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DOI

[10.3390/su14074107](https://doi.org/10.3390/su14074107)

Publication date

2022

Document Version

Final published version

Published in

Sustainability

Citation (APA)

Klerks, G., Slingerland, G., Kalinauskaite, I., Brodersen Hansen, N., & Schouten, B. (2022). When Reality Kicks In: Exploring the Influence of Local Context on Community-Based Design. *Sustainability*, 14(7), 1-23. Article 4107. <https://doi.org/10.3390/su14074107>

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Article

When Reality Kicks In: Exploring the Influence of Local Context on Community-Based Design

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Abstract: Social sustainability is becoming an increasingly important topic in design practice, calling for more contextual perspectives on the process of design for social sustainability. This paper presents a retrospective case study analyzing the design process of a serious game which aimed to empower teenagers to organize events to strengthen community bonds. The community context in which the collaborative project took place underwent significant contextual changes due to the COVID-19 pandemic. Analysis using the Ecologies of Contestation framework shows the influence of multiple contextual levels (Socio-cultural, Power, Constructed, and Values-based) on the design process. Moreover, the paper discusses multiple contextual factors which influenced the design process and presents four suggestions for designers to anticipate and benefit from dynamics in these contextual elements. The suggestions regard (1) integrating the temporal dimension in the collaborative design processes, (2) carefully considering (value) alignment between actors, (3) leveraging values in the collaborative design process, and (4) acknowledging and responding to the multilayered nature of communities throughout the design process. As such, this paper explores the relationships between the community context and the collaborative design process to contribute to more resilient design practices.

Keywords: design process; community-based design; digital civics; context dynamics; co-design; civic communities



Citation: Klerks, G.; Slingerland, G.; Kalinauskaite, I.; Hansen, N.B.; Schouten, B. When Reality Kicks In: Exploring the Influence of Local Context on Community-Based Design. *Sustainability* **2022**, *14*, 4107. <https://doi.org/10.3390/su14074107>

Academic Editors: Santosh Jagtap and Lucia Corsini

Received: 25 February 2022

Accepted: 28 March 2022

Published: 30 March 2022

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1. Introduction

Social sustainability has become an increasingly important topic in design [1], because it contributes to our basic human needs such as happiness, safety, freedom, dignity, and affection [2]. Social sustainability is one of the three pillars (social, economical, ecological) of sustainable development and is essential to “protect and enhance the natural environment and social equity” (p. 3 [3]). Moreover, social sustainability is a crucial factor in creating more resilient communities [4] and realizing flourishing societies today and in the future [5]. In their pursuit to contribute to social sustainability, design practitioners aim to “advance the human well-being and flourishing of societies now and in the future provides” (p. 2 [1]). As such, design for social sustainability has started to investigate how civic technologies might contribute to long-term and impactful citizen participation, as well as building local communities [6–8]. Technology design can contribute to the development of social sustainability, for example, by supporting social change through empowerment and participation [1]. Moreover, digital technologies are increasingly finding their place in urban communities to (further) empower citizens, for example, by helping them to organize themselves better, pursue shared goals, or deal with pressing local challenges.

Innovative approaches such as serious games [9–11], citizen sensing technologies [12,13], local community platforms [14,15], and city-wide interventions [16] are being explored to help communities take charge of their everyday lives and foster social connections among citizens. Many of these projects fall under the banner of *digital civics* [17], which zooms in on the role that digital technologies might play in a move from transactional (top-down) to relational (bottom-up) models of societal organization. All of these developments illustrate how (digital) technologies can contribute to social sustainability by supporting local communities to create positive local and social change [18,19].

Design for social sustainability is, essentially, a contextual and participatory practice [20], requiring the engagement of local communities and a place-based approach to create social connections and locally embedded solutions [21–23]. In order to create local social change and to empower communities through design, design researchers are urged to look beyond the creation of technological interventions towards “successful establishment of its usage in a practice context” (p. 114 [24]). Consequently, design researchers need to navigate and adapt their design process to local community dynamics [22]. Furthermore, local perceptions of technology can influence adoption and participation [25], and local power structures can influence who can participate in the first place [26]. These examples suggest that designing with and for communities to increase social sustainability is a continuous effort of connecting technological interventions with existing practices and local dynamics. As such, the research efforts on (community-based) design begin to outline that the context (i.e., social, cultural, political, economical, physical) plays an influential role in design with and for communities [27]. However, it is still open for debate how and to what extent the local context could influence the design for social sustainability [28]. Through this study, we contribute directly to the call for more contextual perspectives on design for social sustainability [1]. To do so, we analyze the interplay between the community-based design process and its context. We outline multiple contextual factors that might influence design for social sustainability and outline four suggestions to help designers better navigate contextual dynamics to create more resilient design practices and outcomes.

In order to explore the contextual influences on the design project, we review a design for social sustainability project situated in The Hague, the Netherlands. The project was set up to empower local teenagers through technology design to organize events and, as such, strengthen community bonds between the teenagers and their neighborhood. The case was chosen because the project and environment were significantly affected by the COVID-19 pandemic, resulting in profound contextual disruptions which could be studied. The anti-COVID-19 measures resulted in three distinct periods: before, during, and after the first lockdown in the Netherlands. We adopted the Ecologies of Contestation framework [29] as a lens to examine the dynamic community context in the case study [22] from four angles: the Socio-cultural, Power, Constructed, and Value-based Ecologies. Analysis through the Ecologies of Contestations framework helped to reveal the context dynamics that influenced the design process.

This paper is structured as follows: firstly, we introduce the notion of *context*, previous work on design in the community context, as well as the Ecologies of Contestation framework [29]. Next, we present the case and our analysis of it. Then, we present the results based on the Ecologies of Contestation framework. These results describe how the contextual changes affected the design process on each of the ecologies. We then zoom out and discuss how the contestations between ecologies influenced the design process. We conclude with four suggestions for designers and a reflection on the use of the Ecologies of Contestation framework. The design suggestions regard the temporal aspect of design processes, (value) alignment between actors, leveraging values in the design process, and accounting for the multilayered nature of communities throughout the design process.

2. Theoretical Background

The case explored in this study is characterized by recent developments in the field of *digital civics*. Digital civics arose as a response to the desire for making the interaction between citizens and municipal actors more relational rather than transactional [17]. Since then, the field of digital civics has developed into a wide plethora of approaches that all aim to deal with wicked or systemic issues through the application of technology for citizens [30]. These issues can concern, for instance, place-based policy-making [31], advocacy and civil rights [15] or using maker-approaches to engage local communities [32]. As such, digital civics projects generally aim to empower citizens and civic communities through technology [30]. The case presented in this paper falls within this interest and is focused on exploring opportunities to (further) empower a community of teenagers and their youth workers to organize community events supported by a digital serious game. Within the analysis, we specifically explored the influence of the community context on the collaborative design process.

2.1. The Community Context

Context has been extensively discussed in various domains. Our research builds on perspectives from within psychology and Human–Computer Interaction domains. Dey and Abowd [33] describe context as any information that helps to characterize the situation of relevant entities (object, people, place) in cases where people and applications interact. This description primarily focuses on understanding the influences of contextual characteristics on human–computer relationships. Such a perspective is also prominent in the work of Sleeswijk Visser et al. [34], who refer to context as “all factors that influence the experience of a product use” (p. 121 [34]). These definitions suggest that interactions and experiences are best understood in the situation in which they arise. Research in community settings mirrors this perspective and focuses on how community behaviors and expressions are best understood when their context is also known and understood [35]. Huntington et al. [35], for example, describe how members of an indigenous community in Alaska regard wildfires as part of the challenges they encounter in their lives, rather than as a central concern; a preposition the respective researchers only could understand after engaging with the community in context. Scholars in the field of community psychology propose an ecological perspective to assess behavior in the situation in which it arises [36]. The ecological perspective proposes that multiple ecological levels (e.g., cultural, social, political) can influence community transactions and behavior. Sawhney and Tran [29] brought the ecological perspective to Participatory Design in their *Ecologies of Contestations framework* to navigate (possible) challenges that may arise from the complex and multifaceted community context, in which contextual components (i.e., values and priorities, local physical environment, trust and power relationships) are intertwined with the collaborative design efforts [22].

