TU Delft
DESIGN FOR VALUES

TU Delft

# Design for Justice

## White Paper Delft Design for Values Institute

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# 1. Introduction

*Societies are increasingly confronted with justice issues challenging the way we design our lives, society and environment.* These are not just traditional issues of social justice like the distribution of income and (political) power, but also a host of new issues related to the intersection of justice with emerging technologies, natural environments, shifting identities, and so forth. Designing technologies for justice issues is crucial in designing for values. This white paper provides an introduction into design for justice.

## Aims of the white paper

This white paper aims to provide an introduction into design for justice for a wide audience. It also demonstrates ongoing research on this topic by the TU Delft community and to contribute to the exchange of relevant knowledge and expertise. As one of the outcomes of the activities organised for the Delft Design for Values Institute's annual theme 'design for justice', this document includes recommendations on how to foster design for justice. These recommendations are not just relevant for designers, engineers, and academic researchers but also for educators and policy makers.

*Justice has become an important concern in a range of technological domains.* For example, *climate justice* has emerged to give attention within the climate change debate to the fair distribution of risks and benefits of climate change between generations (so-called intergenerational justice) (Caney 2021). Climate justice also relates to global injustices arising when countries from the Global South have to share the burden of climate change, even if they have less historical responsibility for greenhouse gas emissions and fewer resources and capabilities to adapt to climate change. Designing climate change mitigation and adaptation interventions calls for including justice as a value.

Also, societal and technological transformations needed to mitigate climate change, like the *energy transition,* raise justice issues (Jenkins et al. 2016). Typically, the benefits and burdens of the energy transition are not equally distributed, which has led to concerns about energy poverty and distributive justice. Also, the perspectives of some groups – like women - may be underrepresented in the design and shaping of alternative energy systems, which relates to issues of what is called recognition justice (Feenstra & Özerol 2021).

Similar observations on the need to integrate a design for justice approach apply to the design of *water systems.* Climate change will not only lead to higher sea levels but also has implications for water discharge through rivers. Decisions upstream have consequences for areas and measures to be taken downstream, and they thus raise concerns about distributive justice (Ciullo et al. 2020). Fresh water may become increasingly scarce, and this may lead to political conflicts between countries. Consequently, justice is a major value to be considered in the design of future water systems globally.

*Advances in artificial intelligence* raise new or aggravated fairness and justice issues, as has become painfully clear during the past few years. AI systems may be biased and lead to discrimination, for example, if such systems are used to make decisions in court, for law enforcement, for fraud detection, or for decisions about loans and mortgages (e.g. O'Neill 2016). One painful example from the Netherlands is the child benefit affair, in which parents were falsely accused of fraud and had to pay back large amounts of money to the government, and in which the algorithm used by the Dutch Tax Authority had a higher chance of accusing parents with a non-Western family name of fraud.

As these application areas demonstrate, justice is a value crucial for design in our increasingly technological societies. Although the attention to justice in design has been growing in the last 5 to 10 years (e.g., Costanza-Chock 2020), it is a value that is not yet systematically addressed in design and in engineering, technological, or urban research. Justice is a multifaceted value and often not well understood by designers of technologies, let alone that it is clear how to translate it into design choices and to trade it off against other values to make technologies more just.

Justice as a value may be included in existing design approaches such as *design for values* (Van den Hoven et al. 2015). As a procedural consideration, justice may already play an important role in approaches like *Responsible Innovation* (Owen et al. 2013) and in the participatory principles of the Design Justice Network.[1] However, fully incorporating justice in design and technology development may require multiple and potentially new frameworks, as we discuss in this white paper.

Designing for justice also requires new forms of *interdisciplinarity and transdisciplinary research.* Whereas in the past, justice was a topic or concern mainly addressed by political scientists, philosophers, and social scientists, nowadays, it has become a concern for engineers and technological scientists as well. Creating a just society does not only require just laws, just institutions and just decision procedures, but also just technologies and just methodologies applied to socio-material water, energy, and urban systems, among many others.

The Delft Design for Values Institute (DDfV) has adopted ‘design for justice’ as its annual theme for the academic year 2023—2024.[2] DDfV aims to develop and implement approaches that address values proactively in the design process and stimulate the exchange of relevant expertise and experience across the TU Delft and beyond.[3] We acknowledge justice as an important but still neglected topic in technical universities like the TU Delft.

This white paper is structured as follows. In section 2, we discuss the value of justice and the different varieties of justice. Section 3 explains how justice plays a role in technology and design. Section 4 introduces several frameworks that can be used in designing for justice. Section 5 presents justice in different application areas, based on a number of workshops that the Delft Design for Values Institute organised last academic year 2023 - 2024. Section 6 draws some conclusions and provides recommendations for the uptake of design for justice.

