing or new customers and capturing economic value for their shareholders. How an organisation intends to be of value for the receiving party is expressed by its value proposition(s). A value proposition often contains a target customer, the task that the customer can complete with the design, a statement of the need or problem solved and the expected benefit(s). A business model explains how an organisation aims to capture economic value (Bowman & Ambrosini, 2000; Lepak, Smith, & Taylor, 2007). For-profit organisations need to capture economic value to generate profit, and by doing so create economic value for shareholders. The purpose of for-profit organisations is predominantly understood to be the maximisation of shareholder wealth (Moore, 2000).

Organisations often perceive it as difficult to pursue both the creation of economic and social value. Social value is often ill-defined but can be found in goods or services that are perceived to have a positive impact beyond economic value: a positive impact on our ecology, our (collective) health or happiness, for example. While for-profit organisations must keep in mind their social value (to have a licence to operate), non-profit organisations traditionally focus on trying to create social value rather than economic value. Non-profit organisations aim to fulfil a social mission and are constantly looking for better ways to do so (Moore, 2000). A big source of revenues for a non-profit organisation is often its donors – and thus a non-profit organisation tends to satisfy the donors’ desires in contributing to a cause. However, boundaries between for-profit and non-profit are blurring. Creating economic value and social value can be conflicting endeavours, but numerous organisations today incorporate both to some extent, as succinctly illustrated in Figure 2 in the business model spectrum (Alter, 2007). Showing this typology to students and asking them to plot the organisation behind the product-service system on this spectrum is meant to break down the traditional dichotomy between non-profit and for-profit and evaluate examples of organisations that are somewhere in between and how they make it work (e.g., new ownership models and economic value capture strategies).

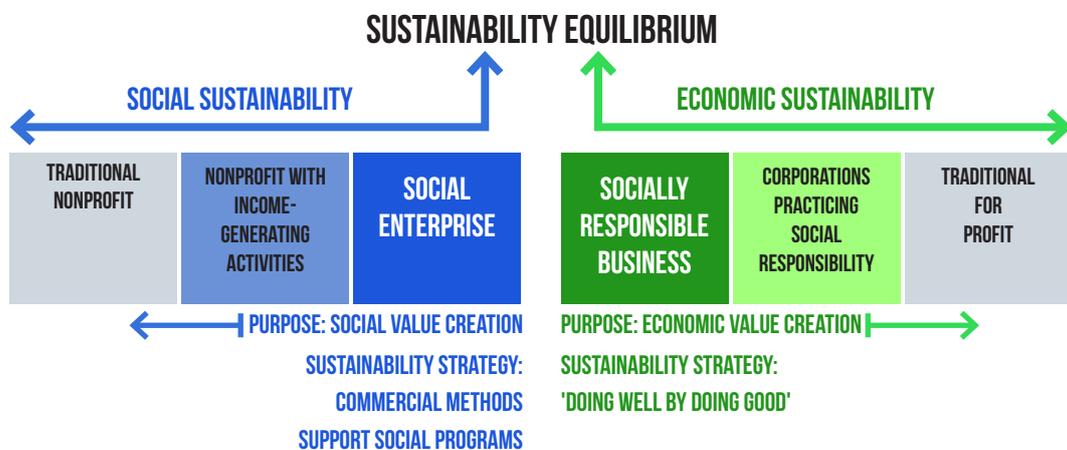


Figure 2: Business model spectrum (Alter, 2007).

The business model spectrum is always discussed in the master's course on 'social venturing', where the aim is to find a 'problem-solution' fit for an issue in society they are passionate about and to come up with ways to make it economically viable. We invite guest speakers who have made it work. One of the guest speakers is alumnus Karthik Mahadevan from Envision. He and his team have built a company around making life easier for the visually impaired with recognition software, for which the users pay a fee. His argument for having his users pay for the service is that this provides a better feedback loop concerning the quality of his service for his users than a traditional non-profit, which gets money from funders who often do not experience the issue themselves directly. If the service decreases in user value, so will his revenues, so successful value capture and user value for a marginalised group in society are tied together.

