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Photo by Ivy Steijn, Laura van der Linden, Nora Allan, and Sanne Grommers

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MAIN SECTION

Value Mapping as a Pedagogical Tool to Understand Complex Urban and Landscape Challenges

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ABSTRACT

The current work explores value mapping as a pedagogical tool to gain a better understanding of the role of values in addressing sustainability challenges and their implications across scales, disciplines, and time. First, we introduce a Master-level course where students use the city as a learning ecosystem and engage with situated creative practices tackling global sustainability challenges at a local scale. Then we discuss the developed value maps. It can be concluded that the value mapping process not only proved instrumental in offering valuable insights and contextual understanding into the intricate, and sometimes conflicting, values identified, but also fostered students' critical thinking skills, allowing them to identify potential areas of discord among stakeholders. The collaborative mapping approach, guided by shared values and facilitated by design expertise, holds the potential to overcome challenges, create a thriving ecosystem, and ensure a future where ecological well-being, shared responsibility, and informed decision-making go hand in hand.

KEYWORDS
Design Expertise, Ecology, Sustainability Challenges, Urban Transformations, Value Mapping.

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1. Introduction

The contemporary landscape of urban transformation recognizes the crucial role of value-based methodologies.[1] These approaches emphasize the importance of identifying, analyzing, and integrating diverse values into decision-making processes to address complex urban and landscape challenges. As Hein and colleagues[2] highlight, value mapping serves as a powerful tool to make implicit, unconscious, and seemingly self-evident values explicit, particularly in port cities. By visualizing these values, value maps aid planners and designers in both identifying and communicating the multifaceted value generated by projects or initiatives for various stakeholders.[3,4]

At its core, the concept of "values" encompasses fundamental principles, needs, and aspirations that influence decision-making.[5] The process involves crafting a visual representation of these values, their underlying principles, and their connections to real-world contexts.[6] This methodology helps to identify and illustrate the diverse values stakeholders attribute to different sites within a city or region.[7] By overlaying these values onto a map, urban designers gain a comprehensive understanding of the diverse aspirations and perspectives that shape the city's identity.

Value maps are particularly effective in acknowledging and managing a broad spectrum of values, encompassing cultural, economic, and environmental dimensions.[8] This holistic perspective empowers urban designers to make informed decisions aligned with the needs and aspirations of the community. For instance, values might include aspirations for ecological conservation, economic growth, or the preservation of cultural heritage, each carrying distinct implications for urban design.

The advantage of framing interests as "values" lies in their ability to reveal both alignments and tensions among stakeholders. Unlike isolated

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1 Carola Hein, Ingrid Mulder and Hilde Sennema. "A Call for Value Literacy in Port City Transitions." *European Journal of Creative Practices in Cities and Landscapes* 4, no. 2 (2021): 108-129.

2 Hein, Mulder and Sennema, "A Call for Value Literacy in Port City Transitions".

3 Joshua Radinsky et al. "How Planners and Stakeholders Learn with Visualization Tools: Using Learning Sciences Methods to Examine Planning Processes." *Journal of Environmental Planning and Management* 60, no. 7 (2017): 1296-1323.

4 Antje Kunze et al. "Visualization and Decision Support Tools in Urban Planning." *Digital urban modeling and simulation* (2012): 279-298.

5 Annika Manni, Karin Sporre and Christina Ottander. "Mapping What Young Students Understand and Value Regarding Sustainable Development." *International Electronic Journal of Environmental Education* 3, no. 1 (2013): 17-35.

6 Li Peng, Xuxi Wang and Tiantian Chen. "Multifunctional Land-Use Value Mapping and Space Type Classification: a Case Study of Puge County, China." *Natural Resource Modeling* 32, no. 4 (2019): e12212.

7 Gregory Brown. "Mapping Spatial Attributes in Survey Research for Natural Resource Management: Methods and Applications." *Society and Natural Resources* 18, no. 1 (2004): 17-39.

8 Andrea Rawluk et al. "Exploring Multiple Dimensions of Values and Valuing: a Conceptual Framework for Mapping and Translating Values for Social-Ecological Research and Practice." *Sustainability Science* 14 (2019): 1187-1200.

interests, values are inherently multidimensional, capturing not only current priorities but also aspirational goals. While benefitting from collaborative mapping techniques integral to the value mapping process, designers can synthesize diverse viewpoints into actionable insights, fostering shared ownership of outcomes, and aligning design interventions with stakeholder aspirations.[9] Collaborative mapping refers both to the participatory nature of the mapping exercise and to the role of designers as facilitators who mediate between stakeholder groups. Moreover, collaborative mapping approaches can be seen as a means towards collective sensemaking.[10]

Even so, the foundation of such mapping approaches lies in the ability of value maps to illuminate the underlying conditions, values, and mindsets that shape urban landscapes.[11] Design plays a crucial role in navigating the complexities of cities, acting as a tool for problem-solving and facilitating sustainable social innovation.[12] Cities concurrently represent both challenges and opportunities for tackling contemporary societal issues, such as climate change and environmental degradation.[13] How urban spaces are utilized reflects various stakeholders' diverse interests, aspirations, and values.[14] However, pinpointing and reconciling these values within the intricate context of cities can be a demanding task.[15]

In the current work, we explore value mapping as a pedagogical tool by moving away from a tool-and-methods-prescription-approach to train upcoming designers to become more value literate in their understanding of mitigating sustainability challenges and develop competencies to deal with the corresponding implications across scales, disciplines, and time.

2. Methodology

The study was conducted within a Master-level course titled "*Design & the City*", part of an Industrial Design and Engineering curriculum, allowing students to explore the emerging role of design in the public realm. Hence, cities are complex and challenging environments, asking for innovation to deal with large-scale societal challenges. This means going beyond more

9 Hein, Mulder and Sennema, "A Call for Value Literacy in Port City Transitions".

10 Aldo de Moor et al. "Collaborative Sensemaking of Design-Enabled Urban Innovations: the Mapping DESIGNSCAPES case." In *International Workshop on Measuring Ontologies in Value Environments*, (2020): 203-226.

11 Zuzana Harmáčková et al. "Linking Multiple Values of Nature with Future Impacts: Value-Based Participatory Scenario Development for Sustainable Landscape Governance." *Sustainability Science* 17, no. 3 (2022): 849-864.

12 Eduardo Staszowski, Scott Brown, and Benjamin Winter. "Reflections on Designing for Social Innovation in the Public Sector: a Case Study in New York City." In *Design for policy*, pp. 155-166. Routledge, 2016.

13 Aidan While and Mark Whitehead. "Cities, Urbanisation and Climate Change." *Urban Studies* 50, no. 7 (2013): 1325-1331.

14 Donizete Beck and Jose Storopoli. "Cities Through the Lens of Stakeholder Theory: a Literature Review." *Cities* 118 (2021): 103377.