In this paper, we apply the Ecologies of Contestation framework to explore the relationships between the community context and the collaborative design process to create more resilient design processes.

2.2. Connecting with the Community Context

In this study, we are specifically concerned with design for social sustainability through empowering local communities to create positive local and social change aided by civic technology [18,19]. However, technology can often not empower a community by itself. In these instances, social sustainability can evolve through community participation in the design process as well as through the outcomes of the collaborative design process [1]. For both effects, community participation is essential and needs to be adequately integrated into local dynamics and infrastructures [22]. In other words, community engagement in the design of civic technologies is often regarded as indispensable for the relevance of the intervention [22,37] and on the basis of in the in situ design processes with and for communities that aim to build community connection [22,38]. The literature outlines

various aspects that are influential in engaging communities in design processes. We outline the most relevant aspects for this paper below.

Design researchers can connect to the community context by considering the local motivations and needs as a starting point for the collaborative design process. In fact, aligning ideas and values is necessary to create meaningful collaborations and social connections (e.g., [39–41]). In other words, a sense of mutual understanding and shared rationale for design needs to be developed between community members. A shared rationale could, for example, concern a shared interest, issue, or objective. Various studies describe participatory projects that commenced from local problems (e.g., [16,42]). However, other community-based design efforts point to the need to find a starting point in the communities' interests and goals to leverage the participation [32]. These examples illustrate the importance of grounding the design processes in local values to increase community connection [43,44]. The physical environment also plays an important role in design for social sustainability [21]. Design researchers can connect to the community (context) by embedding local features throughout the design process, for example, by mapping local sights (e.g., [43,45]) or sharing stories connected to the physical environment (e.g., [46,47]). Balestrini et al. [48], for instance, describe how sharing memories about local heritage sights fostered a feeling of pride amongst the participants and subsequently led to more sustained engagement in the participatory process. As such, connection to the local physical environment can be a relevant strategy to leverage community engagement and contribute to more sustainable outcomes [23].

Trust is another critical mechanism to successfully involve and engage with the community to further develop social relationships during the design process. In fact, Corbett and DiSalvo [49,50] have highlighted that trust is a core topic in work on digital civics. Trust is crucial in digital civics projects because a relational model of citizenship means that services and relations will be less well-defined than in transactional ones [49], placing a premium on trust between parties to foster mutually beneficial and effective relationships. Other scholars also point at the importance of building trust in community–researcher collaborations (e.g., [38,43]) and describe how a bottom-up approach and collaboration over extended periods are essential to building trust relationships [51,52]. Therefore, establishing trust with the local community is a way to better connect to local (power) relationships and networks.

In conclusion, the reciprocity between the design process and the community context creates a complex and dynamic environment, where design researchers and communities work together to create technologies that emerge from and simultaneously can be integrated into the local context in order to further empower and build the community [53–55]. Such a grounding in local infrastructures, resources, and other contextual factors, like values and relationships, allows design practitioners to establish more resilient community engagement and design outcomes [56–58].

2.3. Ecologies of Contestation Framework

The Ecologies of Contestation (EoC) framework helps design researchers to reflect on participatory practices in real-world situations on multiple contextual levels [29]. The framework is chosen for this research as it allows to structurally explore contextual levels relevant to the participatory design process. In other words, the framework enables the exploration of relationships between the design process, participating actors (i.e., social, cultural), and their surroundings (i.e., physical, technical). The EoC framework proposes that multiple contextual levels can be distinguished in these real-world situations. As such, the framework supports design researchers in examining the "interrelated layers of social, political and ultimately value-based considerations that emerged in their design practice" (p. 175 [29]). These layers are grouped into four Ecologies of Contestation, briefly outlined below. *Socio-cultural Ecology* looks at the socio-material context of the design efforts and focuses on the political, social, and cultural environment of the design process. How do these aspects influence the process? *The Ecologies of Power* examine the power dynamics at

play between the actors. These dynamics can be already established connections and dynamically evolving relationships during the design process. The constructed and designed interventions are the focus of *Constructed Ecologies*, which concentrates on how materials and mediums are used and created in the design process as well as how they influence participation in the design process. Finally, *Value-based Ecologies* consider the way meaning is created throughout the design process. Value-based Ecologies look at the actors' values and how these values influence the design process.

While the ecologies can help to reflect on multiple interrelated layers in participatory design processes, the EoC framework specifically supports reflection on the *contestations* that arise when ecologies are not aligned. Contestations refer to the challenges, disagreements, confrontations, resistance, concerns, and obstacles that can emerge in the participatory processes. In the present work, we adopt this framework to examine how misalignment in a range of contextual influences falling under all four ecologies potentially influenced the community-based design process.

3. Retrospective Case Study Approach

This study aims to explore how the community context influenced the collaborative design process in a design for a social sustainability project to help design researchers better anticipate contextual disruptions and orchestrate more resilient and inclusive community-based design processes.

To contribute to this goal, we present a case study [59]. According to Yin [59], case studies are useful when there is no clear boundary between the phenomenon studied, and the context it unfolds in. As such, the case study approach is relevant in our study on the influence of the context on the design process. The case is selected because of its prominent and significant contextual changes due to an unexpected COVID-19 pandemic, which impacted the community-based design process. The disruptions helped to draw out and explore the contextual factors that influenced the design process. In the design project, the design team worked together with a local youth worker, a community of teenagers, and an industrial partner to co-create and implement a serious game to empower the community to organize community events and as such support community building between the teenagers and neighborhood residents. The case study is delimited by the design process, which stretched across a year (September 2019–September 2020), and covers the periods before, during, and after the first COVID-19 lockdown (March–July 2020) in the Netherlands. The case is analyzed on four contextual levels using a critically reflective approach [60]. In the following sections, we first describe the design process analyzed in this paper, and then we describe the data collection and how we conducted the retrospective analyses.

3.1. Case Description

3.1.1. Setting

The analyzed design project is situated in a community center in the suburbs of The Hague, the Netherlands. The respective neighborhood is generally considered as an underprivileged neighborhood because it faces socio-economic issues, such as poverty, unemployment, and poor housing quality [61]. The community center is managed by a social welfare organization (SWO) and provides legal and social support to residents. The community center is open to everybody from the surrounding neighborhoods and functions as an important local meeting place for both the young and the old.

The SWO employs multiple youth workers who each work with a specific sub-group of local youth. One of these youth workers, Ammar (Ammar is a pseudonym for anonymity purposes), was involved as an actor in the presented design process. His work focuses on supporting teenage boys aged 13–18. The teenagers come to the community center for Ammar's advice, support in personal matters, and to participate in activities. Ammar organized activities to teach the group skills that could contribute to active citizenship (e.g., being proactive, speaking up) and educate them about sensitive topics (e.g., knives, debt).

A dedicated room in the community center was available during multiple moments each week for the teenagers to relax and socialize. During these moments, the teenagers could access the community centers facilities, such as couches, the PlayStation, and table tennis.

3.1.2. Project Aim

The project under review aimed to empower a group of teenagers to organize community events. To achieve this, the project intended to create a digital technology complemented by a set of co-creation workshops in collaboration with Ammar and the teenagers. The digital technology had to support the teenagers in organizing local community events, making them more resilient and independent, as well as reducing the youth worker, Ammar's, organizational workload, which in recent years of the community's existence seemed to become an issue.