Students are also asked to identify the core values of the organisation, to reflect about the way the organisation intends to capture value with this PSS and whether it is aligned with their core values. The overall (socially accepted) purpose of organisations is usually communicated in the form of a mission and vision statement. Mission and vision statements embody, among other things, the values of an organisation. Being consistent with the mission while creating value and capturing value can be challenging. Mission drift, which can be defined as straying away from the original mission, may occur when seeking to capture (more) value or due to dependence on funders (Jones, 2007). Organisations commonly have one or multiple explicit core values (Urde, 2003). Core values are intended to guide the behaviour and decision making of employees (like human values do), and thus also of their (in-house) designers. The core values are the shared guiding principles of an organisation, and, like brand values, are also intended to help to manage expectations from the audience. Organisations try to embody their core and brand values in slogans, symbols, and product or service designs. For example, one core value of a car brand can be safety. This brand can communicate safety via the design of the car (e.g., the sound made by the doors when they close). Thus, design can be a means to convey organisational values and will appeal to consumers who hold personal security high in their value system.

We do not include a PSS initiated by a public organisation in this course, but it is worth mentioning here that creating value works differently for public organisations, and designers are increasingly often working for or collaborating with public organisations. Public organisations create public products and services that create public value with public resources. These public resources can be used to create such products and services when citizens (often their representatives) have agreed that it is publicly valuable to do so (Moore, 2000) – for example, making infrastructural investments to make bike riding in the city safer and more pleasurable, so more people will choose to bike instead of using other modes of transport. Inclusive design, related to the accessibility and usability of design outcomes by diverse people, is often assigned a more central role in designing these public products and services.

THE VALUE NETWORK OR ECOSYSTEM

All types of organisations need partners and suppliers to be of value. Value chains used to consist of sequenced activities to manufacture physical products. Traditional value chains were composed of organisations involved in extracting materials from the ground, refining the materials, making parts, assembling parts into products, distributing the products to shops, selling the products to consumers, and after-sales services. These steps were considered part of a supply chain and each step would add value. With the increasing importance of servitisation, digitalisation, and circularity in our economies, innovation has become more complex, and organisations are nowadays more often established within a value network or ecosystem. In digitised supply and demand, the activities are not linked in a linear sequence, unlike in the physical world (e.g., Peppard & Rylander, 2006). The sequential value chain also does not apply to a circular economy where products are shared, leased, reused, repaired, and refurbished, and where eventually materials are restored and recovered to be of value in another product instead of being simply 'disposed of' at the end of the chain (Kalmykova et al., 2018).

So, to accommodate the context of the product-service systems that our students are evaluating, we prefer the idea of a value network. We define the value network as the ecosystem of direct and intended stakeholders in a design project that contribute to establishing the value proposition. By learning how to analyse the network of interdependent partners and suppliers involved in the PSS, our aspiring designers take a first important step in widening the traditional focus on user/consumer and organisational value(s). Mapping different types of value flow in an ecosystem can help open discussions about possible conflicting interests between partners/suppliers and trigger a discussion on potential inclusion of stakeholders that might also have an interest (den Ouden, 2013). In this, it is helpful to reflect on whether the partners promote the same values or at least do not hinder prioritised values. For example, if security is important for an organisation, but it uses a data service that is not very proactive in prioritising data security, it would be good to select a different partner.

In a project to design a 'smart grid' we had partners who delivered the hardware: the screens on the wall (stakeholder A), the smart washing machines (B), the smart meter (C), the front-end software programming and maintenance (the user interface that runs on these screens) (D), and design (E), the back-end programming (the data collection and generating and sending of forecasts and the flexible tariff structures) and maintenance, but also the owner of the servers that were used (F), the energy supplier with flexible rates (G), the grid operator that was also the main service provider for maintenance (H), and all the parties involved in designing, mining, assembly, and shipping of the hardware (I-Z?). This last group remained invisible to us, however, but if we had been more curious, we could have been more selective in ways of mining, etc. to better match 'sustainability', a value that we prioritised, as it was an important reason to start this project.

SOCIETAL VALUE(S) AND ECOLOGICAL VALUE(S)

We see that more of our students wish to direct their efforts towards the benefit of humankind and/or our ecology: social design and design for sustainability are gaining popularity. Within this context, social value, public value, and ecological value are of key importance; students are interested in addressing issues such as inequality, littering, and animal welfare. We feel that the practice of explicitly considering societal or ecological value(s) arises from an awareness of our interdependence with each other and our ecologies. However, doing so requires deeper reflection on the effects of our design outcomes than we are used to, and thus calls for greater critical reflection on the artefacts that we have become attached to in the act of creating. In our course, we teach our students to define a broad range of indirect and often unintended stakeholders and to assess how societal and ecological value(s) are affected. The terms encapsulate the manifold values of anyone, or anything (non-human) potentially affected by the design 'now and here' but also 'there and then'. When considering these stakeholders, we adhere to the mediation approach, where stakeholders are defined as roles in relation with the design, not as individuals or entities (Friedman & Hendry, 2019). One individual or entity can have different roles and a role can refer to multiple individuals or entities. For example, an individual can be a user, but also a neighbour in a different context.