15 Hein, Mulder and Sennema, "A Call for Value Literacy in Port City Transitions".

conventional market- or user-driven innovation towards mission-driven innovation. Cities are also contexts where design plays a key role in solving situated problems and where its adoption can be further fostered to address sustainability challenges. Please take note that the course does not derive from an urban planner or urban design perspective but aims to contribute to the current call for new inter- and transdisciplinary methodologies to tackle values in urban transformations. Therefore, the course refers to the city as a learning ecosystem and encourages students to develop their learning journeys and action repertoire while exploring the evolving role of designers in tackling real-world sustainability challenges, developing value-driven design practices, and/or addressing urban transformations.[16]

2.1. Transdisciplinary Collaboration

More specifically, the course is developed as a transdisciplinary learning space where students can participate in a timely discussion on the rapidly changing role of design in addressing sustainable development goals by working in close collaboration with pioneering creative practices and transdisciplinary programs that aim to push the envelope of design for the common good (e.g., New European Bauhaus[17]). In earlier editions of the course, students benefited from the pioneering European H2020 project DESIGNSCAPES: Building Capacity for Design-enabled Innovation in Urban Environments at the interplay of Design, Innovation, and the City[18,19] while more recent cohorts joined forces with the ongoing New European Bauhaus demonstrator Bauhaus of Seas Sails,[20] a New European Bauhaus lighthouse reimagining sustainable living through creative, interdisciplinary approaches. The project focuses on leveraging the sea as a critical natural resource, empowering cities near water bodies to achieve climate neutrality through innovative design interventions.

2.2. Course Setup and Structure

The course has run for eleven editions (n=236); the learning objectives and final assignment were similar for all editions; however, themes, challenges, local territories, and ecosystems as well as the values unveiled varied across cohorts and student teams. Each course spans ten weeks,

16 Ingrid Mulder and Alberto Magni. "A Collaborative Learning Infrastructure to Build Capacity for Urban Transformations." *Interaction Design & Architecture(s)* 52 (2022): 119-140.

17 EU. "New European Bauhaus." Accessed December 18, 2024.

18 Ingrid Mulder and Alberto Magni. "Design and Engineering as Agents of Change: a Capabilities." In *DS 117: Proceedings of the 24th International Conference on Engineering and Product Design Education* (E&PDE 2022), London South Bank University in London, UK. 8th-9th September 2022. 2022.

19 Grazia Concilio and Ilaria Tosoni. *Innovation Capacity and the City: The Enabling Role of Design*. (Cham: Springer, 2019).

20 Nuno Jardim Nunes. "The Bauhaus of the Seas: A Manifesto for the New European Bauhaus." *Design Issues* 40, no. 2 (2024): 90-97.

with students dedicating approximately twelve hours per week to lectures, workshops, and project work. The course's primary objective is to help students understand the significance of value-driven urban transformations and to develop design capabilities for addressing these challenges. The main deliverable is a value map, which refers to a visual placeholder enabling students to convey acquired insights. The purpose of such a value map is to articulate insights explicitly, revealing the conditions, values, and mindset within the selected context.

The course setup as a dialogical learning space,[21] combines theoretical grounding with hands-on mapping exercises, fostering students' understanding of value systems and their application in urban contexts. Several inter- and transdisciplinary viewpoints are brought in by guest lectures and supported by group assignments enabling students' reflection upon values and the emerging role of design in urban transformations. In this way, students gain insights throughout the course to construct a value map that identifies the ecosystem of actors and communicates value-driven pathways across multiple dimensions. For example, by engaging in hands-on value mapping exercises using value card methodology,[22] students gained a deeper understanding of the value systems at play within the designated locations and ecosystems. Other lenses presented referred to the use of open geodata encouraging students to connect values and data[23] to develop value maps that add a value-based narrative layer to the Bauhaus of Seas geospatial platform[24]. This platform is a tool designed to analyze coastal regions such as port-city territories, aimed at supporting sustainable development. The platform integrates open-access geospatial data with sustainability, aesthetics, inclusivity data, and narratives from land-sea interactions, enabling data-driven decision-making.

2.4. Mapping Beyond the Monodisciplinary Approach

As said before, the primary course deliverable is a visual representation of stakeholder ecosystems and value creation pathways, encompassing cultural, social, ecological, and economic dimensions. These maps act as tools for communicating complex insights and facilitating dialogue

21 Mulder and Magni. "A Collaborative Learning Infrastructure to Build Capacity for Urban Transformations".

22 Irene Conversano, Livia del Conte and Ingrid Mulder. "Research Through Design for Accounting Values in Design." In *Proceedings of the fourth biennial Research through Design Conference* (RTD 2019) "Method & Critique – Frictions and Shifts in Research through Design", 19-22 March 2019 | Science Center, Delft & Het Nieuwe Instituut, Rotterdam, The Netherlands.

23 María Elena López-Reyes, Birger Larsen, Ingrid Mulder, and Rikke Magnussen. 2024. "Navigating Open Data Ecosystems: Exploring Engagement in the Use of Local Governments Open Geodata". In *Proceedings of the 17th International Conference on Theory and Practice of Electronic Governance* (ICEGOV '24). Association for Computing Machinery, New York, NY, USA, 120–129.

24 Bauhaus of the Seas Sails Geospatial Platform. Accessed December 18, 2024. https://bauhaus-seas.app/

among an ecosystem of stakeholders pushing disciplinary borders.

The current study draws from the tenth cohort of the course, which focused on the Flemish-Dutch Delta, a region at the confluence of the Rhine, Meuse, and Scheldt rivers, which is one of the Bauhaus of Seas pilots. This Delta plays a vital economic and ecological role, with cities like Rotterdam and Antwerp serving as major ports. The students were grouped into six teams of three to four students each. They were asked to select a specific challenge such as water management, renewable energy, or urban biodiversity. Students were free in their choice as long as they motivated the relevance for the Bauhaus of Seas vision and the Delta context in particular. Students employed digital tools to create their maps. Data collection methods varied across teams. Some groups engaged directly with stakeholders (e.g., policymakers, NGOs, and local communities). Others relied on secondary sources, such as policy documents, academic literature, and datasets, to inform their analysis. Although the students were guided through the value mapping process, value mapping was not presented as a step-by-step process. Instead, the ability to produce a value map justifies the students' learning journey.

The following section presents the outcomes of the value mapping exercises conducted by the student teams.

3. Value Mapping Results

All groups explored themes of beauty, sustainability, and togetherness, aligned with the principles of the Bauhaus of the Seas Sails project. Their processes culminated in the development of value maps, presented through interactive tools and layered framework that invite the user to actively explore and engage with them.

A common focus was that values were locally groundedin in the urban setting, where students addressed values derived from the use of natural resources and urban spaces. They examined local initiatives and stakeholders in Rotterdam that demonstrated attention to sustainability, biodiversity, and liveability. A recurring theme was the potential of unused urban spaces to create new value for the city. Examples such as repurposing an old heliport or city rooftops illustrate how these underutilized areas can be returned to citizens, while fostering a deeper understanding of the interconnectedness between sea life, the environment, and the city.