3.1.3. Digital Technology: UpTrek

The design project involved an industrial partner, a gaming company, to facilitate the development of the digital technology. The industrial company provided UpTrek, a serious game developed to facilitate learning processes and behavioral change. UpTrek had already been used in educational programs to support students in practicing their negotiation skills and in company settings to support the onboarding of new employees. The UpTrek platform consists of modules, such as a negotiation game, dialogue exercise, poll, strategy game, reflection exercise, or quiz, which could be combined to fit the target context (see Figure 1 for images of UpTrek). This flexibility was convenient for the research team and Ammar, allowing them to adjust the game to the research setting.

To apply UpTrek in the case study, the research team combined modules so that UpTrek became a resource to be used by the teenagers while organizing their events. The finished game challenged teenagers to think about what could happen during the organization of their event and develop an alternative plan. It also offered a negotiation game to experiment with using the budget and a step-by-step guide supporting the subsidy application.

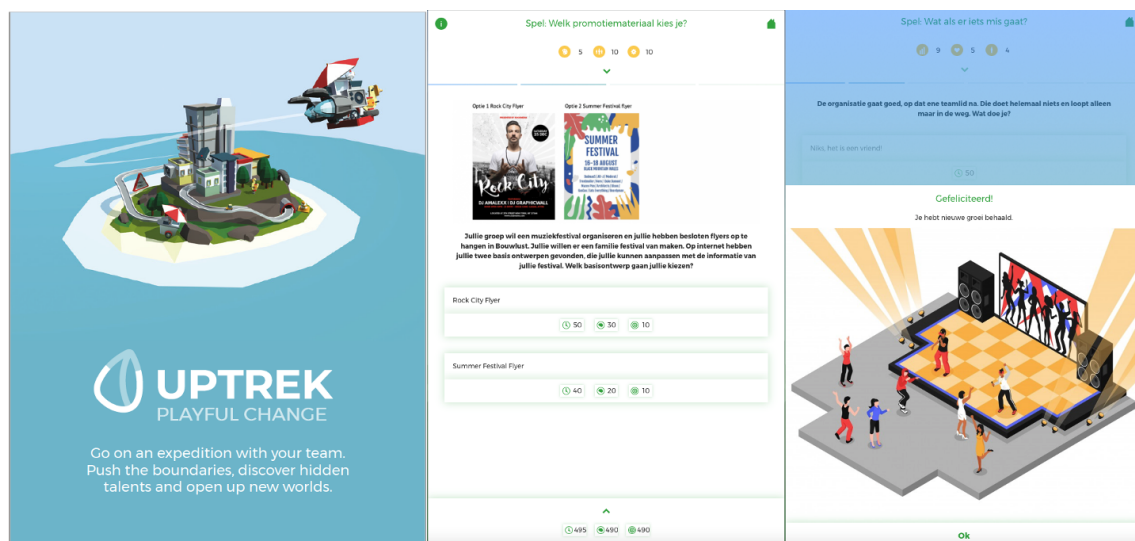


Figure 1. Impression of UpTrek: on the left is shown the island that develops and grows as players progress in the game, the middle and right images provide an example of the strategy game.

3.1.4. Collaboration and Organization

Co-creation workshops [62] were adopted as an approach throughout the design process to engage with and involve participating actors. The collaborative process involved multiple actors: the research team, an industrial partner, and the local community consisting of Ammar (youth worker) and a group of teenagers (see Figure 2 for an overview of when each actor engaged in the design process). The design team consisted of three

designers (all authors of this paper) who worked closely with Ammar throughout the design process. Ammar was the prime connection to the community center, the SWO, and the community. Therefore, he was responsible for involving the teenagers and organizing meeting rooms and other facilities in the community center. The research team was responsible for developing the serious game and workshop program based on the input from the other actors. The industrial partner provided technical input and helped to situate the game in the setting. Progress was regularly discussed between Ammar and the research team to assure appropriability for the setting. The teenagers were invited to co-creation workshops to provide input for game development and organize community events.

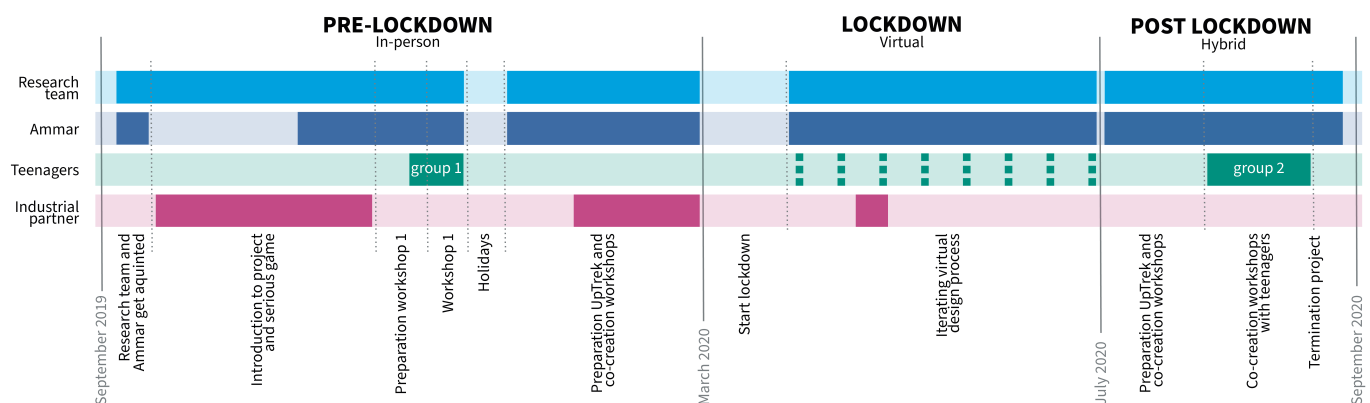


Figure 2. Schematic representation of the involvement of all actors throughout the design process.

3.1.5. Community Involvement

Ammar arranged community involvement by inviting teenagers who had previously expressed interest in organizing events. Eight teenagers (aged 14–18) accepted the invitation. They participated voluntarily and would receive a small reward in the form of a cinema ticket upon completing the project. A cinema ticket was the kind of compensation Ammar used more often when teenagers would do something for the broader neighborhood community. Ammar attempted to engage with the teenagers via WhatsApp during the lockdown period. However, he lost contact with most community members during that time. Therefore, Ammar recruited a second, new group of teenagers upon the re-opening of the community center. He invited the teenagers who returned to the community center to this group. Six community members (aged 13–16) accepted the invitation. They participated voluntarily but were also offered a reward: the teenagers would receive free entrance to one of the summer activities in the community center upon completion of the project.

3.2. Data Collection

The University Ethics Committees approved the design project. All participants and their adult guardians provided informed consent for participation. The design team aimed to create a safe environment for the teenagers to participate and share their ideas throughout the project. One of the designers' priorities was to create a degree of trust amongst the participating teenagers. Ammar advised not to make any audio or video recordings during the first meetings with the community to support this. He explained that recording sessions would potentially influence participation as it could create a setting in which the teenagers would feel like they were checked and expected to give the "right" answer. However, as both groups of teenagers did not participate long enough to establish a trust relationship, no audio or video recordings could be made.

Data were collected in the form of notes (field notes, logbook, meeting minutes), questionnaires, e-mail conversations, and activity outcomes throughout the design process. For example, during each meeting and workshop, the designers took notes and elaborated on these notes afterward with additional information and reflections.

We collected 22 notes, 94 e-mails, two questionnaires, outcomes from three workshops, 18 pictures from the workshops, and session outputs for the analysis.