STAKEHOLDER PROMPTS

Taking a broader view on stakeholders to include indirect stakeholders can improve the general 'goodness' of design outcomes. The 'stakeholder prompts' outlined by Bowles (2018) can be used to detect indirect stakeholders in the design process. Some are already formulated as having roles. Others are not, but can be further specified and reformulated into roles in relation to the design – e.g., a company can be a specific supplier of something like knowledge.

Stakeholder prompts: Individuals. Companies. Professional organisations. Unions. Governments. Militaries. Terrorists. Criminals. Workers. Managers. The unemployed. Minorities. Citizens. Voters. Hackers. Children. Future generations. The earth. Animals.

To improve our design outcomes, we can reflect more carefully on – and actively inquire how – they benefit or harm stakeholders. While the uses of a design beyond those intended by its designers lead to unintended consequences (e.g. spreading fake news more easily, buying many houses to rent them out to tourists, or, on a more positive note, hacking mass manufactured furniture so it becomes more personal), externalities concern the effects that fall on those that do not directly interact with the outcome (e.g. people who start to believe the fake news spread by social media users who they see as authorities and start to live by it and are harmed as a result, the neighbours who now have to live next to partying tourists who come and go, or again, more optimistically, visitors who enjoy the creatively beautified hacked furniture). A broader consciousness of the consequences and externalities of our designs on more stakeholders than users and organisations can result in a sense of responsibility for effectively responding to those consequences and externalities – that is, responsibility for mitigating any harmful effects and finding ways to benefit more stakeholders. To enable students to uncover the effects of the existing product-service system and opportunities for improvement, we provide the value map of Bocken et al. (2013) in our course. After mapping the value captured, missed, destroyed, and wasted of the existing PSS, they are asked to come up with suggestions to modify the value proposition in ways that could create and capture additional value.

Participatory design offers an approach to invite a broader set of stakeholders to actively engage in the process. In doing so, it prevents designers from unintentionally neglecting the values of those not involved, which could potentially remove or even destroy value for those left out of the process. However, there is no framework

VALUE-MAPPING

Value-mapping is a method aiming to map value for different stakeholders to discover points for improvement for the design outcome (Bocken et al., 2013). The tool adopts a multiple stakeholder view of value and introduces value destroyed or wasted/missed, in addition to the current value proposition and new opportunities for value creation. In contrast, value missed is untapped value potential and can be regarded as waste, but it is not directly considered harmful.