Another shared theme across the value maps was the relationship with water. Water-centric environments are characterised by the complexity of holding together a diverse network of stakeholder, including the non-human ones, and conflicting interests. Students highlight the challenge of achieving balance between human activities, economic growth, and environmental preservation. The Borssele Wind Park at sea, was used as a case study bto address the "green dilemma", the urgent need for

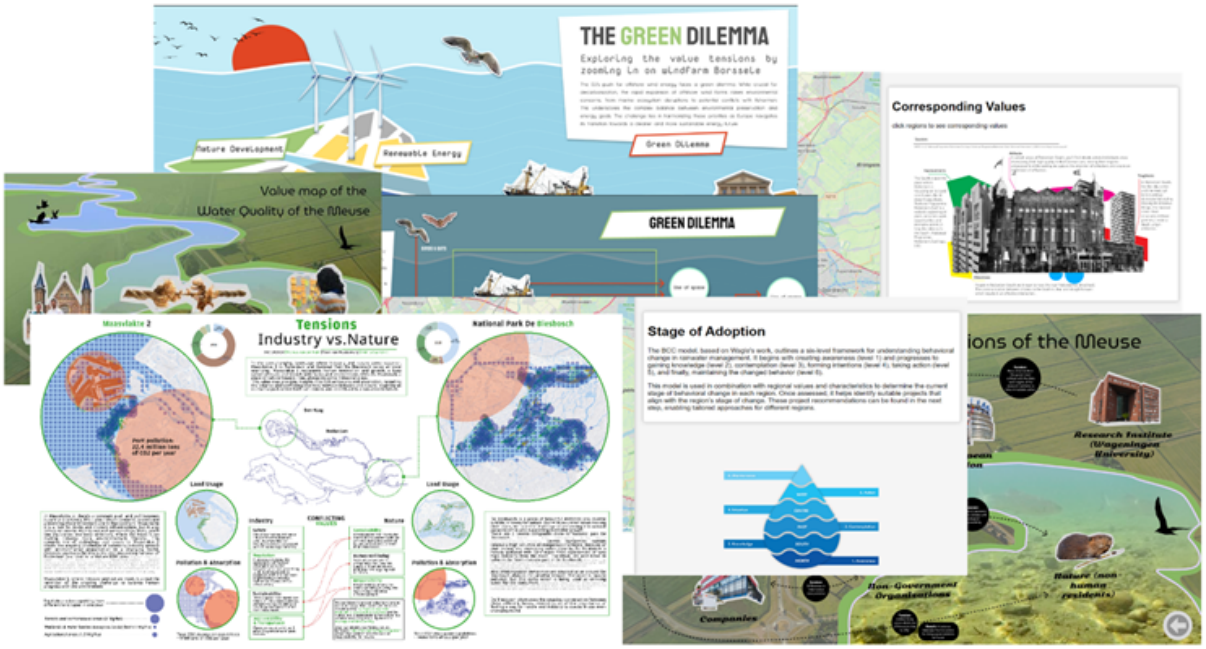

FIG. 1 A collage of resulting Value Maps. Jos van der Velden, Karel Hamburg, Maarten de Jong, Ivy Steijn, Laura van der Linden, Nora Allan, Sanne Grommers, Lori Lo, Rijk Roozenbeek, Siqi Chen, Ömer Taha Döver, Nicole Marques Morgado, Silke Rijcks, Florence Kao, Shervin Tjon, Federico Villa, Teun van Woudenberg, Andrija Stanković and Thomas van der Helm 2023.

sustainable energy solutions alongside the equally pressing goal of reconciliation with the sea, a core anchor of the Bauhaus of the Seas Sails project. This dilemma underscores the importance of sustainable development considering both ecological preservation and economic imperatives (see Section 3.2 for details).

Similarly, other groups looked into the intricacies of the river Meuse (Maas), where the need of preserving the water environment and its bio-diversity intersects with the importance of reconnecting with the local communities. Their value map encourages a deeper understanding of the complex interactions around the river, illustrating the challenges of balancing economic development, environmental protection, and societal well-being.

Figure 1 shows a collage of the value maps produced by the students, each addressing specific challenges such as water management, renewable energy, or urban biodiversity. An elaborate narrative of the students' work can be found here[25] and here.[26]

In the remainder, we elaborate upon the results from three student teams to illustrate different aspects of the value mapping process—conflict resolution, inspiring design opportunities, and stakeholder alignment. These examples demonstrate the utility of value mapping as a tool for addressing sustainability challenges and fostering collaboration among diverse stakeholders.

25 https://www.portcityfutures.nl/id5127-design-and-the-city

26 https://delftdesignlabs.org/news/reconceptualizing-the-agenda-of-design-in-port-cities-mapping-values-for-a-value-based-future-in-the-delta-region/

3.2. Navigating the 'Green Dilemma': Stakeholder Values in the Borssele Wind Park

The Borssele Wind Park[27] serves as a compelling example of conflict resolution within the context of renewable energy transitions. Located in the North Sea, this offshore wind farm faces the "Green Dilemma,"[28] balancing environmental conservation, economic interests, and societal needs. The value map created for this case highlights the intricate network of stakeholders—including energy providers, policymakers, conservation groups, and local communities—and visualizes their competing priorities.

Key values identified include: 1) Economic growth, driven by renewable energy production. 2) Ecological preservation, emphasizing marine biodiversity and sustainable practices. 3) Community engagement, focusing on equitable resource use and local benefits.

The value map revealed tensions between economic objectives and ecological concerns, such as the potential disruption of marine ecosystems by wind farm operations. By mapping these tensions, the process facilitated a nuanced understanding of stakeholder priorities and identified opportunities for compromise, such as incorporating seaweed cultivation within the wind park. This approach not only mitigates environmental impact but also generates additional value through innovative mariculture initiatives. The Borssele case underscores the role of value mapping in resolving conflicts by fostering informed dialogue and collaborative decision-making.

The value map's significance lies in its ability to visualize the interests, alignments, and tensions in values among diverse stakeholder groups within the Borssele Wind Park. It offers a visual representation of the intricate dynamics associated with the wind farm, emphasizing that it is not a universally applicable solution. The map acts as a visual synthesis of the complexities inherent to the "Green Dilemma," utilizing the wind park as its contextual framework (Fig. 2). Selecting the "green dilemma box" within the map reveals the various stakeholders involved, along with their associated values and the potential tensions arising between them (Fig. 3). Further details can be accessed by hovering over the different elements (Fig. 4).

27 Golroodbari et al. "Pooling the Cable: a Techno-Economic Feasibility Study of Integrating Offshore Floating Photovoltaic Solar Technology Within an Offshore Wind Park." *Solar Energy* 219 (2021): 65-74.

28 Tanja Straka, Marcus Fritze and Christian C. Voigt. "The Human Dimensions of a Green–Green-Dilemma: Lessons Learned from the Wind Energy—Wildlife Conflict in Germany." *Energy Reports* 6 (2020): 1768-1777.