3.3. Retrospective Analysis

The data were analyzed through the prism of the EoC framework. The analysis process consisted of four steps. First, the data were mapped on a timeline in the three distinct periods by the first two authors to create an overview of the design process and map the data referring to the community context. Researchers used an online white-boarding tool (Miro (See www.miro.com, accessed 3 February 2021)), as social distancing and travel restrictions were still in place.

Next, the timeline was validated in a virtual meeting with Ammar. The semi-structured interview aimed to verify and elaborate the mapped design process and ask additional questions related to the four ecologies. The researchers also used this meeting to validate and extend their insights into the teenagers' attitudes with Ammar. To illustrate, Ammar provided more insight into how he had experienced the lockdown and how the lockdown had impacted the teenagers. He explained, for example, how the teenagers felt scared at the start of the lockdown and how this turned into frustration, incomprehension, and anger towards the end of the lockdown period. During this meeting, one of the researchers mainly focused on asking prepared questions, and one took notes directly on the online whiteboard. The notes functioned as input for the conversation, and Ammar could elaborate and respond to them. In later parts of the paper, we will refer to this meeting as the *evaluation* with Ammar.

As a third step, the researchers individually examined the mapping and prepared clusters on similar themes. Then, they met and jointly clustered the data of each period in the four ecologies. For example, data related to Ammar's initial priorities would be placed in the first block (pre-lockdown) in the Value-based Ecologies. This step resulted in a matrix of three by four squares filled with data (see Figure 3 for a schematic representation of main insights).

	PRE-LOCKDOWN Community center open	LOCKDOWN Community center closed	POST-LOCKDOWN Community center open (access restricted)
Socio-material Ecology	The community center is a local meeting place for the community and has a formal, supportive function and an informal, social function. Relating the design process to the community center's activities helped lower participation barriers and developed connections with teenagers.	The lockdown disturbed the social and cultural context; most people had to stay home and could not meet in person. the community center had to close The design team lost its links to the context and the community.	Some COVID-19 related measures were still in place. The community center seemed to have lost its function of uniting people. The design team and Ammar could not connect with the community as intended in the hybrid workshops.
Ecologies of Power	Ammar is interested in UpTrek; the design team is interested in community participation. A balanced power relationship between Ammar and the design team arises, resulting in a fruitful collaboration.	The teenagers do not engage in the virtual design process. Power relations are imbalanced due to designers' and Ammar's dependence on the teenagers' engagement in the community activities and design process.	Changed relationship between Ammar and teenagers, less engagement from the side of the teenagers; teenagers' engagement quickly declined throughout the workshop series. Ammar and the design team could not refine their collaborative dynamic.
Constructed Ecologies	The design team and Ammar gained more profound insights into the context. They adapted the role of UpTrek in the process to fit contextual insights and characteristics.	The community center did not have any virtual presence or infrastructures. Ammar and the design team had to develop a digital social infrastructure from scratch, as there was no locally existing practice they could connect to.	Travel restrictions prohibited the designers from being present in person at the co-creation workshops. The hybrid workshop format might not have facilitated the degree of in-person contact needed for this community at this point.
Value-based Ecologies	All actors had clear priorities, goals, beliefs, focus, intentions, and attitudes. The development of UpTrek sparked a conversation about priorities, goals, focus, and intentions. The beliefs and focus of the designers shifted.	Due to the lockdown measures, shifts occur in priorities, goals, focus, and intentions among actors. It was hard to get a grip on the teenagers' perspectives and evolve the design process accordingly.	Ammar and the design team expect priorities, goals, beliefs, focus, intentions, and attitudes to resemble a pre-lockdown situation. Disengagement of the teenagers shows that these expectations might have been wrong and that priorities, goals, beliefs, focus, intentions, and attitudes evolve.

Figure 3. Schematic representation of the main dynamics in each ecology.

Finally, the third researcher was involved in joint reflection on the complete grid. This reflection helped further understand the relations between the ecologies, the influence of the author's values on the process and summarize the insights. The third researcher was especially suited to join this part, as he had helped set up the project and then left, so he knew the project background but was also able to provide a fresh perspective. The discussion results were then written up and can be found in the following sections.

4. Results

The results section presents our exploration into the effects of the context dynamics on the collaborative design process through the lens of the EoC framework. Each section describes a respective level of the ecology and is structured according to the three distinct periods of the case study: pre-lockdown, during the lockdown, post-lockdown. The results are also summarized in Figure 3.

4.1. Socio-Cultural Ecology

Socio-cultural Ecology focuses on the political, social, and cultural environment of the design project. In this study, the Socio-cultural Ecology mainly concerns the interactions between the design process and the community center and its facilities, the social community infrastructures, and the impact of the COVID-19 policies.

Before the imposed lockdown, the community center was a popular place for the teenagers to meet. According to Ammar, the community center was a place to build friendships, share personal stories, learn new skills, find help, and have fun with peers. The social role is reflected in Ammar's remark during the evaluation meeting: *"the boys often have seen each other in other places, but they build friendships through the activities in the community center"*. The first co-creation session with the teenagers further illustrates the social function of the community center. When the teenagers brainstormed about the ideal community center, they listed a big part of their already participating activities (e.g., table tennis, PlayStation, indoor soccer), signaling their appreciation for these activities. One group even wrote down: *"There are few places where you can go when the community center is closed"*, signaling how the community center was an important place to meet for the teenagers. One of the groups even worked on creating a plan for extending the opening hours of the community center during the co-creation workshop. These examples illustrate the social role the community center and SWO played in the lives of the teenagers. Many teenagers also came to the community center to access personal support, something they could not always find at home. As such, Ammar was in daily contact with many teenagers before the lockdown: *"I am in daily contact with some of them, they see me as an older brother or father"*. Here, Ammar relied primarily on in-person contact. He developed a trusting relationship with the teenagers through his community center program based on their input and informal contact as he explained: *"I look for them when they meet each other outdoors in the neighborhood and chat with them. This helps me to connect with them and provides input for the program"*. As such, the community center seemed to have a formal function (personal support, access to facilities) and an informal, social one (meeting peers, having fun, and a place to go) for the community. These functions made the community center an excellent gateway for researchers to engage with the community. Positioning the project as part of the community center's program helped the design team embed the project in the community infrastructures and, as such, lower participation barriers.

Then, the Dutch government imposed a nationwide lockdown to respond to the COVID-19 pandemic. For many people, the regulations greatly influenced their daily lives; children had to stay home, everybody needed to work from home, it was impossible to practice sports together or meet friends and family, to name a few examples. The sentiment of this period is illustrated by one of Ammar's e-mails: *"It seems like I am playing a part in a bad B-movie"*. The lockdown was a big hit for the community because their lives changed drastically. Most teenagers lost their jobs, social contacts, and leisure activities. The lockdown also required the community center to close, leaving the teenagers without

physical access to its facilities and support, as Ammar wrote in an e-mail: *“A big part of the activities is canceled because physical contact is a key requirement”*. Losing the community center as a place for in-person meetings and community building required substantial changes in the design process. Virtual and hybrid forms of meetings seemed logical and helped the designers and Ammar stay in touch. Due to travel restrictions and the closed community center, the designers had to rely on Ammar to connect with the community. However, the loss of in-person contact also made it challenging for Ammar to maintain his relationships with the teenagers. The loss of the facilities of the community center and the significant changes in the actors’ daily lives changed the design process from a locally embedded process to a process detached from the physical and, to a large extent, social context; the gateway to the community was lost. In conclusion, the political context (COVID-19 regulations) strongly disturbed the community’s social context (i.e., access to a meeting place that is built on trust with the community worker) and cultural context (i.e., preference for face-to-face interaction, instead of digital). Consequently, it weakened the design team’s links to the community.