## 2. What is justice?

Justice is a feature of social institutions in the broadest sense, including laws, social norms, and technology. But 'just' is not the same as 'ethically good'. When a person steals something, it might be unethical, but it seems inappropriate to signify this action as 'unjust'. When a society structurally disadvantages certain groups of people, however, the society is unjust. Therefore, John Rawls defined justice as 'the first virtue of social institutions' (Rawls 1971: 3), and Powers and Faden stated that justice is 'a defining feature of the institutional arrangements and web of social norms' (Powers & Faden 2019: 1). A just society may be understood as one in which everyone receives what they deserve, in which goods are distributed in a fair way, and in which everyone has decision-making power. Injustice, therefore, can take on many different forms, such as oppression, systematic disadvantage, and violating people's rights (Powers & Faden 2019).

According to Iris Marion Young, 'justice is the primary subject of political philosophy' (Young 1990: 3). So, to dive deeper into the meaning of justice, we can turn to the domain of philosophy, including environmental philosophy and critical theory. Different dimensions of justice can be distinguished, such as distributive justice, procedural justice, recognition justice, and restorative justice (Schlosberg 2007). These dimensions or concepts should be distinguished from conceptions of justice, as each concept can be interpreted in multiple ways (Van Uffelen et al. 2024).

*Distributive justice* implies the just distribution of burdens and benefits. What this means is a topic for debate. For example, a pie can be distributed by giving everyone an equal piece or by giving the baker, or the hungriest person a bigger piece. Different goods may require different distributions (Walzer 1983). Energy services, for example, should not be distributed among energy consumers according to the same principles as job positions in engineering companies, which are often based on merit.

*Procedural justice* highlights the importance of just decision-making procedures. There are different conceptions of procedural justice, especially in the context of technological innovation. It is often unclear who should make decisions about design, especially when the technology will have a major societal impact. Traditionally, designers and engineers make most of the decisions, but many voices have argued for a more democratic design process. This raises the question of how much power stakeholders should have – should they be able to dictate what the designer does, or should the designer be able to override their input?

*Recognition justice* points towards the cultural aspects of justice (Fraser 2000). Justice as recognition entails a critique on viewing justice as solely a problem of distributive justice, as social norms can also be institutionalised, and unjust social norms often underlie unjust distributions (Young 1990; Schlosberg 2007). As such, justice has a cultural component, and injustices include the (institutionalised) devaluation of social groups through intersectional characteristics, such as homosexuals, people of colour, people with low socio-economic status, women and non-binary people, and so on.

*Restorative justice* is about restoring historical injustices. The first part of the equation is determining what harm(s) have been done. This refers to questions about moral responsibility and blameworthiness. For example, there are vivid debates about to what

extent the Global North should pay for the consequences of climate change in the Global South and whether one should only compensate for harm in retrospect or also for taking risks in the first place. There is often disagreement about what a just restoration would be – is an apology enough, or should there be a fundamental monetary redistribution or compensation?

To sum up*, justice is a virtue of institutions, including social norms,* consisting of several dimensions. However, there is normative uncertainty about what these categories entail. 'Justice' is not a simple concept that can simply be 'measured', 'applied' and 'designed' (Taebi et al. 2020; Van Uffelen et al. 2024).

### Justice as an overarching value

Justice has many different dimensions: distributive, procedural, recognition, restorative. We might even distinguish more, like *interactive justice* (dealing with the management of value conflicts in politics; Ceva, 2016), *epistemic justice* (about the treatment of knowledge claims coming from underrepresented groups; Fricker, 2013) or transformative or transitional justice (what counts as a just transition?). What these different kinds of 'justice' have in common is that they are all about how we should treat other people and how groups in society deserve (or have a right) to be treated. Justice may thus be conceived as an overarching, multidimensional value, with important implications for the development and design of technology.

## 3. Justice in design and technology

*The value of justice, traditionally discussed in relation to social institutions and the law, is deeply entangled with the domains of design and technology.* This has been true since ancient times, at least in the history of Western thought. We are reminded of that every time we see TU Delft's logo with the flame of Promotheus. As is widely known, according to Greek mythology, the pyre symbolises the fire and the useful arts stolen by Prometheus from Zeus to be handed over to humankind as the gift of *technology*. For his theft, Zeus sentenced the Titan to perpetual suffering, binding him to a stake on a mountaintop and having an eagle devour his liver every day, only for the organ to regenerate by night for the next day's punishment.

Figure 1. Logo of Delft University of Technology

A lesser-known account of this myth lays even more bare *the connection of technology with design and justice* (Guthrie 1956). With his brother Epimetheus, Prometheus was tasked with completing the *design* of all creatures that were to populate Earth, including humans, by equipping them with the proper means for survival. Epimetheus started distributing gifts across all animals in a compensatory manner, giving strength and size to some to prey on others, feathers and flying ability to some smaller ones to avoid getting eaten, and so forth. However, when getting to humans, Epimetheus (meaning "Afterthought") was perplexed to realize he had spent all natural gifts on other animals, leaving 'man naked, unshod, unbedded, and unarmed'. Coming to inspect his brother's work, Prometheus (meaning "Forethinker") then cunningly devised and executed the above-described theft, seeking to avoid the impending extinction of humans if they came into the world unfinished, unlike other creatures. As such, his divine transgression is also an act of providence for humankind and can be interpreted as motivated by a sense of *justice* not to let humans endure the fate caused by a fault in their design.