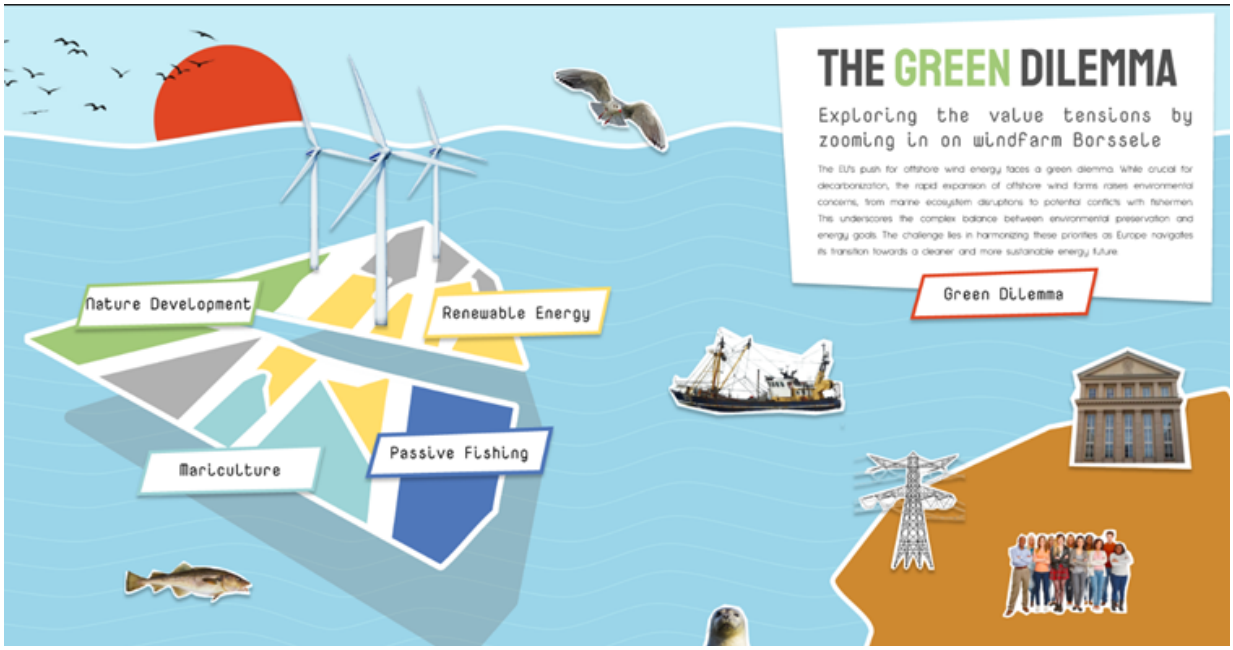

FIG. 2 The green dilemma value map. Ivy Steijn, Laura van der Linden, Nora Allan, and Sanne Grommers 2023.

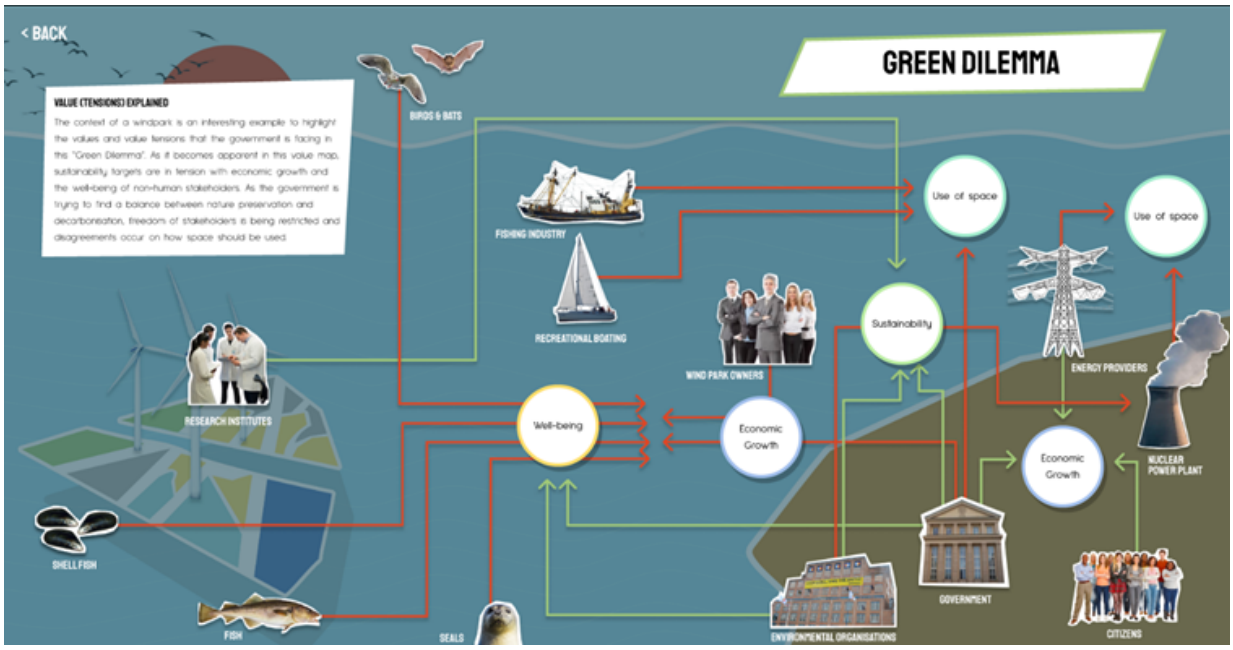

FIG. 3 Stakeholder's values and tensions. Ivy Steijn, Laura van der Linden, Nora Allan, and Sanne Grommers 2023.

Returning to the initial map view (Fig. 2), we observe the wind farm segmented into four distinct categories: Nature Development, Renewable Energy, Mariculture, and Passive Fishing. Clicking on each section reveals a corresponding detailed description (Fig. 5), providing a deeper understanding of the activities and interests within that specific domain.

Further exploration through the "values of this area" section triggers another interactive value map, focusing exclusively on stakeholders associated with the chosen category (Fig. 6). Employing the same intuitive

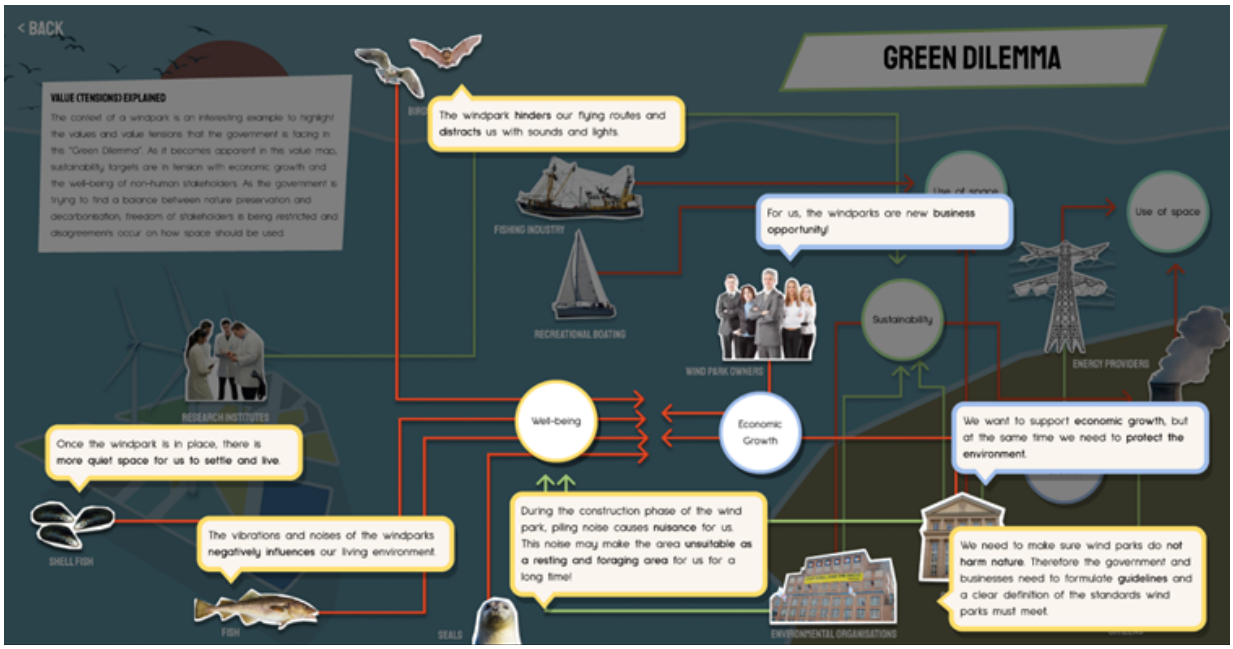

FIG. 4 Additional information. Ivy Steijn, Laura van der Linden, Nora Allan, and Sanne Grommers 2023.