After almost four months of lockdown, the COVID-19 policy relaxed, and the community center could open its doors again. Meanwhile, some restrictions were still imposed, which limited the number of people allowed in the community center and required social distancing measures. These rules challenged opportunities to organize activities due to maximum capacity and social distancing. During the evaluation meeting, Ammar explained how the community center had become less of a central meeting point due to such COVID-19 policies: there was much paperwork connected to organizing something, and only a limited number of people (25–30) could join activities. Altogether, the function of the community center to unite people seemed to be challenged by the previous four months of lockdown. Only a few teenagers returned upon opening the community center. Ammar found that even the extended contact with boys who used to come to the community center for over ten years was (partly) lost. As he described during the evaluation: *“Teenagers that had visited the community center for over ten years did not return after the lockdown. Only a minimal amount of teenagers came back.”* He expected the community center to be less of a central place due to the barriers imposed by the measures. Due to the past contextual changes, the community center could no longer take back its former role in the design process. It became less of a gateway to the community, making it harder for Ammar and the design team to (re)connect with the teenagers as intended.

These changes in the Socio-cultural Ecology indicate that both the physical meeting point and in-person contact played a role in preserving the community in its original form. The community center was shown to be an essential place for formal and informal, in-person gatherings, reflecting the community’s social culture and infrastructures. Access to this meeting point was disturbed due to changes in the political environment (lockdown). The ways of establishing and maintaining connections that worked before the lockdown were suddenly not applicable anymore. Online substitutes, such as WhatsApp and video-conferencing, could not be turned into a social infrastructure able to successfully combat the lack of face-to-face interactions in the community center on such short notice. After the lockdown, the social community infrastructures seemed to have changed, leaving the designers with weakened connections to the community.

4.2. Ecologies of Power

The Ecologies of Power consider the power relations within the case study, which were first primarily found between Ammar and the designers, and later between Ammar, the designers, and the teenagers.

At the start of the project, the power relationship could be primarily observed between the design team and Ammar. On the one hand, Ammar was interested in the UpTrek technology that the design team offered. On the other hand, the design team’s intentions of an inclusive and participatory design process required the participation of the target group, the community of teenagers, to which Ammar had access. As Ammar and the design team

needed each other to reach their goals, the power balanced out and encouraged both parties to align interests and values, in other words, to collaborate. Indeed, we observed that the balanced power resulted in a fruitful collaboration where both Ammar and the design team knew what the other was looking for and could provide in the design process. At this point, the teenager's relationships with Ammar were healthy and active, and thus their role in power relationship was rather considered insignificant.

Throughout the lockdown period, Ammar lost contact with the community of teenagers (as described in Socio-cultural Ecology), which he had to offer to the design team. This change would suggest, thus, that the power shifted towards the design team, as they still had UpTrek technology to offer, and Ammar was still interested in it. However, that seemed not to be the case. First and foremost, Ammar's main focus was still, rightfully, to support the teenagers, and the design process became less of a priority to him. As he expressed in the evaluation meeting: *"My focus changed, as I did not know what was going on in their home situation, because I did not speak to them anymore"*. In this case, one would think that the power shifted to Ammar's side. However, the power dynamics in the relationship between Ammar and the design team were imbalanced by their dependence on teenagers' engagement in community activities and the design process. These difficulties made collaboration harder and caused the design process to slow down, which is reflected in the speed of the e-mail conversation and the difficulties in scheduling meetings.

When the community center re-opened, Ammar and the design team tried to re-establish their fruitful collaborative atmosphere by resuming their pre-lockdown plans. Ammar recruited a new group of teenagers from the community to resume the activities where they had stopped before the lockdown. Unfortunately, the initial enthusiasm of the teenagers did not last: *"During the first co-creation workshop it seemed as if some of the boys were less motivated and were only there for the reward activity they could get"* (Ammar, in his logbook). The gradually decreasing involvement of the teenagers' community and the inability to find again the same collaborative dynamic as before the lockdown eventually led to the termination of the project.

The fluctuations in the power balance suggest that the community had implicit power over the relationship between Ammar and the design team, which was neither explicitly addressed by designers nor by Ammar. The Ecologies of Power suggest that all actors were related to each other and influenced the power balance during the design process. The designers depended on Ammar and the community to run their design process; Ammar cared for the community and depended on the design team for innovation. Lastly, the teenagers relied on Ammar for help and access to the community center and its activities, of which participation in the design process was one. The designers and Ammar potentially underestimated the power of the teenagers over the process. This underestimation might have contributed to the power imbalances and decreased collaboration during the design process.

4.3. Constructed Ecologies

Constructed Ecologies focus on how the materials and mediums constrain or support interaction and co-creation with the community throughout the design process. In this case, the Constructed Ecologies mainly concern digital technologies that facilitate online meetings and UpTrek.

Before the lockdown, the design team adapted UpTrek to fit the project aims. However, the construct of UpTrek appeared to be less suitable for the project context than the design team had imagined because of the games' clear competitive elements. Ammar and the design team expected that the focus on competition might be counterproductive in this sensitive context. As explained in the designers' notes:

"We concluded that making a competition out of organizing events is probably not the right approach, for a couple of reasons: (1) it is tough to compare different community events, as they can differ in many ways [...] (2) when using UpTrek to score points, you are having a competition on how well you can read and

perform in mini-games, instead of on the real event and organizational skills and (3) it is nice to score many points, but being last in the ranking has probably way more negative impact than the positive effect of scoring points. As such, we think it would be better not to have a competition and for example have a couple of prizes in the end that are awarded by us (e.g., nicest idea, best teamwork) so all groups can win and have a nice moment to close the project.” (Designers’ notes)

In other words, the competitive elements were expected to draw away the attention from organizing the event towards performance in mini-games. Therefore, Ammar and the design team decided to decrease the competitive elements in the game and give UpTrek more of a supportive role (providing relevant information) rather than a leading role with a focus on competition. The context in which UpTrek would be applied highly influenced its final shape. In other words, Ammar and the design team discovered that their initial assumptions about UpTrek’s potential were presumably wrong when they had explored the context of use more in-depth. They understood that competition could potentially negatively influence the social ties that kept the community together.

Then, the lockdown implied a switch to digital tools for social gatherings, blocking the intended project set-up and intended use of UpTrek. Ammar and the design team proceeded with online meetings to cope with the changing environment. As the community center had not yet established a practice of meeting each other digitally, there was no existing digital infrastructure to which to connect the design process, nor an online format to apply. The design team and Ammar had to reconsider their approach to engaging the teenagers virtually. To do so, they explored the potential of a digital community center, joining another initiative focusing on making information accessible through QR codes and organizing online co-creation workshops. However, these attempts did not leverage community engagement. In conclusion, the lockdown changed how people were living drastically. The design team and Ammar struggled to adapt to these new contextual dynamics without direct community infrastructures to which to connect.

Ammar was motivated to reconnect with the teenagers as soon as possible when the community center opened again: *“If it were up to me, we would meet on short notice”*. The initial project setup was reconsidered and used with some adjustments to adhere to COVID-19 related measures. The design team could, for example, not visit the community center due to travel restrictions. Ammar and the design team organized the co-creation workshops in a hybrid format: the design team joined via a videoconferencing platform, and Ammar and teenagers were present in the community center. The hybrid format limited the participation of the designers due to the limited audibility and visibility of participants. For example, the researchers could not see and hear all teenagers. The limited audibility and the hybrid format also created an uncomfortable situation in which the teenagers, for example, needed to walk up to the computer to say something to the design team. Furthermore, by being projected on a giant screen, the researchers stood above the others, limiting the inclusive atmosphere that the design team tried to create. These obstacles made it difficult to follow discussions and participate in the workshop. The challenges are reflected in the notes of the design team, who noted down questions such as *“are these initiatives what the teenagers really want to do?”*. In in-person settings, the designers would have addressed these topics with the teenagers. It seemed like in-person meetings were essential to establish a connection with the teenagers in this post-lockdown period.