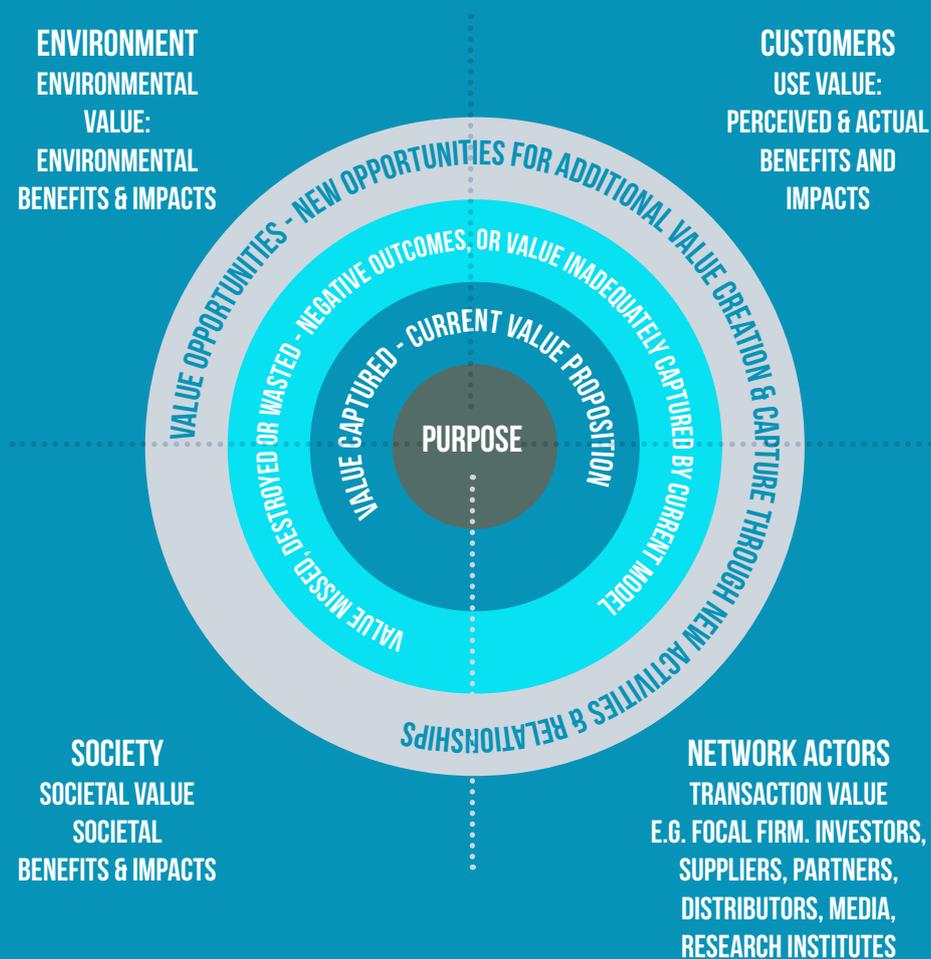


Figure 3: Simplified value mapping tool by Bocken, Short, Rana & Evans (2013). Diagram by authors.

to decide who or what to include in a design process, or how to weigh differing stakeholder values and deal with value tensions. For example, we can choose to maximise happiness for the majority or rely on deontological ideas, such as fairness, to better address the oppression of minorities. A deeper knowledge of theories of ethics and moral values can assist us in making more guided decisions in this context, and as such should be considered an integral part of design education (Tonkinwise, 2004; Roeser, 2012).

7. DESIGN AS APPLIED ETHICS

'Ethics is not another equation to be solved which would be a sad, solutionist point of view that would ignore the most important parts of ethics: dialogue, consensus, resolve'

Cennydd Bowles (2018).

MORAL VALUES AND DESIGN

Intrinsically connected to human values, moral values can be defined as a system of values and principles of conduct, which determine what is the right and what is the wrong way to behave (Haidt & Kesebir, 2010). Moral values and judgements about the morality of an action or decision are closely related to 'ethics' and in practice are often used interchangeably, although moral values refer to personal guiding principles and ethics to a set of rules or actions. The moral values of the designer influence decisions in the design process, which have important consequences in terms of the extent to which a product, a service or a system serves and/or harms direct and indirect stakeholders. Individual moral values generally evolve as individuals reason about why they consider a certain behaviour acceptable or not. Correspondingly, ethical standards in society also evolve as its members slowly develop conventions and laws are put in place. As a result, designers cannot rely on existing ethical standards and laws to only define right and wrong behaviours. Designers often deal with the new, which by definition has often not yet been regulated – and even in regulated domains, there may be grey areas that are left to the interpretation of the designer. In addition, due to the complexity of global ecosystems, designers need to deal with differing regulations, situations in which current regulations might be influenced by economic stakes rather than morality, or even activities that in one country are perceived as immoral and illegal but are unregulated in another (e.g., child labour in the supply chain).

CONTINUOUSLY REFLECTING ON VALUE TENSIONS AND WRITING OWN CODE OF ETHICS

In addition to complying with existing laws, designers must rely on their own moral judgement when they decide to take up a project and when they make decisions in the design process. However, according to Haidt (2001), a moral judgement rarely results from conscious moral reasoning but is often the outcome of quick, automatic evaluations where social and cultural influences play an important role. This obviously creates biases and causes the designer to overlook the negative consequences and externalities of their design project. To avoid such situations, moral values should be consciously incorporated into the design process, as is suggested by the ethical cycle of van de Poel and Royakkers (2007). Moreover, as part of our course, students are asked to continuously reflect on their own moral values and to make several iterations of a personal code of ethics. By engaging in dialogues and evaluating an existing product-service system, we assume that they will encounter many value tensions. We ask them to keep track of the value tensions they experience, to reflect on them, and to draft rules on how they intend to be, make decisions, or act in the future.

To get more inspiration for a code of ethics, we will invite alumni from diverse fields to visit at the end of the course and ask them about the value tensions they have experienced in the past. We ask our students to carry out the interviews and look for habits, skills, values, and character traits that they feel can inspire their own code of ethics. This idea is based on virtue ethics, which considers the overall moral character of actions, according to which focusing on being virtuous leads to good behaviour. Virtue is a way of living that enables human flourishing – it can only be learnt by experience, but moral exemplars can be used as inspiration for performing good behaviours (Vallor, 2016).