Beyond the myth's supernatural aspects, we know that, historically, humans have not been equipped with technological means due to divine misappropriation, nor has technology been naturally present and equally shared by all living beings. Rather, technology for human purposes, including fire, is always *designed* through the purposive transformation of given objects of the environment into something previously non-existent, new. In designing, humans exercise the afterthinking needed to establish that something that *is* should have been otherwise, plus the forethinking needed to conceive what *ought to be* in the future. Although this ability is not entirely absent in other animals, humans can design technologies that comparatively persist further and get refined over time, putting them in a distinct position to be held accountable for technological evolution and the world-transforming impacts of their designs.

Owing to the Promethean myth that 'continues to be a source of inspiration for the TU Delft engineer'[4], we hold that ***designing for justice*** **at this university should always**

**embody the human responsibility to appropriate technology for creating a world of greater equality for all living beings, not one where some are destined to suffer.**

Historically, all human societies had their own technological inventions and revolutions, leading to their respective opportunities and challenges related to design justice. Since the Industrial Revolution, design discourse has advanced mostly in particular disciplines, including architecture, mechanical engineering, and industrial design. Within these disciplines, several justice-related concerns have emerged or matured with broader societal repercussions, for instance, regarding the cultural-aesthetic value of machine-manufactured products, the impact of overconsumption on natural resources, strategies for revolutionizing predominant modes of production, adaptations of industrial development in poorer countries, restoration of indigenous values and traditions, and so forth. However, as an anthropological constant, design is not limited to any domain of human activity or discipline.

**Student contributions to design justice from various TU Delft faculties**[5]

A thesis award on the annual theme of 'design for justice' was organised to recognise and promote excellence in undergraduate education at TU Delft. The shortlisted submissions showcase the originality, rigour, breadth, and cross-disciplinarity characterising student-led projects. These include work coming from the following MSc programmes:

**Architecture, Urbanism and Building Sciences** (Faculty of Architecture and the Built Environment)
Algirdas Ramonas, 2023 'Brave tolerant city: planning for diversity forbearance in Kaunas'
Andria Charilaou, 2023 'Bodies of antithesis: gender power relations in conflict and militarized environments'
Anna Kalligeri Skentzou, 2023 'Landscapes of power: reconfiguring the energy production landscape of Western Macedonia'
Lucas Meneses Di Gioia Ferreira, 2021 'Territories of mediation: shared existences in the Brazilian Amazon'

**Communication Design for Innovation** (Faculty of Applied Sciences)
Tian Qing Yen, 2023 'Decolonizing the data science community through meaningful inclusion of underrepresented voices'

**Complex Systems Engineering and Management** (Faculty of Technology, Policy and Management)
Bram Ruiter, 2023 'Detection of hidden moralities in the energy transition: an explorative study for the development of a research method'

**Design for Interaction** (Faculty of Industrial Design Engineering)
Albert Kingma, 2019 'Design for compassion: Humanising the courtroom for the suspect'
Anne Arzberger, 2022 'Creating Monsters: crafting gender ambiguous child toys through reflexive designer-AI interactions'

Fabiana Tomasini Giannini, 2020 ‘Balancing Power: Explorations towards a more decolonial participatory design process’

**Engineering and Policy Analysis** (Faculty of Technology, Policy and Management)
Daphne van Meggelen, 2023 ‘Towards an equitable solar energy transition: on reaching the solar climate goals in Amsterdam’
Gerdus van der Laarse, 2023 ‘Towards climate-just nature-based solutions: a social vulnerability framework of ecosystem service demand’

**Integrated Product Design** (Faculty of Industrial Design Engineering)
Cindy Jantji, 2021 ‘Beige by default: the issue of skin tone inclusivity in product design and a proposal for resolving it in design education and professional practices’

**Transport, Infrastructure and Logistics** (Faculties of Civil Engineering and Geosciences, Mechanical Engineering and Technology, Policy and Management)
Nadine Martje Eichenauer, 2023 ‘The importance of sociodemographics in transport policy: an application of Latent Class Analysis to explore the impact of sociodemographics on travel behaviour profiles’

**Transport and Planning** (Faculty of Civil Engineering and Geosciences)
Monica Van Luven, 2022 ‘How to achieve an equitable distribution of accessibility by evaluating and modifying public transport networks: a comparison of accessibility distribution principles in the Netherlands’

QR Code theses awards
shortlist Design for Justice

## 4. Frameworks for designing for justice

Justice is a value of social life with great relevance for design and technology. In today's society, technology itself has become one of the main regulators of human behaviour. That is to say, technology has begun to function as a social institution that incorporates social norms and values. What norms and values are afforded by a technology depends on its exact design, and this is why it is crucial to design technologies with an understanding of their value-laden character while upholding the overarching value of justice.