The experiences in the Constructed Ecology illustrate that the construct (UpTrek) and mediums (virtual and hybrid workshop setup) in this design project were connected to the local context. The role of UpTrek needed to change drastically to fit the sensitive context and project goals. The workshop series that was applicable in a pre-lockdown context did not remain so during and post lockdown. The online and hybrid design settings suggest that these formats did not support the same interpersonal qualities as in-person meetings. One cannot directly translate offline efforts into online alternatives. The move to a virtual and a hybrid format decreased the possibilities for the design team to build relationships with the teenagers. The virtual and hybrid formats hindered such development due to the

unfamiliarity of these tools and their primary focus to support meeting efficiency rather than informal bonding and one-on-one interactions. As such, the Constructed Ecologies suggest that specific in-person components might have been essential to this community-based co-creation process, where the community was vulnerable due to the COVID-19 measures. In this project, focusing on developing (stronger) community ties was especially relevant, but it was probably best achieved when there were opportunities to meet in person. As Ammar put it during the reflection meeting: *“the implementation of online processes needs to be supported by in-person contact”*.

4.4. Value-Based Ecologies

Value-based Ecologies look at how value and meaning were created throughout the design process and consider the values that played a role in the case study. Values were not explicitly addressed during the design process. Therefore, we based this section on our interpretations of the data and Ammar’s insights into the teenagers and reflection on our experiences. We interpreted expressions of priorities, goals, beliefs, intentions, focus, and attitudes that potentially motivated or inhibited actions in context as *values*.

Before the lockdown, the development of UpTrek triggered a conversation about project goals and intentions among the design team, Ammar, and the industrial partner. Decisions that needed to be taken about specific aspects of UpTrek elicited actors’ opinions and beliefs regarding its development and implementation in context. These discussions allowed Ammar, the design team, and the industrial partner to align their values better. For example, Ammar explained how he valued involvement of the teenagers in the design process, to create a meaningful game for them, as reflected in the meeting notes: *“Ammar explained how he would like to incorporate a part in which we talk with the teenagers and discuss how this is important for them; how it is meaningful”*. Throughout this co-creation process, the attitudes of the design team and their focus in the process shifted. Data from the start of the design process show a focus on exploring the potential of technological intervention (UpTrek). For example, the initial project plan describes the aim of the project to be: *“Designing and developing a playful social gamified course in UpTrek to stimulate citizen participation and empower different communities in specific neighborhoods in The Hague”*. Notes reflect that discussions among the researchers mainly concerned the functionality of UpTrek and how it could support the teenagers to organize events. The shifting role of UpTrek (from guiding the teenagers to supporting through information) was bound to the insights of the design team that further empowering the teenagers also required a process and support from the other actors, next to the technological support UpTrek. As such, the priorities and focus of the research team evolved based on a more thorough understanding of the context.

The pandemic compelled all actors to reconsider their priorities to deal with the changes in their daily lives. As Ammar described during the evaluation, *“Reality kicked in for the teenagers due to the forced home-stay”*. While Ammar explained during the evaluation that the community center could cater to teenagers’ focus on their friendship, having fun together, and learning new skills, this changed during the lockdown. At that point, other things became a priority for the teenagers, such as taking care of family and restructuring their lives to comply with the lockdown rules: *“Their parents might have forbidden them to go out, some of them were also scared themselves”*. During the lockdown, Ammar became concerned about the teenagers. As he puts it: *“What is happening in their homes? How can I get in contact with them? I do not speak with them anymore; how would they be doing?”*. Consequently, his focus was primarily on taking care of the immediate welfare of the teenagers (rather than educating them). The apparent shuffle of teenagers’ priorities and interests made it harder to connect to and involve them in the virtual design process. Consequently, the design team and Ammar had to rely mainly on the experience and insights of Ammar to proceed with the design process in a virtual fashion. The design team wanted to help Ammar in his attempts and left their focus on empowerment aided by serious games and prioritized aligning with Ammar’s interests, as reflected in their attempts to find other fitting possibilities to engage the teenagers. However, engaging

the teenagers in any online activities failed, hinting at the inability to rightfully cater to their needs and priorities or that this was not the right time for these kinds of initiatives. Ammar explained the attitude of the teenagers: *“Why would you even put energy in a project? Everything changes all the time. We will see what happens”*. In other words, the primary goals, priorities, and other values seemed to be connected to the contextual situation. The shifts in priorities, goals, and intentions seemed to have impacted actors’ engagement and participation in the design process. Ideally, design processes would evolve along with these changes; however, this would have potentially meant a complete shift in the design project.

After the lockdown, the design team and Ammar expected everything to go back to the way it was before the lockdown and anticipated that the priorities and goals of the teenagers would resemble the situation before the pandemic. However, while the group of teenagers that participated before the lockdown was very enthusiastic about the project, part of the second group disengaged during the process. As Ammar described during the preparations of the second co-creation workshop after the lockdown: *“The teenagers are very unpredictable, one moment they are involved and another they are not, one week everything is nice, and the next it is not”*. After the lockdown, the values and priorities of the design team and Ammar evolved again and resembled the situation before the lockdown (empowering the teenagers to organize events), as they expected the context to return to its original form. However, changes in engagement of the teenagers suggest that this shift and consequent setup of the design process might not have been in line with their interests and priorities.

The experiences in Value-based Ecologies indicate that priorities, goals, beliefs, intentions, and attitudes can evolve throughout the design process, especially when significant transitions are happening in the context (in this case, due to the pandemic). Co-creation supported the emergence and alignment of priorities, intentions, and goals among actors throughout the design process. When Ammar and the design team lost touch with the community, they also lost sense of what moved, motivated, or interested them. As such, these examples seem to suggest that designers must carefully consider ‘meanings’ or values in the context to ensure that their process makes sense. Designers would benefit from addressing values and meanings explicitly in the design process, which was not done here but was observed.

5. Discussion

This paper explores how severe fluctuations in the community context of a design for social sustainability project affected the collaborative design process. The relationships between community context and the collaborative design process were explored using the EoC framework (the Socio-cultural, Power, Constructed, and Value-based Ecologies). This section presents multiple insights that can help design researchers anticipate and react to dynamics in a community context in order to create more resilient design projects focused on social sustainability. First, we discuss the results in light of co-design and Participatory Design literature. Next, we zoom out and introduce four suggestions for future design for social sustainability efforts in the community context. We conclude the discussion with limitations and recommendations for future research.

5.1. General Insights

The perspective of the Socio-cultural Ecology explored how the social (community interactions), cultural (e.g., community infrastructures, habits), and political (COVID-19 measures) context changed due to the imposed lockdown. Most people adopted digital technologies to collaborate, communicate, connect, and socialize during the lockdown period. Additionally, Ammar and the research team attempted to substitute the social infrastructures facilitated by the community center with online alternatives. However, as our results indicate, it was challenging to translate community infrastructures, practices, and routines typical to the physical setting into a virtual variant. We speculate that this is caused by the strong encapsulation of social infrastructures into the physical context [63,64] in this case; in other words, community bonds to the physical location. As such, we suggest

for designers to carefully examine the infrastructures at play in the community and find ways to extend and complement these structures rather than to replace them. Our results are in line with the literature suggesting that the developments of alternative or new infrastructures, such as digital interaction spaces, should be developed and implemented gradually and carefully consider the emerging priorities and wishes in the community in question [22,53,57]. Explorations from the perspective of Constructed Ecologies further strengthen these insights by suggesting that the lockdown and post-lockdown situations required certain degrees of interpersonal contact (informal talk, overseeing and participating in the process) between the design team and the community. While developing a certain degree of trust and connection between design researchers and participants is essential in the collaborative design processes [65], the design designers felt limited by the opportunities to build this trust in online or hybrid workshop settings. In conclusion, this community seemed tied to a specific social context, in which in-person interactions (primarily related to the community center) helped sustain the community.