THE IMPORTANCE OF REASONING IN DIVERSE TEAMS IN MORAL DELIBERATION

A code of ethics can serve as a compass, but most moral questions do not have a straightforward answer that can be captured by a rule. Value tensions are often difficult to resolve in practice and have their own context. Therefore, learning how to engage in high-quality dialogues is essential in the process of addressing ethical issues. This means that our course must pay special attention to teaching students to interact in high-quality dialogues. Values are felt as part of someone's personality, and when we feel our values are questioned, we tend to become defensive and even emotional, which can hinder the quality of these dialogues. The aim of a dialogue is

to uncover the beliefs that lack reasoned support (Bohm, Senge, & Nichol, 2004); values can be considered to belong to this category in the sense that they may be sustained by feelings and past experiences more than by cognitive, reasoned support (Maio, 2016). As people discuss and analyse the reasons for their values, they might develop novel thoughts, which, depending on the situation, may be more or less supportive of their existing values, or cause changes in their value priorities or value conceptualisations. We will offer students various forms of group dialogue to experiment with, which will be facilitated by our coaches.

RULES FOR ENGAGING IN A DIALOGUE

These rules are inspired by the work of David Bohm and Myrna Lewis to improve the quality of dialogues. The coach sits in and reminds the students of the rules when needed. The coach actively asks for other/new perspectives.

- Set your mind free: No collective decisions are made on what to do or what is the absolute truth about anything
- Everybody is equal: Nobody has a monopoly on the truth
- Be inconsistent: It shows you're learning, which we consider to be a good thing
- Suspend judgement: Everybody shares ideas. 'Neither believe them nor disbelieve them; don't judge them as good or bad.' Reflect on the effect it has on you and how it helps you to uncover new ideas or to let go of 'old' ideas that don't serve you well
- Be constructive: Try to build on other ideas. Show others you're listening by explicitly integrating perspectives
- Be as honest and transparent as possible: don't hold back ideas

In addition, we invite students to exercise moral imagination to extend moral argumentation. Designers then imagine various future scenarios for their designs and morally assess their consequences for a broad range of stakeholders. For example, they imagine how their design could be hijacked and the potential consequences of abuse. This assessment should, if needed, lead to the redefinition of the value proposition. It is important to note that moral imagination should preferably be broadened in a diverse design team (Bowles, 2018; Monteiro, 2019). By having an open-minded team with various backgrounds, the team gains broader perspectives,

and ethical issues can be raised more rapidly. Using the ethical cycle (van de Poel & Royakkers, 2007) can help students to redesign the existing value proposition of the product-service system to increase moral acceptability.

THE ETHICAL CYCLE

The ethical cycle (van de Poel & Royakker, 2007) is a process in which the formulation of the moral problem, the formulation of possible solutions, and the ethical judging of these solutions go hand in hand to reach a morally acceptable decision.

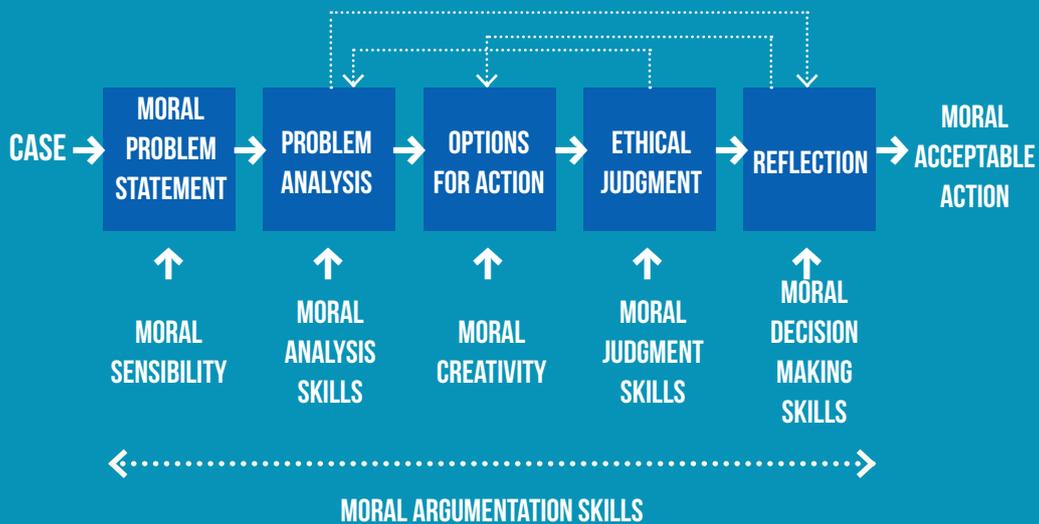


Figure 4: The ethical cycle based on Van de Poel & Royakkers (2007).