*Designing for justice cannot be limited to technological design.* Nowadays, technologies and social institutions (like laws) are entangled in so-called sociotechnical systems, which makes designing for justice a partly social and political endeavour. Moreover, we should be open to the possibility that sometimes non-technological or low-technology solutions are preferable for addressing justice issues. For these reasons, social institutions should be designed for justice as well; for that, we must incorporate knowledge and practices coming from a diversity of disciplines.

*The value of justice can be taken up in design in two distinct ways,* reflecting the ambiguity of the term 'design' itself, which can refer to both a process and an outcome. First, it can be used from a *procedural* stance, implying the just involvement of relevant stakeholders, fair application of methods and techniques, fair delineation of objectives and evaluation criteria, etc., throughout multiple stages of the design process. Second, justice may be incorporated from a more substantive perspective as pertaining to the results (i.e. products, services, systems, etc.) of design processes. For both dimensions, there are existing design frameworks to build upon.

When it comes to incorporating justice in the design process, not just procedural justice is relevant but also recognition justice (and epistemic justice), which is about giving voice to underrepresented and marginalized groups. For example, the *design justice* movement echoes an important slogan of disability activists, 'Nothing about Us without Us', emphasizing that those affected by the design of something should always be involved in its design process (Costanza-Chock 2020). Another relevant framework is offered by *responsible innovation* that aims at aligning technological research and development with the values and needs of society (Owen et al. 2013). One important criterion for these practices is *inclusion*, which according to the responsible innovation approach, should be considered not only for moral and democratic reasons, but also because it leads to better technologies for a better society. Similar expectations regarding the procedural dimension of justice and the inclusion of this value in the design process can be observed in the various forms of *participatory design* since its inception (e.g., Alexander 1975; Ehn 1988; Schuler and Namioka 1993).

**Design justice: redefining design processes and the role of the designer**

Design justice, as presented by Sasha Costanza-Chock in her work "Design Justice: Community-Led Practices to Build the Worlds We Need,"[6] (Costanza-Chock 2020) represents a paradigm shift in the field of design. The approach builds on the principles of intersectionality and situated knowledge, with the aim to address systemic inequalities embedded or not addressed in traditional design practices. Design justice also challenges existing norms through advocacy for community-led, inclusive, and accountable design processes that empower marginalized groups and promote social justice (Costanza-Chock 2020).

Drawing from Langdon Winner's seminal work "Do Artifacts Have Politics?" (Winner 1980), design justice is rooted in the recognition that *design is inherently political.* Costanza-Chock (2020) emphasizes that design decisions often reflect and reinforce existing unjust power dynamics unless intentionally directed otherwise, and that the people most adversely affected by design decisions are typically excluded from the design process itself. Design justice explicitly seeks to rectify this imbalance by centering the voices of those directly impacted by design outcomes. Costanza-Chock assert that many *participatory design approaches* - including increasingly growing user-centered and human-centered design methodologies - fall short in terms of community accountability and ownership. Design justice goes further by explicitly addressing issues of power and equity. It advocates for a more inclusive professional design workforce and recognizes the value of community-led, indigenous, and diasporic design practices. Design justice also aligns with the principles of disability justice, that design practices should be accessible and inclusive for all. This approach demands a shift towards mechanisms for community control, equitable distribution of design benefits, and recognition of diverse contributions to the design process.

The framework of Design justice is also heavily influenced by *intersectionality*, which highlights how various forms of oppression (such as racism, sexism, and classism) intersect and compound each other. Costanza-Chock employ the Matrix of Domination, a tool developed by Patricia Hill Collins (1990), to assess and address these overlapping inequities within design practices. As such, a critical aspect of design justice is the production of *situated knowledge*. This concept, rooted in feminist epistemology (Harraway 1988), rejects what it calls a false dichotomy between objectivity and relativism. Instead, it acknowledges that all knowledge is produced from specific social and historical contexts. By valuing the perspectives and experiences of marginalized communities, design justice promotes a more nuanced and equitable understanding of design problems and solutions. The approach, therefore, aims to ensure that design processes do not merely incorporate user feedback but actively engage communities in co-creating solutions that address their unique needs and challenges. This way, design also becomes a tool to fight specific unjust power dynamics.

Costanza-Chock's vision for design justice is not just theoretical but deeply practical. They provide numerous examples of activistic design practices, such as using ICTs for

social justice movements and creating hackathons and hacklabs that prioritize marginalized voices (Costanza-Chock 2020). These practices embody the first principle of the Design Justice Network: "using design to sustain, heal, and empower communities while seeking liberation from oppressive systems." Costanza-Chock and others argue that, by embracing Design justice, the design field can move towards a more equitable and inclusive future, where all voices are heard, and all communities have the power to shape their own destinies.