Through the Ecologies of Power lens, we explored how the pandemic influenced what the actors could contribute to the design process and how these shifts consequently altered the power balance. Our case study suggests that the power relations were situational (dependent on contextual factors, such as roles, personal stakes, and priorities) rather than specific to formal power relations, and shifted with they changing socio-cultural context. In our case study, all actors played an essential role in realizing the project goals as of what they had to offer: The designers offered the technology, Ammar—his experience and contacts to the community, and the teenagers—their participation. Each actor held a certain degree of power over the others. The teenagers also, although seemingly implicitly, held some power over the other actors; all actors preferred the teenagers to be part of the design process because the project intended to help them organize events. Such dynamics in the power relations can be found more widely in participatory processes, as these processes generally aim to ensure that all actors have a stake in the outcome as well as equal opportunities to influence the corresponding design process [66]. The results also show how attending to the community became increasingly important during and after the lockdown, as was Ammar's role as an intermediary [67] between community, context, and designers. We suggest to acknowledge this importance of community development throughout the collaborative design process. Continuous alignment of interests and goals of participating actors seems critical to maintaining productive power balances throughout the collaborative design process [68], but might need to be complemented by community-building activities. The significance of alignment also came to the fore in the Value-based Ecologies. The explorations in Value-based Ecology showed that the actors' priorities and agendas changed with on- and offset of the lockdown measures. Co-creation helped to capture actors' preferences and supported the alignment. Other scholars also suggest this positive effect of co-creation on inducing alignment (e.g., [39,44]).

5.2. Insights on the Interaction between Contextual Elements

The use of the EoC framework goes beyond dissecting the context into various ecologies. In particular, the EoC framework poses contestations to emerge when the ecologies do not align [29]. For example, the inability to reflect stakeholders' values (Value-based Ecologies) on the technologies (Constructed Ecologies) can cause conflicts during the implementation of the intervention. The subsequent paragraphs discuss the most significant moments when ecologies did (not) align. These moments are specific to the case study context. Such locality and specificity of the context in the design process are often seen as a research limitation because they hinder the extent to which findings can be generalized [69–71]. However, we do not intend to make our insights generally applicable, but rather attempt to better understand the situatedness of the community-based participatory design processes. To achieve this, we will now present a set of potentially transferable insights about the structure and relationships between various contextual elements and the collaborative design process.

5.2.1. Time as a Lost Dimension

The case study presents notable contextual changes and contestations in all ecologies. These changes resulted, for example, from shifting perspectives among actors towards the design process (e.g., changing interests, priorities, agendas) and adoption of virtual and hybrid forms of running the design process. These shifts draw attention to the temporal dimension of design processes. While Ammar and the design team expected life to go back to the way it was before the lockdown at the end of the project, the dynamics within the design process had changed. These changes again show that the context in which the design process takes place is in constant (subtle) motion. As its context evolves and changes over time, the design process should evolve along, recognizing that most elements in the process are not static. Other scholars also show the need for an evolving and adaptive design process [62,72,73] in which all discuss how design ideas, problems, and solutions evolve as the design process unfolds.

Take-away. We should consider time as a contextual element continuously influencing the design process and therefore integrate the temporal dimension into our current design processes. The design process must allow for reflection and awareness of this temporal element, empowering participants to reflect and act on past, present, and future dynamics in the context. This could for example be achieved by keeping a diary and/or documenting the design process [74,75] and regularly collaboratively evaluating these entries.

5.2.2. Continuous (Values) Alignment

Contestations arose when the Socio-cultural Ecology (preference for in-person contact), Constructed Ecologies (virtual and hybrid interaction), and the Value-based Ecologies (furthering the design project, non-project related priorities) did not align anymore due to the COVID-19 measures. These contestations resulted in difficulties in both the Ecologies of Power and the Values-based Ecologies. The results on these ecologies suggest the importance of continuous alignment of actors' perspectives towards the design process (e.g., priorities, goals, interests, beliefs, agendas) to create a productive power balance (Ecologies of Power) as well as a meaningful design process (Values-based Ecologies). Such a need for alignment echoes work by Jafari et al. [76], who posit that it is impossible to "just" identify shared values at the start of a design process and apply them.

Take-away. Alignment of actors' perspectives within the design process should be a continuous process. As such, we observe the importance of fostering a "dynamic and dialogic process of cultivating the emergence of values [44]" to create a shared frame of reference and continuously review this frame in light of its relevance in context.

The results also show how co-creation of UpTrek and conversations about the importance of the community center (Constructed Ecologies, Socio-cultural Ecologies)-fostered exploration and alignment of actors' goals, intentions, and priorities (Value-based Ecologies) [77,78]. Both UpTrek and the community center were contextual elements with different meanings to the various actors. For example, while the research team regarded UpTrek as a potential tool to facilitate community empowerment, Ammar saw opportunities to boost innovation and efficiency in his work as a youth worker and new ways to support the community. While the community center seemed a gateway to the community for the research team, Ammar saw it much more as a part of the community that should be managed carefully. The community, in turn, experienced the community center as their own, a place where they could meet and relax. In this way, UpTrek and the community center helped the actors get to know each other and their perspectives. They seemed to function as boundary objects [79,80] and allowed stakeholders to share individual perspectives to foster further alignment, a process essential to participatory processes [16,65].

Take-away. In conclusion, the results suggest that certain contextual elements, such as UpTrek and the community center in our case, could support (values) alignment. These elements helped explore each other's perspectives, intentions, and goals. Identification of such elements could aid designers to connect more easily to the context and actors and help them align perspectives throughout the design process. Sharing stories, memories,

and narratives regarding the local environment seems to be a valuable method to identify such elements, as well as to uncover (shared) values [43] and create mutual appreciation and pride [48].

5.2.3. Community as a Multilayered Construct

The community (Socio-cultural Ecology) seems dynamic and transforming throughout the design process in the case study. When the lockdown commenced and the community center closed, the teenagers needed to find other ways to stay in contact. The community center was influential in bringing the community together and facilitated continuous community-building activities. As such, it seems that the community center in our case contributed significantly to the identity of the community of teenagers [81]. For example, the teenagers referred to the community center as “their” place, and Ammar called the community “his group”. When the community center became inaccessible, the contact between the community and Ammar decreased. The relationship between the community (Socio-cultural Ecology) and community center (Constructed Ecologies) suggests that the community might not be only a socio-cultural construct, but a multilayered construct [82,83], in this case, tied to a physical location.

Take-away. The textcolorredcommunity is a multilayered social construct that changes and evolves. These changes should be carefully considered throughout the design process in order to engage the community meaningfully [42]. The community cannot be studied in isolation. Becoming aware of community context, e.g., contextual elements, such as meaningful objects or places, could help to better understand and connect to the community, as these elements seem to play a role in building community and developing a shared community identity [84]. Practitioners could benefit from identifying relevant contextual elements to embed in the design process to foster community engagement [46,52,85].

5.3. Applying the Ecologies of Contestation Framework

This study is one of the first to adopt the EoC framework as a prism to explore the influence of context fluctuations on the collaborative design process. As a result in this paper, we are able to reflect on the fit of the EoC framework to explore the complex multi-layered contextual influences on design processes targeting social sustainability. The framework assisted the authors in systematically examining the design process on multiple contextual levels (Socio-cultural, Power, Constructed, Values-based) and exploring the relationships, challenges, and opportunities that arose in the design process when the ecologies did or did not align. However, the focal point of the EoC framework in our study was to aid design researchers in anticipating (potential) contestations in the design process. This focus on the obstacles, challenges and other difficulties drew our attention away from the successes and positive experiences during the design process. Future adopters of the framework should be mindful of the focus on contestations the EoC framework brings when applied in the analysis.