AND AFTER THIS COURSE?

Even when a decision is deemed unethical or immoral, it is often asked whether designers are in a position to say 'no' or even ask 'why?' Refusing to participate in a design project can have serious consequences for the designer, such as losing their job or being passed over for promotion. It is therefore tempting for designers to fall back on the saying, 'If I don't do it, someone else will'. Monteiro (2019) argues that design professionals should thus form unions, which would protect them in case they refuse a project that violates the ethical standards of the profession or even punish them when they act against these standards, as is common in other professions. Such examples can be found in medicine with the Hippocratic Oath, in journalism with the Charter of Munich, and in law. Such a shared code of ethics would need to be open, and all professionals should be able to openly contribute. Yet, design manifestos have been created in the past without leading to major changes in the profession and, as mentioned before, even if such a code is strictly followed, it would not give straightforward answers to all questions.

8. CONCLUSION: THE INDUSTRIAL DESIGN ENGINEER AS A SENSITIVE AND CREATIVE ORCHESTRATOR OF VALUES

Due to the ever-greater interconnectedness of our world, the consequences of our actions have become more and more far-reaching. By going beyond the consideration of the obvious and direct stakeholders, we aim to raise awareness about the fact that while you may create value for some stakeholders, others might suffer. In other words, taking this course may enable designers to acknowledge that no design is purely good, but always comes with consequences and externalities that are undesired by someone or something, somewhere, at a certain point in time. This represents an important change in design education, which used to be focussed almost solely on the value for the user and the organisation commissioning the design work.

We encourage our fellow teachers to trigger reflection on values using the theories and tools presented in the chapter. It is important to inspire conscious and explicit thinking about the values of the actors initiating and involved in the design process, and to acknowledge the tensions that might exist. Stimulating students to conduct high-quality dialogues between these collaborating actors might help them resolve these tensions while making them more aware of their own values. Reflecting on how a design creates value for some while it destroys value for others will inevitably lead designers to make decisions that involve their own moral values.

It is thus important for aspiring designers to reflect on their moral values, on what is ethical or not. On the one hand, this will enable them to initiate design projects that are morally meaningful to them. On the other hand, this will also enable them to refuse to design projects that conflict with their own moral values.

Finally, it is important to acknowledge that teaching students to understand values is challenging. Values and value are intertwined, and it is therefore difficult for students and even teachers to articulate the relations and differences clearly. It is also a topic that students might find difficult to comprehend because value and values are abstract. Consciously thinking about values requires a capability to engage in a high level of reflectivity, which not all students might have acquired yet. It is therefore important to let them apply these concepts in real-life cases. For example, in our course, we ask them to analyse the values supported or hindered by a product-service system, how it brings or destroys value for a broad range of stakeholders. We also ask them to reflect on their (moral) values and to propose an improved value proposition for the PSS. While it is important to introduce these concepts at an early stage in design education, they will not resonate equally with all students. It is therefore key to train students to adopt this lens on values in other projects across the whole curriculum. By doing so, this approach will become part of their DNA by the end of their design education, and the new designers will be better equipped to address the societal and ecological challenges of our time.