When it comes to including justice considerations in the 'outcomes' of the design process, approaches like *value-sensitive design* (Friedman and Hendry 2019) and *design for values* (van den Hoven et al. 2015) are relevant. A first step in line with such approaches would be to elicit the relevant values, including the various forms of justice discussed earlier, that are at stake in the case and context at hand. A second step would be providing relevant conceptualisations of these different forms of justice and specifying them, for example, by translating them into design requirements for the product, service, or system to be designed (Van de Poel 2013). This may also require dealing with conflicting values; both different forms of justice may conflict with each other, as well as justice conflicting with other values. When justice is embedded into the results or outcomes of design processes, the criterion of inclusion is once again seen, this time in relation to integrating to the greatest extent possible relevant values of different stakeholders, interests, abilities, worldviews, and so on into designed outcomes. This ambition is a primary driver for such justice-oriented design approaches as *inclusive design* (Preiser and Ostroff 2001), *universal design* (Keates and Clarkson 2003), *culture sensitive design* (Boeijen and Zijlstra 2020), *pluriversal design* (Escobar 2018), among others.

*Dealing with justice in design is thus multifaceted and relates both to the process and the outcomes of design.* As far as we are aware there is currently no single design framework that incorporates in an integral way all relevant justice considerations. Designing for justice would therefore seem to benefit greatly from the creative combination of different frameworks or from developing new, more comprehensive ones.

# 5. Designing for justice in different domains

In the section, we explore how justice claims are currently contested across various social domains; specifically, we consider energy systems, artificial intelligence, spatial planning, and climate change. These are a result of inputs from workshops organised by the DDfV (Delft Design for values) community to examine justice discourses that emerge across a few technical fields present at TU Delft. As such, these discussions are by no means exhaustive and are not meant to represent a comprehensive overview of justice claims in the design of technology and technological artifacts; they merely give a snapshot of some example justice discourses.

## 5.1 Energy justice

**By Nynke van Uffelen**

Concerns about social justice in relation to energy systems and technologies are not new. Where the right to sustainable and clean energy for all are acknowledged globally, energy infrastructure is known to be harmful to humans, animals and environments. Think of the consequences of coal or lithium mining, the waste from nuclear energy production, oil pipelines crossing indigenous lands, or earthquakes induced by gas extraction. Since 2013, researchers expressed the need for an explicit agenda about energy systems and policies in relation to justice (McCauley et al. 2013). Since then, research on energy justice has increased exponentially and reflected in just energy policies.

Energy justice is generally understood as a pursuit to "provide all individuals across all areas with safe, affordable and sustainable energy" (McCauley et al. 2013). In other words, energy systems, technologies, and policies should be just, rather than unjust. In this, energy justice is often understood as a combination of procedural justice, distributive justice, recognition justice (Van Uffelen 2022; Feenstra & Özerol 2021), and restorative justice (Van Uffelen et al. 2024). Moreover, important principles that should guide design for energy justice are availability, affordability, due process, good governance, sustainability, intergenerational equity, intragenerational equity, responsibility, resistance, and intersectionality (Sovacool 2013; Sovacool et al. 2016, 2017).

Designing just energy systems faces an important challenge, because justice is a contested concept. Different stakeholders often interpret 'justice' differently. Competing conceptions of justice often cause resistance, social movements, and energy conflicts. For example, there are many debates about whether nuclear energy is a just solution or not, given its impact on the far future. Moreover, some people might consider subsidies for solar panels as a just policy measure, while others disagree and evaluate the measure as unjust. In other words, there is *normative uncertainty* about what the most just option is, and about how to design for energy justice (Taebi et al. 2020; Van Uffelen et al. 2024).

Energy justice has been set apart from value-sensitive design and responsible research and innovation (Jenkins 2016). In this, energy justice is supposed to focus on the effects of energy technologies, systems and policies, while RRI and VSD focus on the innova-

tion and design process (Sovacool 2021). However, it is crucial to consider energy justice already in the design phase. Therefore, we call for a stronger link between energy justice and design for values. Designing for energy justice requires interdisciplinary research, involving philosophy, the social science, and engineering. It is crucial to study the technological possibilities and their potential effects, risks, opportunities and challenges, which is the specialty of designers and engineers. Social scientists can study the conceptions of justice that different stakeholders maintain in relation to these technologies. Next, philosophers and ethicists can contribute an ethical assessment of these conceptions in their specific contexts. All these elements should inform a critical and inclusive dialogue as part of the design process.

## 5.2 Climate justice

**By Anna Melnyk and Edo Abraham**

Climate justice addresses ethical dimensions of climate change and its disproportionate impacts on current, past, and future generations. Its tenets of justice encompass the recognition of historical responsibilities and the equitable distribution of the benefits and burdens of climate action (e.g., in current and future mitigation and adaptation strategies). Climate justice emerged as an intersectional notion that connects environmental, social, gender, decolonial, and racial justice concerns regarding current, past, and future generations. It became a topic at the crossroads of academic research, policy-making, and social movements, creating a multifaceted forum for sharing, representing, and translating diverse voices on local and global issues. Whereas in academic scholarship, discussions of climate justice trace back to the beginning of the 1980s (Schlosberg & Collins, 2014), within climate policy and the public debate, it received quite a vocal uptake over the last decade. Numerous protests occur worldwide in the last decade with the slogan: "What do we want? Climate Justice! When do we want it? Now!" Climate justice has become an essential theme in international summits and conferences of parties (e.g., COP) and is an important notion for climate agreements (e.g., PCA, IPCC). Moreover, nowadays, climate injustice cases have become international court cases. In 2023, for instance, a surge of cases of climate injustice reached international courts and tribunals, seeking legal interventions, such as Pacific Island Students Fighting for Climate Change at the International Court of Justice and Senior Women for Climate Protection Switzerland with the complaint to the European Human Rights Court.