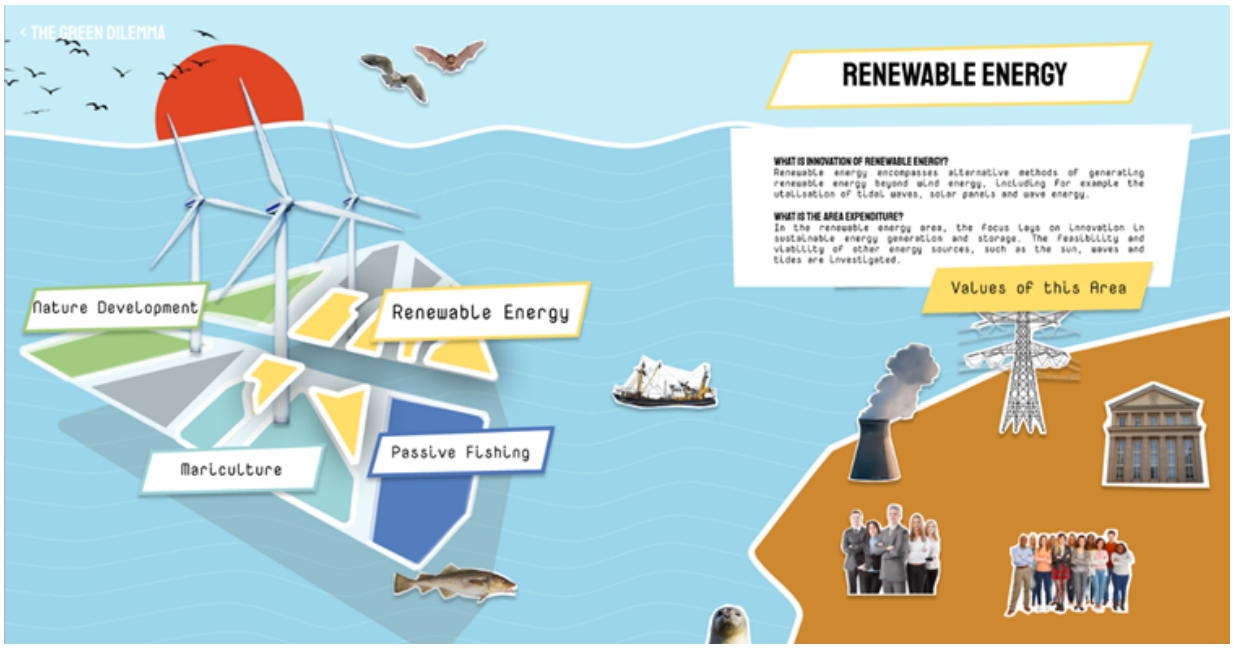

FIG. 5 Renewable energy in the area. Ivy Steijn, Laura van der Linden, Nora Allan, and Sanne Grommers 2023.

hovering mechanism, users can access further explanations regarding the values held by diverse stakeholders and the potential tensions arising between them. This layered approach facilitates a nuanced comprehension of the complex interplay between competing interests and shared values within the wind farm ecosystem.

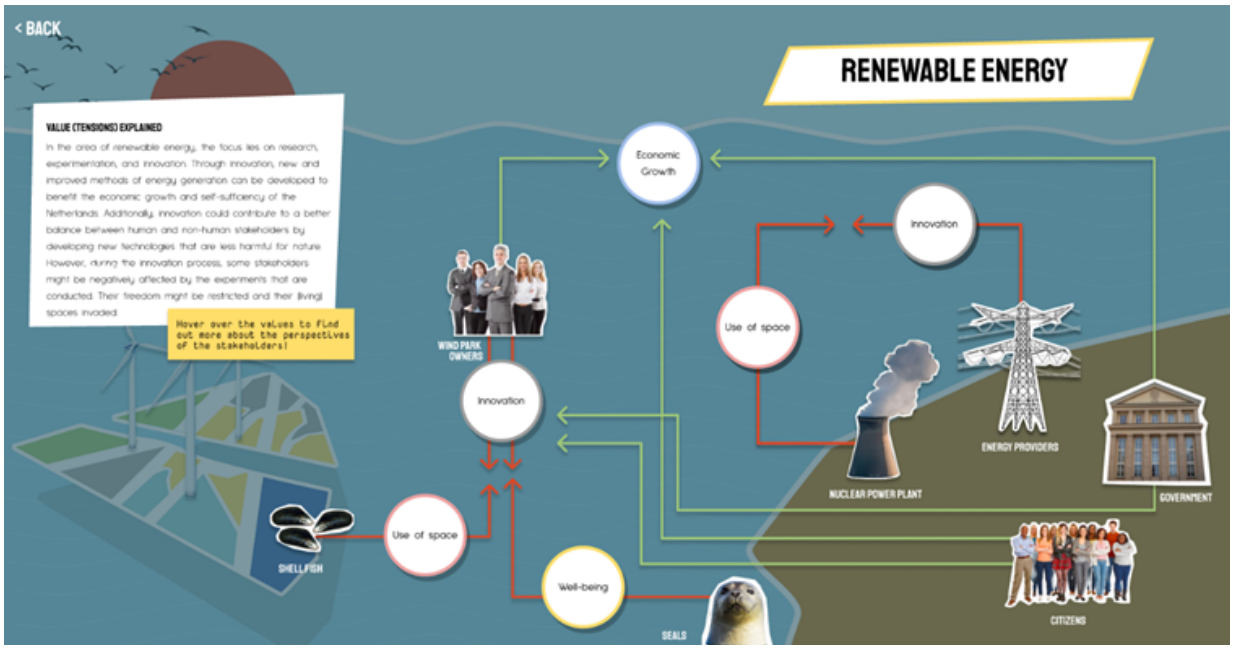

FIG. 6 Additional information about renewable energy in the area. Ivy Steijn, Laura van der Linden, Nora Allan, and Sanne Grommers 2023.

The Borssele case study offers a compelling example within the global quest for renewable energy solutions. In the face of the "Green Dilemma," the value map serves as a guiding framework, facilitating the navigation towards an optimal balance that accommodates the diverse interests of stakeholders. It ensures that the voices of both human and non-human entities are represented and heard. Furthermore, a comprehensive understanding of stakeholder values and their interactions is critical for effectively addressing the "Green Dilemma" and constructing a more equitable future. The Borssele wind park value map emerges as a valuable resource in tackling this complex issue, illuminating the intricate dynamics that shape energy transitions worldwide.