REFERENCES

- Abeele, V. V., & Zaman, B. (2009). *Laddering the user experience*. Paper presented at the User Experience Evaluation Methods in Product Development (UXEM'09)-Workshop. https://limo.libis.be/primo-explore/fulldisplay?docid=LIRIAS1674319&context=L&vid=Lirias&search_scope=Lirias&tab=default_tab&fromSitemap=1
- Alter, K. (2007). Social enterprise typology. *Virtue ventures LLC*, 12(1), 1-124.
- Bocken, N., Short, S., Rana, P., & Evans, S. (2013). *A value mapping tool for sustainable business modelling*. Corporate Governance.
- Bohm, D., Senge, P. M., & Nichol, L. (2004). *On dialogue*. Routledge.
- Boradkar, P. (2010). *Designing things. A critical Introduction to the Culture of Objects*, Oxford.
- Bos-de Vos, M. (2020) A framework for designing for divergent values, in Boess, S., Cheung, M. and Cain, R. (eds.), *Synergy - DRS International Conference 2020*, 11-14 August, Held online. <https://doi.org/10.21606/drs.2020.374>
- Bowles, C. (2018). *Future ethics*. NowNext Press.
- Bowman, C., & Ambrosini, V. (2000). Value Creation Versus Value Capture: Towards a Coherent Definition, *British Journal of Management*, 11(1), 1-15.
- den Ouden, P. (2013). Creating meaningful innovations: the value framework. In C. de Bont, P. H. Den Ouden, H. N. J. Schifferstein, F. E. H., M. Smulders, M. van der Voort (Eds.), *Advanced design methods for successful innovation* (pp. 166-186): Design United.
- Dorst, K. (2015). Frame creation and design in the expanded field. *She Ji: The journal of design, economics, and innovation*, 1(1), 22-33.
- Friedman, B., & Hendry, D. G. (2019). *Value sensitive design: Shaping technology with moral imagination*. Mit Press.
- Haidt, J. (2001). The emotional dog and its rational tail: a social intuitionist approach to moral judgment. *Psychological Review*, 108(4), 814.
- Haidt, J., & Kesebir, S. (2010). Morality. In S. T. Fiske, D. T. Gilbert, & G. Lindzey (Eds.), *Handbook of social psychology* (pp. 797-832). John Wiley & Sons. <https://doi.org/10.1002/9780470561119.socpsy002022>
- Heskett, J. (2009). Creating economic value by design. *International Journal of Design*, 3(1), 71-84.
- Hinkle, D. N. (1965). The change of personal constructs from the viewpoint of a theory of construct implications [Doctoral Dissertation, The Ohio State University], *Personal Construct Theory & Practice*, 7, 2010.
- Jones, M. B. (2007). The multiple sources of mission drift. *Nonprofit and Voluntary Sector Quarterly*, 36(2), 299-307.
- Kalmykova, Y., Sadagopan, M., & Rosado, L. (2018). Circular economy-From review of theories and practices to development of implementation tools. *Resources, conservation and recycling*, 135, 190-201.
- Lepak, D. P., Smith, K. G., & Taylor, M. S. (2007). Value creation and value capture: A multi-level perspective. *Academy of management review*, 32(1), 180-194.
- Maio, G. R. (2016). *The psychology of human values*. Routledge.
- Maio, G. R., & Olson, J. M. (1998). Values as truisms: evidence and implications. *Journal of Personality and Social Psychology*, 74(2), 294.
- Moore, M. H. (2000). Managing for value: Organizational strategy in for-profit, nonprofit, and governmental organizations. *Nonprofit and voluntary sector quarterly*, 29(1_suppl), 183-204.
- Monteiro, M. (2019). *Ruined by design: How designers destroyed the world, and what we can do to fix it*. Mule Design.
- Norman, D. A., & Draper, S. W. (1986). *User centered system design: New perspectives on human-computer interaction*. Routledge.
- Oster, S. M. (1995). *Strategic management for nonprofit organizations: Theory and cases*. Oxford University Press.
- Papanek, V., & Fuller, R. B. (1972). *Design for the real world*. Thames and Hudson.

- Peppard, J., & Rylander, A. (2006). From value chain to value network: Insights for mobile operators. *European Management Journal*, 24(2-3), 128-141.
- Reynolds, T. J., & Gutman, J. (1988). Laddering theory, method, analysis, and interpretation. *Journal of Advertising Research*, 28(1), 11-31.
- Roeser, S. (2012). Emotional engineers: Toward morally responsible design. *Science and Engineering Ethics*, 18(1), 103-115.
- Schwartz, S. H. (2011). Values: Individual and cultural. In F. J. R. van de Vijver, A. Chasiotis, & S. M. Breugelmans (Eds.), *Fundamental questions in cross-cultural psychology* (pp. 463-493). Cambridge University Press.
- Schwartz, S. H. (2012). An overview of the Schwartz theory of basic values. *Online readings in Psychology and Culture*, 2(1), 2307-0919.1116.
- Schwartz, S. H., & Bilsky, W. (1987). Toward a universal psychological structure of human values. *Journal of Personality and Social Psychology*, 53(3), 550.
- Schwartz, S. H., Cieciuch, J., Vecchione, M., Davidov, E., Fischer, R., Beierlein, C., . . . Demirutku, K. (2012). Refining the theory of basic individual values. *Journal of Personality and Social Psychology*, 103(4), 663.
- Simon, H.A. (1957). *Models of Man, Social and Rational*. Wiley.
- Tonkinwise, C. (2004). Ethics by design, or the ethos of things. *Design philosophy papers*, 2(2), 129-144.
- Tonkinwise, C. (2014). Design away. In S. Yelavitch & B. Adams (Eds.), *Design as future-making*, 198-213. Bloomsbury Academic.
- Tromp, N., & Hekkert, P. (2018). *Designing for society: Products and services for a better world*. Bloomsbury Publishing.
- Troyer, J. (2003). *The classical utilitarians: Bentham and Mill*. Hackett Classic.
- Urde, M. (2003). Core value-based corporate brand building. *European Journal of Marketing*, 37(7/8), 1017-1040.
- Vallor, S. (2016). *Technology and the virtues: A philosophical guide to a future worth wanting*. Oxford University Press.
- Van de Poel, I. (2009). Values in engineering design. In A. Meijers (Ed.), *Philosophy of Technology and Engineering Sciences* (pp. 973-1006). North-Holland.
- Van de Poel, I. (2013). Translating values into design requirements. In D. P. Michelfelder, N. McCarthy & D. E. Goldberg (Eds.), *Philosophy and engineering: Reflections on practice, principles and process* (pp. 253-266). Springer, Dordrecht.
- Van de Poel, I., & Royakkers, L. (2007). The ethical cycle. *Journal of Business Ethics*, 71(1), 1-13.
- Van de Poel, I. R., & Royakkers, L. M. (2011). *Ethics, technology, and engineering: An introduction*. Wiley-Blackwell.
- Verbeek, P. P. (2006). Materializing morality: Design ethics and technological mediation. *Science, Technology, & Human Values*, 31(3), 361-380.