Backed by the human rights approach (e.g., Skillington 2017; Schapper 2018), climate justice in public and policy debates is focused on vulnerable people in light of current and future implications of climate change and consideration regarding inequitable distributions of benefits and burdens over time and across space. The human rights approach to climate change was first introduced by climate ethicist Simon Caney (2010) as a moral threshold equivalent to the universal human right to life, health, and food. Later, it served as an entry point for appealing to institutional actions regarding restoring climate injustices in international courts. Apart from the human rights approach, other climate justice discussions are typically built on non-duty-based ethical reasoning. Many scholarly discussions regarding climate justice include discussions about ethical principles and emission allocation models, e.g., Basic Rights, Polluter Pays, and Fair Division

(e.g., Shue 2020), strategies for climate mitigation and adaptation, including levels of strategy operation (e.g., micro and macro levels) (Whyte 2019) and cases of injustices towards freedoms (e.g., economic, political, social, transparency guarantees and protective security) (Alves & Marianno, 2018). As Caney (2015) suggests, these discussions can be seen as centred around two main themes: *Burden-Sharing Justice and Harm Avoidance Justice*.

**The role of technology:** Technology and complex sociotechnical systems like energy systems are at the forefront of many climate justice challenges and discussions (e.g., Gardiner 2011); addressing climate mitigation and adaptation will require systemic transformations of water, energy, agricultural, transport and other essential systems for society. These discussions usually offer a strongly critical or constructive-restorative approach to climate justice and technologies needed for climate mitigation (e.g., McCauley at al. 2013), climate adaptation, and climate engineering (Preston 2016). Some scholars are either extremely critical of technological development driven by economic growth (e.g., Tornel 2019) or are somewhat more optimistic about the possibility of addressing climate injustice issues, for instance, with the help of responsible and proactive engineering (e.g., Van de Poel 2017).

One of the initiatives that was taken to explore these perceptions on climate justice further was the Climate Justice workshop organised in cooperation between Delft Design for Values Institute and TU Delft | The Hague. The initiative brought together researchers, engineers, policymakers and practitioners to engage in two round tables to articulate different discourses regarding climate justice in the context of policies and technologies. Fruitfully, such stakeholder engagement is endemic to the design for values approach and simultaneously complements the objective of climate justice, inclusive discussion and cross-sectorial cooperation. By enabling stakeholders to engage with the topic directly, stakeholders shared their perceptions of climate justice with regard (and not) to their professional standpoint, experience and expertise. As Pearson et al. claim, such engagement on the level of perceptions can "serve as a bridge and barrier to cooperation" (Pearson et al. 2021). In the case of this workshop, it served as a bridge between different sectors and stakeholders representing these sectors.

## 5.3 Spatial Justice

**By Roberto Rocco and Marielle Feenstra**

Social processes unfold within particular spaces, where varied claims for justice compete for recognition and resolution, hence the expression “spatial justice.” *Spatial justice is a framework that seeks the fair and equitable distribution of burdens and benefits of spatial development and our life together in cities and communities.* It addresses how geography and space can contribute to or alleviate social inequalities, aiming to ensure that all individuals and groups have access to the benefits of urban life, such as public transportation, green spaces, social services, and political representation. Spatial justice challenges the idea that space is neutral, highlighting how spatial arrangements can perpetuate disadvantages for certain populations while advantaging others.

The "spatial turn" in the social sciences began in the late 20th century, emphasising the significance of space, place, and geography in understanding social phenomena (Bachmann-Medick 2016). Scholars across various disciplines recognised that spatial dimensions are not merely passive backgrounds for social action but active elements that shape social relationships, power dynamics, and cultural practices. This movement shifted focus from temporal and political analyses to considering how spatial arrangements influence political, economic, and social structures. It underscored the importance of 'space' as a critical factor in the production and reproduction of societal processes, leading to new insights into topics like globalisation, the connection between capital and urbanisation, and environmental issues (Lefebvre 1968). Lefebvre's ideas challenged the then-prevailing functionalist and technocratic approaches to urban planning and development, foregrounding the importance of space in the production and reproduction of social relations. His advocacy for the active participation of urban residents in the creation and transformation of their spaces was crucial to later urban social movements. This idea influenced participatory planning and design practices, emphasising the role of citizens in shaping their environments.