3.3. Stakeholder Alignment in the Blue Economy: The Alga.farm Project

The Alga.farm project in Rotterdam highlights value mapping's role in fostering stakeholder alignment within a circular economy framework. This initiative repurposes the former Tropicana swimming pool into a facility for cultivating spirulina, demonstrating how abandoned urban spaces can be revitalized through innovative ecological practices. The value map categorized the project's impact into three scales: 1) Local (Drop-Pilot): Enhancing community engagement and environmental awareness. 2) Citywide (Ripple-City): Promoting collaborations between businesses and local governments. 3) Global (Wave-Wider): Advancing sustainable production practices and knowledge sharing. The "Drop, Ripple, Wave" metaphor illustrates how a single action or process can grow and influence outcomes over time, much like a drop of water creates ripples that expand

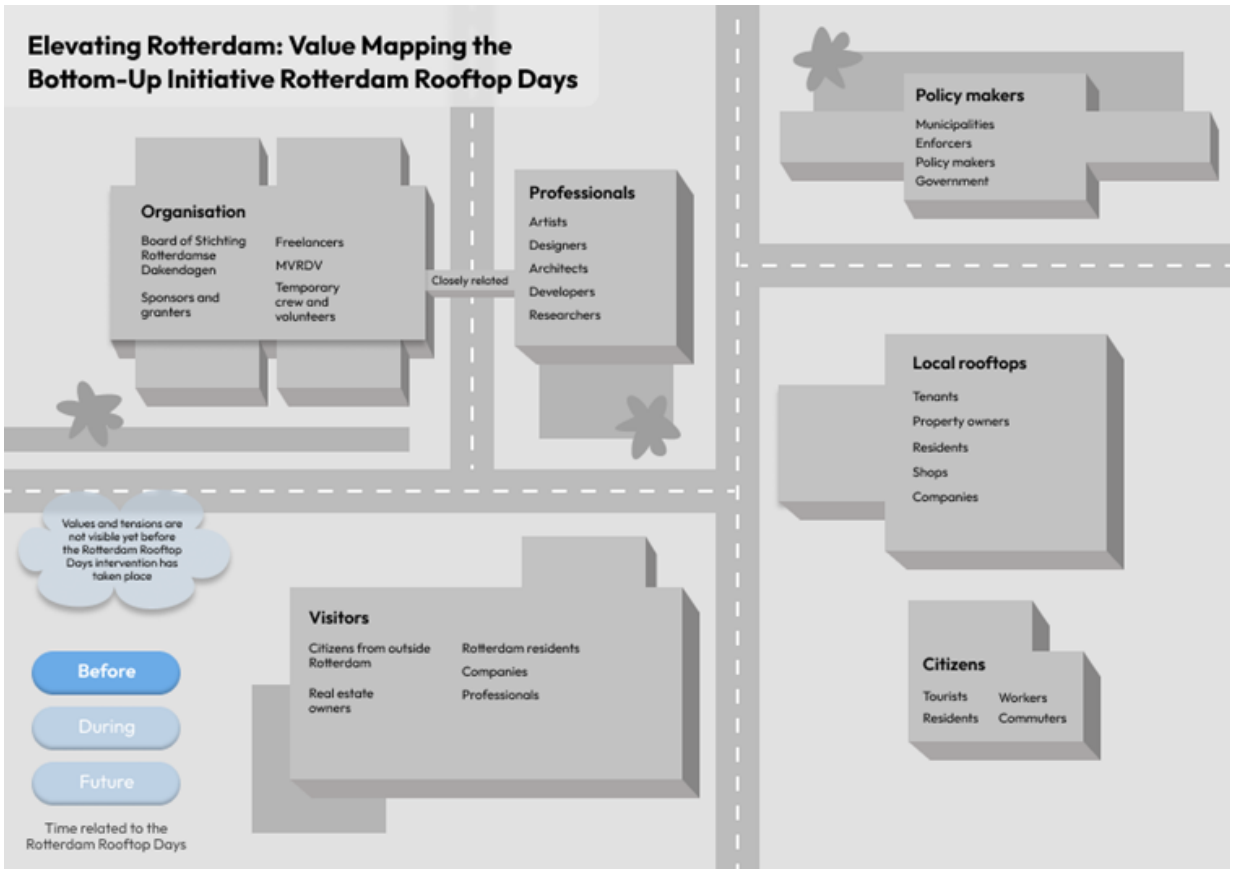

FIG. 7 Period before the initiative Rotterdam Rooftop Days. Ömer Taha Döver, Nicole Marques Morgado, and Silke Rijcks 2023.

into larger waves. This concept is applied in the Bauhaus of the Seas Sails[29] project to describe the phases of development and the broader impact of its initiatives.

Key values visualized include environmental sustainability, economic innovation, and social responsibility. For instance, the project's focus on algae cultivation not only supports renewable materials and food production but also fosters connections between stakeholders, such as companies, citizens, and research institutions. The map revealed opportunities for expanding the initiative's reach, such as integrating algae-based technologies into building materials or urban energy systems.

By aligning diverse stakeholder interests, the Alga.farm value map underscores the importance of collaboration in achieving sustainability goals. This case illustrates how value mapping can bridge gaps between ecological, economic, and social priorities, driving collective action toward a blue economy.

3.4. Reimagining Urban Spaces: Rotterdam Rooftop Days

The Rotterdam Rooftop Days is an annual event showcasing the potential of underutilized urban rooftops to address sustainability and livability

29 Bauhaus of the Seas Sails. Accessed December 18, 2024. https://bauhaus-seas.eu/

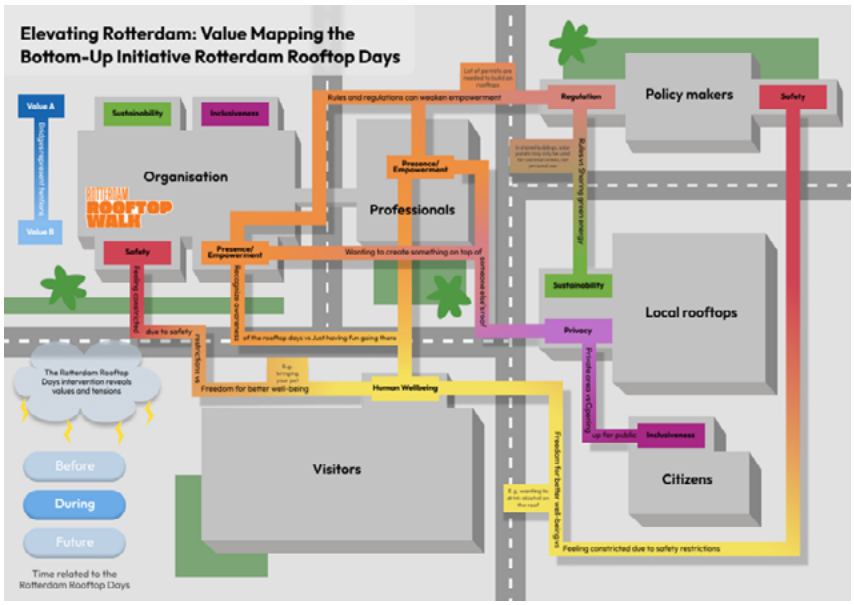

FIG. 8 Period during the initiative Rotterdam Rooftop Days. Ömer Taha Döver, Nicole Marques Morgado, and Silke Rijcks 2023.

challenges. The value map for this case exemplifies how value mapping can inspire innovative design opportunities. Specifically, it explores three temporal phases—before, during, and future—to illustrate the evolution of stakeholder engagement and value creation.During the event, rooftops were transformed into spaces that foster biodiversity, renewable energy, and community interaction. The value map identified key guiding principles: 1) Sustainability, promoting green roofs and energy-efficient installations. 2) Inclusivity, ensuring accessibility and diverse community participation. 3) Empowerment, encouraging residents to envision new uses for urban spaces.