in 3 days due to deadline just taking a nap

for creative purposes

ARCHITECTS

of course these are huge clichés, let's change these!

graphic design

model-making 3D

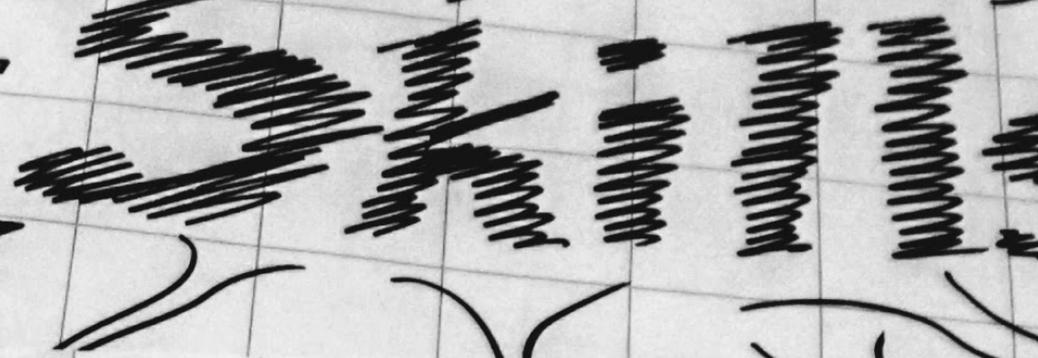
Values

refer to the societal

SM

INTEGRITY

honesty

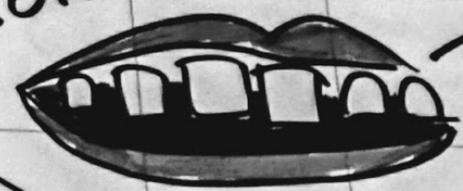


representation



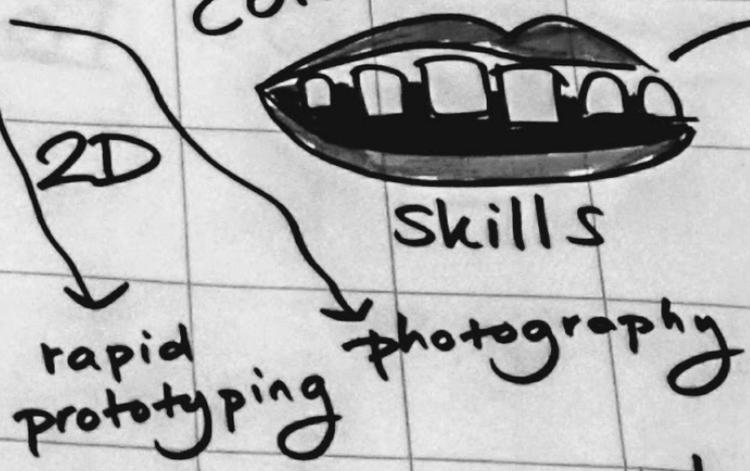
skills

communication



bla
bla
bla

skills



ies

professional / values

social interaction

love,
hugs,
friends &
sex

"purpose
of life"

what
the
world
is