Furthermore, while the ecologies provided a valuable tool for analysis, the authors suggest extending the Ecologies of Power when using the EoC on similar cases. While the Ecologies of Power were useful to shed light on the relationships between the various actors, also other relational dynamics seemed to be worthwhile to examine. Trust relationships were, for example, influential in the case study to gain insights into the communities’ intentions, priorities, and perspectives. The need for trust became apparent during the first co-creation workshop, where the teenagers tended to give socially acceptable answers instead of expressing their true feelings and wishes. The need for trust has been shown in similar contexts by [65,86,87]. Furthermore, trust in the authorities might have influenced the community’s participation. As Ammar explained, the teenagers were unsure if their lives would be the same each day due to the continuously changing COVID-19 measures. This uncertainty resulted in changing interests and frustration, which seemed to have led to rebellious behavior, vandalism, and meetings in violation of COVID-19 restrictions. When we look at these findings in light of Corbett and DiSalvo’s work on trust in digital

civics [49,50], this is a good example of a failure of the authorities to manage expectations of the community. As such, trust was an influential topic in the design process, illustrating how other relationships beyond power might need to be considered in the Ecologies of Power.

In conclusion, our study illustrates the practical applicability and the potential of the EoC framework to be employed as a lens to examine the interrelations between the community context and the collaborative design process. Researchers should be mindful of the framework's focus on contestations and the possibility to broaden the Ecologies of Power.

5.4. Limitations and Future Work

The design project analyzed in this study focused on designing tools and events for a community to empower them to organize community events. The project's focus was on running the project and collaborative design process rather than understanding the process dynamics. Furthermore, the study's retrospective nature depended on already collected data. Both dynamics have influenced the type and amount of data available for the case study. These limitations were overcome by reviewing, checking, and extending the findings with Ammar and by positioning the study as an exploratory study. Furthermore, two of the authors were involved throughout the design process, making it easier to interpret and consolidate data.

Another limitation that might be found in our work is the fact that values were not explicitly addressed in the design process. Therefore, we specified what we interpreted as values and evaluated these impressions with Ammar. While values were not explicitly addressed in the design process, we observed the importance of attending to values throughout the design process. Therefore, we want to call for a more specific focus on supporting community characteristics such as shared and individual values, attitudes, and goals to be discussed and aligned throughout the community-based design process. Ideally, this would cover empirical research and the development of tools to support articulation and alignment of shared values.

Lastly, we recognize that the abrupt contextual changes from the lockdown measures might not represent a "regular" community process. As literature shows, community building takes time [22,88,89]. Due to the contextual changes and the accompanying shifts in perspectives and priorities, such a community-building process became difficult to realize for the designers. Authors are in doubt as to whether the research team could have done much to counter the experiences of the teenagers and *suspend doubt* [49] in authorities as a consequence of the changing lockdown measures. Many of the factors influencing the lives of the youth after the lockdown were beyond the control of the research team. Thus, while the contextual changes might not have represented a "regular" community process, these changes did allow us to draw out and investigate the relationship between the community context and the collaborative design process. Drawing out such relationships was expected to be more difficult when contextual changes would have been more subtle.

This retrospective study has provided more insights into the interrelations between the community context and the collaborative design process. While this study provides multiple applicable insights and design suggestions, we acknowledge that a more structural approach would be very beneficial for designers to better link to the community context in time. As such, we would like to call for more structural work, such as design frameworks and tools to support designers intervening in this complex environment.

6. Conclusions

Social sustainability has become an increasingly important topic in design [1], because it is an important factor in creating more resilient communities [4] and realizing flourishing societies today and in the future [5]. As such, design for social sustainability investigates how civic technologies might contribute to long-term and impactful citizen participation, and community building processes [6–8]. The increased interest in design for

social sustainability calls for more contextual perspectives in order to better understand the factors that might influence the design process [1]. This paper contributes to this quest by presenting an exploration of the influence of the context on the collaborative design process and four suggestions to take the contextual factors into account in design for social sustainability as a result of the contextual analyses. The insights presented in our paper are based on a retrospective case study of a design for social sustainability project in a neighborhood in The Hague, the Netherlands. In the design project, designers worked together with an industrial partner, youth worker, and teenagers to develop a serious game aiming to support teenagers in organizing activities for the local community in order to strengthen community connections. After weeks of preparation, co-creation workshops were organized to further co-design and test the developed serious game UpTrek. However, the project experienced significant pressure due to the outbreak of COVID-19 in Europe, requiring the Netherlands to go into a strict lockdown.

The Ecologies of Contestation framework [29] was used to analyze the design process on four levels (Socio-Cultural, Power, Constructed, and Value-based Ecologies) throughout three distinct periods: before, during, and after the lockdown. During these three periods, the actors collaborated to adapt the design process to the given circumstances. The Socio-Cultural Ecology revealed how the community was potentially linked to physically embedded social and cultural structures, functioning as a gateway to the community. The Constructed Ecologies extend this finding by showing the difficulties of translating the design process into a virtual and hybrid alternative, suggesting the influence of already existing social infrastructures on building new ones. The Ecologies of Power showed how all actors were dependent on each other, and all had a certain degree of power throughout the process. Values-based Ecologies further extend this finding by showing how priorities, goals, beliefs, intentions, and attitudes shifted over the design process and influenced the collaboration amongst actors, suggesting the importance of continuous alignment and addressing values.

We identified various suggestions for designers engaging in community-based design based on these results. First of all, the dynamics in the context draw attention to the temporal element in community-based design. In other words, community characteristics such as priorities, goals, intentions, meanings can change and influence the process. The influence of time should be considered throughout the design process. Designers should empower participants to reflect on the past and look into the future to attend to these changes. A specific aspect to focus on is a continuous alignment of values, which could be supported by identifying contextual elements that hold a different meaning for each actor. Identifying important contextual elements for the community can also help better connect to the community, as the community can often be seen as multilayered and dynamic.

Literature has already shown that careful consideration of the context can help design researchers increase participation and strengthen the design outcomes. This paper shows how the context could influence the design process on the Socio-cultural, Power, Constructed, and Values levels. The proposed suggestions could help design researchers strengthen their collaborative design processes to create more resilient practices.

Author Contributions: Conceptualization, G.K., I.K. and G.S.; methodology, G.K., I.K., G.S. and N.B.H.; formal analysis, G.K. and G.S.; investigation, G.K., G.S. and N.B.H.; data curation, G.K.; writing—original draft preparation, G.K.; writing—review and editing, G.K., I.K., G.S., N.B.H. and B.S.; visualization, G.K.; supervision, B.S. and I.K.; funding acquisition, B.S. All authors have read and agreed to the published version of the manuscript.

Funding: This research was funded by Dutch Research Council grant number 652.001.005.

Institutional Review Board Statement: The study was approved by the Ethics Committee of Eindhoven University of Technology (ERB2020ID7, 03-02-2020) and Delft University of Technology (18-10-2019).

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: Data are not publicly available.

Acknowledgments: Authors would like to thank Redouan El Khayari for his continued support and contribution to this research. Furthermore, we would like to thank all other participants and involved stakeholders for their collaboration throughout the design process.

Conflicts of Interest: The authors declare no conflict of interest. The funders had no role in the design of the study; in the collection, analyses, or interpretation of data; in the writing of the manuscript, or in the decision to publish the results.

Abbreviations

The following abbreviations are used in this manuscript:

PD Participatory Design
SWO Social Welfare Organization

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