For example, the map revealed trade-offs between sustainability and inclusivity, such as balancing green infrastructure development with the need for equitable access. By visualizing these dynamics, the value map enabled stakeholders—from policymakers to local residents—to align their efforts toward a shared vision. The initiative demonstrates how value mapping can inspire actionable design solutions that address urban challenges while fostering collaboration and creativity.

Figure 7 depicts the “before” phase of the value map, presenting a spectrum of stakeholders, from policymakers to residents, who influence the city’s dynamics but lack cohesive collaboration. The roofs themselves are shown as underutilized and vacant spaces, symbolizing unrealized potential. The grayscale rendering emphasizes the stark reality of this underutilized urban resource. The “during” phase of the Rotterdam Rooftop Days value map (Fig. 8) delves into the transformative influence of key values on stakeholders and the urban environment. It highlights seven critical values: Sustainability, Inclusivity, Presence/Empowerment, Safety, Human Well-being, Privacy, and Regulation.

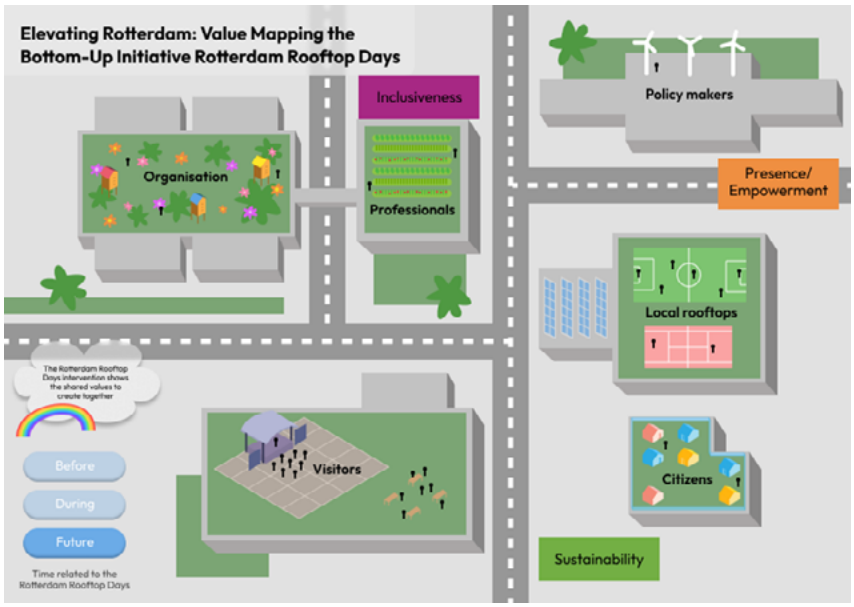

FIG. 9 Period after the initiative Rotterdam Rooftop Days. Ömer Taha Döver, Nicole Marques Morgado, and Silke Rijcks 2023.

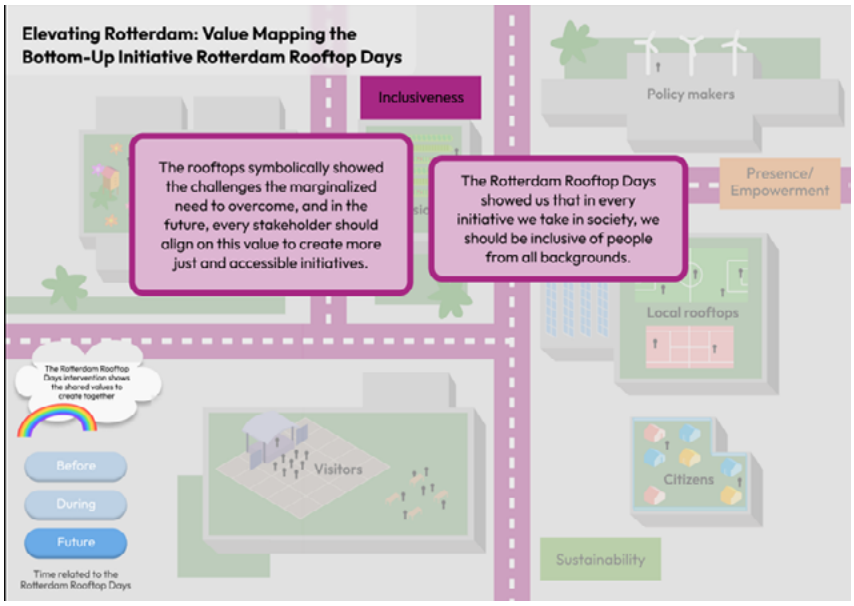

FIG. 10 Example of additional information. Ömer Taha Döver, Nicole Marques Morgado, and Silke Rijcks 2023.

The map utilizes a vibrant color scheme to visually represent the inherent trade-offs and conflicts associated with value-driven transitions. This reflects the dynamic nature of the initiative, where competing priorities and concerns must be negotiated to achieve successful implementation. For instance, the value of "Sustainability" might conflict with "Inclusivity" if accessibility considerations necessitate additional construction, potentially impacting environmental footprint. Similarly, "Presence/ Empowerment" through resident participation may require balancing it with "Privacy" concerns regarding rooftop activities.

The "future" phase of the Rotterdam Rooftop Days value map (Fig. 9)

embodies a collaborative vision of a more sustainable, inclusive, and empowered urban environment. This aspirational future rests upon three core values: Sustainability, Inclusiveness, and Presence/Power. These values serve as guiding principles for stakeholders as they strive to transform the city's rooftop landscape. Clicking on each value within the map reveals further details and explanations (Fig. 10).

Inspired by the Rotterdam Rooftop Days initiative, the "future" phase emphasizes the critical role of aligning stakeholders with these core values. This alignment serves as a catalyst for enduring and positive transformations within port cities. By fostering collaboration and a shared understanding of these values, stakeholders can move beyond individual interests and work towards a collective vision for a more vibrant and equitable urban future. This collaborative approach, informed by the insights gleaned from the "during" phase, allows for the identification of potential synergies and the mitigation of potential conflicts between competing values.

The presented analysis delves into the multifaceted role of design within mission-driven innovation, examining both the professional practices of expert designers within the Rotterdam Rooftop Days organization and the diffuse design skills and mindsets exhibited by other collaborators, including visitors. By exploring this spectrum of design capabilities, we gain insight into the various layers, classifications, and manifestations that design can assume in the realm of urban innovation. Stakeholder mappings further illuminate these aspects, emphasizing the importance of diverse collaborative design approaches such as co-design and participatory design.

4. Discussion

The student-created value maps of the Flemish-Dutch Delta offer insights into the complex challenges of urban sustainability as well as the opportunities for interventions driven by shared values. These maps underscore three key contributions of our introduced value mapping methodology while also pointing to its broader applications, limitations, and future directions.