However, Lefebvre never used the term “spatial justice”, even though justice in the city was his guiding concept. The term "spatial justice" itself started to appear more frequently in academic writings in the early 21st century. Edward Soja, for example, prominently used the term in his 2010 book "Seeking Spatial Justice" (Soja 2010) where he directly links social justice to spatial planning and urban geography, making the case that justice has a geography and that the equitable distribution of resources, services, and accessibilities is a critical aspect of social justice. For Marcuse (2009), spatial justice requires addressing these issues by ensuring affordable, adequate housing for all, challenging the forces that prioritise profit over people’s right to the city.

It is challenging to separate social processes from space. For example, deprived neighbourhoods like slums are a glaring testament to social injustice. However, place matters in how citizens build their relationship with the State, with institutions and with each other, and how they access rights and services. Access to citizenship was built upon community action connected to a specific place, its challenges and the perpetual threat of eviction, which provided them with the impetus to collectively seek justice (Rocco & Ballegooijen 2018). They did so by pooling their collective resources (Newton & Rocco 2022) *The discussions around spatial versus social justice illuminate the complexity of achieving the "right to the city," showcasing the need for integrated approaches in urban design that consider both the spatial manifestations and the underlying social processes of urban inequality.*

## 5.4 Justice in AI

**By Cynthia Liem**

Ever since large-scale digitalization and datafication led to the incorporation of algorithmic predictive routines in decision-making processes, concerns have risen with regard to the degree to which the resulting systems automate biases and reinforce inequalities. When phenomena are to be translated to computer-readable data, inevitably, reductions

take place in the representation. With human designers choosing what will be measured, represented and optimized, choices made will encode their own world views and biases. Furthermore, parties commissioning these types of systems tend to hold considerable institutional and/or corporate power. As such, injustice will likely happen, in which rights and needs of minoritized and vulnerable populations easily get ignored. Several articles, essays and books have raised this issue (e.g. O'Neill 2016; Taylor 2017; Costanza-Chock 2018; Noble 2018; D'Ignazio & Klein 2020); striking is that authors of these works are often from minoritized groups themselves.

Still, data-driven prediction and decision-making has remained popular, with major algorithmic technological innovations in machine learning and AI having been spearheaded by Big Tech companies. With these companies being owners of large-scale data, and having the capacity to develop large-scale infrastructure, their R&D labs became an attractive employment option for researchers; as such, many of the current prestigious publication venues in AI and machine learning are dominated by authors with corporate lab affiliations. As noted by Birhane et al. (2022), when analyzing the most-cited works from such venues, the values encoded in the published research typically would promote Performance, Generalization, Quantitative evidence, Efficiency, Building on past work, and Novelty, which connect to visions of centralization of power. Again, this creates a culture in which the most obvious interests are not about protecting vulnerable groups from harm.

Research communities have acknowledged this, and the topic of algorithmic fairness has become actively researched, although it often focuses on aspects of distributional justice (e.g., balancing who should (not) be affected by an impactful decision). In this, the challenge is that no mathematical operationalization can capture all possible interpretations of fairness; in fact, different possible mathematical fairness optimization criteria will not be satisfiable at the same time, and thus, value systems need to be explicated to justify whether proper mathematical fairness criteria are chosen (Friedler et al. 2021). Furthermore, application domain experts typically are no algorithmic experts, making translations from conceptualizations of fairness to possible mathematical operationalizations challenging (Sarkar & Liem 2024).

Beyond distributional justice, for algorithmically minded audiences, questions of procedural justice are often considered out of scope. Still, in real-life applications, these are relevant too, and ideally, holistic views should be taken. For example, apart from predicting whether a citizen may have filed an erroneous welfare application, it matters whether this prediction is used for internal organizational monitoring of possible systemic biases or accessibility issues, or whether it leads to the citizen being treated as a criminal suspect. As another example, apart from predicting whether a customer of a vehicle-sharing platform may display risky driving behavior, the vehicles may be designed to nudge the customer towards safe driving behavior.

Here, more inclusive participation by more diverse audiences, starting from the design phase, will be beneficial. At the same time, because of the strong power imbalances inherent in the AI domain, authors have warned of risks of 'participation-washing', in which inherently unjust systems may unrightfully get legitimized through participation (Sloane et al., 2022). To avoid this, current inclusion-oriented reforms in the museum world, that manage involving communities while giving room to curation and the con-

frontation with different perspectives, may be inspirational (Huang & Liem, 2022). Furthermore, in the move towards more holistic approaches than a pure focus on algorithmic optimization, it may be helpful to see the prevention of algorithmic harm as a system safety challenge, and learn from system safety best practices that so far were implemented in other types of systems, and managed including transdisciplinary and socio-technical perspectives (Dobbe, 2022).

## 6. Conclusions: bringing justice and design together

The value of justice has gained importance in engineering and design over recent years. *A just society depends not only on just institutions and laws but also on just technologies.* There is an increasing body of scholarship addressing justice issues in technology, as witnessed by the emergence of new concepts like design justice, energy justice, climate justice, water justice, spatial justice, and algorithmic fairness. Nevertheless, despite the existence of design-relevant concepts and frameworks, justice is a value that has not been addressed in technological design as systematically as other values such as safety, sustainability, and privacy.

We therefore recommend technical universities like TU Delft to pay more attention to design justice issues in research and education, as well as in its societal outreach. The MSc thesis competition and the various events that the DDfV institute organised on design for justice this year shows that among students and researchers there is considerable interest in, and remarkable work on the topic.

In the humanities and social sciences, there has long been serious engagement with the value of justice in research and education, but usually with lesser elaboration over design and the role of technology. We firmly believe that the societal challenges of the 21st century demand a swift and decisive bridging of the gap between the engineering and technological sciences and the social sciences and humanities, fostering new modes of interdisciplinary cooperation to advance design aimed at social justice.

There is a proliferation of justice terms, relating the value to specific domains, contexts, and technologies. This helps to make justice concerns more concrete and operational, so that it becomes clearer how justice can guide the development of specific technologies in specific contexts. However, there may also be a certain risk in this development. Justice concerns eventually apply to entire societies and cannot be fully compartmentalized. Identifying, analysing, and addressing social injustices requires and integral and intersectional view. We therefore plea for a continuing dialogue between the different strands of research on justice in technology and for an integral design approach that integrates different justice concerns as well as other values.

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[1] https://designjustice.org/read-the-principles
[2] Design for Justice - Delft Design for Values Institute
[3] https://www.delftdesignforvalues.nl/
[4] https://www.tudelft.nl/en/huisstijl/bouwstenen/logo/pictorial-mark
[5] All theses are to be found on the TU Delft Education Repository or on the website of Delft Design for Values
[6] Design for Values Colloquium held on 15/01/2024 hosted Dr. Sasha Costanza-Chock. The talk explored their book "Design Justice: Community-Led Practices to Build the Worlds We Need (2020)".

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## *About Delft Design for Values Institute and TU Delft*

The Delft Design for Values Institute (DDfV) is part of TU Delft, or Delft University of Technology. The university is a renowned public technical university located in Delft, the Netherlands. Established in 1842, it is the oldest and largest technical university in the country. TU Delft is nationally and internationally known for its strong emphasis on engineering, design and applied sciences. It offers a wide range of undergraduate and graduate programs, fostering innovation and research in fields such as aerospace engineering, civil engineering, and architecture. The university collaborates with industry, the public sector and other academic institutions worldwide, maintaining a strong focus on sustainability and addressing global challenges through its research and educational programs.

Delft Design for Values is a collaboration of five faculties of TU Delft: Technology, Policy and Management (TPM), Industrial Design Engineering (IDE), Architecture and the Built Environment (ABE), Civil Engineering and Geosciences (CEG) and Electric Engineering, Mathematics, and Computer Science (EEMCS). The institute contributes to the realization of the mission of TU Delft "to make a significant contribution towards a sustainable society" and to train "scientists and engineers with a genuine commitment to society" to contribute to "technological innovations with both economic and social value".

Design for values requires the integration of different kinds of expertise and skills. It requires knowledge of and expertise in design, philosophical knowledge of values and relevant moral theories, and domain knowledge of specific technologies. TU Delft is uniquely positioned to bring such knowledge and skills together in one institute. It is well known for its excellence in engineering and design, but it also has unique expertise in philosophy and ethics of technology. In the last few decades, researchers from TU Delft have internationally played a prominent role in (further) developing the design for values approach. The vision of the institute on design for values is:

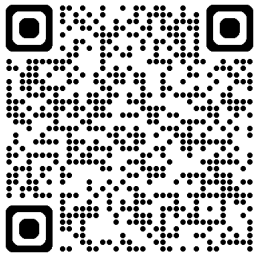
1. Design for values is a design approach aimed at integrating values in all stages of the design process. It foregrounds sensitivity to values instead of seeing them as a mere constraint at the end of a design process.
2. Design for values should aim at both social acceptance and moral acceptability of designed products, systems and services. It critically scrutinizes stakeholder values for moral acceptability.
3. Design for values requires a transdisciplinary approach that involves different academic disciplines, societal stakeholders and industry. It combines expertise in design, engineering and philosophy. It requires insight into the nature of values, reliable operationalizations of values, the translation of values into design options, and methods to assess the consequences of different design options to compare them with the target values.

The Institute undertakes activities in the areas of:

- Research: funding & organization of academic events, formulating a research agenda, facilitating research initiatives, facilitating visiting scholars

- Education: teaching Ph.D. courses, minors, MOOCs, masterclasses for practitioners, and Fundamentals Lecture Series for students & researchers
- Collaboration: collecting best practices & stimulating learning between faculties, application domains, values or design traditions (for example, through 'playground meetings')
- Outreach & external visibility: online portal; public events; engaging in public debates

Want to know more about DDfV? Look on our website www.delftdesignforvalues.nl, follow us on LinkedIn or reach out to info@delftdesignforvalues.nl



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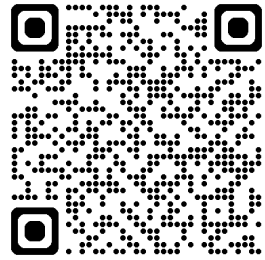

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