A primary contribution of value mapping lies in its ability to bridge diverse stakeholder values with actionable design opportunities. By visualizing cultural, social, and ecological values within a specific context, the maps highlight alignments, conflicts, and areas for intervention. For instance, the Borssele Wind Park case revealed tensions between economic development and environmental conservation. By mapping these competing values, the exercise provided a clearer understanding of the trade-offs and helped inform more balanced design solutions.

Connecting stakeholder values through value-mapping has the potential to inform decision-makers and practitioners by helping them to prioritize

interventions that maximize benefits while minimizing trade-offs, as exemplified by the Rotterdam Rooftop Days initiative, which shows how underutilized urban spaces can be repurposed to tackle sustainability challenges. Furthermore, integrating data-driven insights with value mapping can enhance collaborative decision-making.

This approach is aligned with findings from the open data ecosystem literature[30], which emphasizes the importance of collaboration through transparency and accountability. Practitioners can leverage data-driven insights within value maps to foster a shared understanding among stakeholders and improve access to critical urban data. Meanwhile, decision-makers can use these insights to structure their arguments and support evidence-based policy formulation, ensuring that urban planning decisions are transparent and grounded in a comprehensive understanding of stakeholder ecosystems

Another essential strength of value mapping is its capacity to recognize and accommodate regional diversity. The Flemish-Dutch Delta, with its varied landscapes and unique social-ecological dynamics, requires location-specific approaches. This diversity is evident in cases like the Maasvlakte, which illustrated the tension between industrial activity and ecological preservation, and the Rotterdam rainwater initiative, which highlighted the importance of localized, community-focused interventions. By visualizing the specific needs and challenges of each region, value mapping enables a nuanced approach to urban design and planning.

The ability to facilitate context-specific solutions is another significant strength of value mapping. The Borssele Wind Park case, for instance, demonstrates how this approach reveals the intricacies of local contexts, which can help practitioners tailor their interventions to address specific regional or cultural challenges effectively. Policymakers can leverage value maps to develop regulations accounting for the unique social, ecological, and economic dynamics within different areas, as illustrated in the Maasvlakte and Biesbosch case studies.

Perhaps most significantly, value mapping inspires forward-looking, aspirational futures by aligning shared values with innovative possibilities. For example, the Rotterdam Rooftop Days value map demonstrated how underutilized urban spaces like rooftops could be reimagined to enhance sustainability and well-being. By projecting future opportunities, value mapping fosters long-term planning and innovation, making it a powerful tool for envisioning transformative urban interventions. Additionally,

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30 van Loenen, Bastiaan, et al. "Towards value-creating and sustainable open data ecosystems: A comparative case study and a research agenda." *JeDEM eJournal of eDemocracy and Open Government* 13. no.2 (2021): 1-27. María Elena López-Reyes, Birger Larsen, Ingrid Mulder, and Rikke Magnussen. 2024.
"Navigating Open Data Ecosystems: Exploring Engagement in the Use of Local Governments Open Geodata". In *Proceedings of the 17th International Conference on Theory and Practice of Electronic Governance* (ICEGOV '24). Association for Computing Machinery, New York, NY, USA, 120–129.

driving innovation through interdisciplinary collaboration helps align the goals of various stakeholders. This methodology encourages cooperation among practitioners from different fields, such as urban designers, ecologists, economists, and social scientists. This interdisciplinary approach has the potential to generate innovative solutions that utilize diverse expertise, as seen in initiatives like Alga.farm.

The current demonstrations of value mapping extend across a range of urban design contexts. It can guide ecological interventions by emphasizing the interconnectedness of human and natural systems, as seen in the prioritization of green infrastructure in port cities like Rotterdam. Additionally, value mapping promotes shared responsibility among stakeholders by visualizing collective challenges and opportunities, a feature particularly relevant in multi-stakeholder projects like water management in the Meuse. Furthermore, the process enhances transparency by making explicit the values and trade-offs at play, as demonstrated in the Borssele Wind Park case, where it facilitated dialogue by clarifying the tensions between renewable energy objectives and community concerns.

In summary, value mapping not only helps to identify and bridge stakeholder values—it also empowers practitioners and policymakers to create more sustainable urban environments through informed decision-making, context-specific solutions, and collaborative innovation. However, despite its potential, value mapping is not without challenges. The process of defining and mapping values may introduce subjectivity, particularly when certain stakeholders dominate the narrative or when designers unintentionally impose their interpretations. Reconciling competing values also requires careful facilitation to avoid reinforcing existing power imbalances.[31] Moreover, creating interactive and accessible maps often necessitates advanced digital tools and expertise, which can pose significant barriers in resource-constrained settings.

To address these limitations and enhance the effectiveness of value mapping, future efforts should prioritize participatory approaches that actively involve stakeholders in the mapping process. This inclusion fosters trust, improves the accuracy of the maps, and ensures that diverse perspectives are represented. Additionally, innovations in software and data visualization techniques can make the process more intuitive and accessible, expanding its usability. Finally, embedding value mapping within policy frameworks and urban planning practices can ensure its long-term relevance as a tool for strategic decision-making.

By addressing these challenges and building on its strengths, the proposed value mapping methodology has the potential to transform urban design and planning. It provides urban designers and planners with a

31 Fabiana Tomasini Giannini and Ingrid Mulder. "Towards a Power-Balanced Participatory Design Process." In *Proceedings of the Participatory Design Conference* 2022-Volume 2, pp. 111-117. 2022.

methodology to foster inclusivity, sustainability, and value-driven transformation, ensuring that future urban interventions align with the aspirations and needs of diverse communities.

5. Conclusion

The elaborate value mapping process has proven to be an effective pedagogical and methodological tool for gaining value literacy and understanding of complex urban and landscape challenges. Conducted within the Flemish-Dutch Delta, the student-generated value maps underscored the critical importance of understanding and visualizing diverse stakeholder values to foster sustainable and inclusive urban development. By illuminating regional complexities and stakeholder interconnections, the maps offered valuable insights into aligning design interventions with local needs and aspirations.

Beyond its use in educational settings, value mapping demonstrates significant practical applications for urban design and planning. By bridging the gap between stakeholder values and design opportunities, this approach supports informed decision-making and fosters collaborative solutions. It promotes ecological well-being, shared responsibility, and transparency, aligning with the broader goals of sustainability and inclusivity in urban transformation.

However, while the method shows promise, it is not without limitations. Reconciling competing stakeholder values requires careful facilitation to avoid bias and subjectivity. Moreover, the technical demands of creating interactive and accessible value maps may pose challenges, particularly in contexts with limited resources or expertise. These issues highlight the need for continuous refinement to improve the applicability of value mapping across diverse contexts. To address these challenges and maximize its potential, future efforts should prioritize the integration of participatory methods that actively engage stakeholders in the mapping process. Such an approach would ensure greater accuracy and relevance while fostering a sense of shared ownership among participants. Furthermore, advancements in digital tools and data visualization techniques could enhance the accessibility and impact of value maps, making them more effective for communication and collaboration.

In conclusion, our value mapping methodology provides urban designers and planners with the means to act as facilitators and mediators, guiding collaborative transformations rooted in shared values. By addressing critical urban challenges through this approach, value mapping holds the potential to create thriving ecosystems and inclusive urban futures. It exemplifies how design expertise can contribute to advancing sustainability, inclusivity, and resilience in response to contemporary societal challenges.

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