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(Re-)Imagining Neighbourhood Spaces from a Transdisciplinary, Inclusive Research Perspective: The Vaartkom Case

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Abstract

Cities and dense urban areas are dynamic environments, always adapting to changing circumstances and shocks, such as the recent COVID-19 pandemic. The Vaartkom (or the Canal Bowl in English), a neighbourhood in Leuven, provides an interesting case study, having undergone a drastic transformation in the past two decades from a dilapidated industrial zone to mixed neighbourhood and cultural hotspot. This has introduced renewed and ongoing community dynamics, which inevitably influences the use of public and private space in the neighbourhood, creating new areas for inclusion and exclusion. This threefold transdisciplinary research focuses first on the spatial dynamics

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on the level of public space under COVID-19 as part of a wider series of neighbourhood dynamics. Second, it dives into the aspect of inclusive environments and third, it uses the transdisciplinary research process to reflect on a meta-level. Employing various methods – such as interviews, site visits, stakeholder and physical mapping exercises, we worked with community members to explore these spatial dynamics. Our findings highlight the conflicting expectations about the present and future use of public space. These opposing opinions reveal the tensions that exist among community members about how public spaces are used and whom they are for. This suggests there are multiple understandings of the Vaartkom. These multiple understandings were drawn from responses collected during a public engagement activity, which were subsequently analysed in a thematic and spatial way. This analysis brought forward influences of a temporal and spatial nature – that is, we acknowledge that the selected locations at which we engaged with community members, and the time of day, played a role in who we reached in the community and the responses we collected. This highlights the degree of awareness and participatory effort required to be truly inclusive. We therefore propose that future engagements involve the creation of a "Third Sphere" – a space for open, transparent and neutral dialogue – allowing the opportunity not only to imagine a collective future, but also to build bridges and help community members feel heard and empowered to contribute to the creation of a more inclusive post-COVID-19 environment.

Key words

transdisciplinarity, inclusivity, urban, neighbourhoods, post-corona, public space, spatial analysis

Challenge statement

Increased spatial inequality is experienced in public space in relation to large redevelopment projects and pandemic restrictions.

1. Introduction

"Transdisciplinary Insights" is an Honours programme organised by the Institute of the Future of KU Leuven with the objective of bringing together students from different faculties to tackle wicked problems. These problems – in contrast to tame problems – are so complex, high-stakes, dynamic, open, and interrelated that they require innovative, creative, and transdisciplinary approaches to be addressed (Rittel and Webber, 1973). With the world paralysed after the outbreak of COVID-19 in March 2020, the academic coordinators decided to centre the challenges of the academic year 2020–2021 around the pandemic. One of the challenges proposed was launched by two members from the research group Social, Methodological and Theoretical Innovation / Kreative from the Faculty of Social Sciences, KU Leuven. It was meant to explore the concept of inclusivity in an urban environment using a spatial point of view and a (post-)COVID perspective.

The city is a living ecosystem that evolves as an adaptable organism when facing changing circumstances, shocks, and stresses. Citizens and local stakeholders already play an essential role alongside official institutions in "normal times" to continuously create quality places, or the process of place-making (Wyckoff, 2014), but especially to address uncertainties. In the case of the pandemic, we see fast changes such as shifting interaction from the physical to the digital space, reorganising in organisations dealing with reduced networks or bubbles, or omitting face-to-face activities. Due to their complexity, cities and dense urban environments are impacted by uncertainties in several ways. While in the years 2020 and 2021 the world has experienced an unprecedented shock, with COVID-19 affecting every aspect of our lives, this pandemic is not the only uncertainty that our society faces: climate change, political polarisation and instability, and economic and technological unpredictability are all contingencies that challenge the world today. More complex systems, higher density, and more dependency on public infrastructure put more stress on cities in times of uncertainty. This disproportionally affects the most disadvantaged citizens, those who are "out of place". The pandemic has painfully exposed the existing socioeconomic inequalities in our society, through higher incident rates (Mari-Dell'Olmo et al., 2021), but also in the form of impact due to living conditions or digital divide (Boza-Kiss, 2021). It is in this particular context that we explored the idea of inclusivity in the context of a fast-changing neigbourhood in Leuven, Belgium: the Vaartkom.

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a. Introducing the Vaartkom – an ongoing transformation

We chose the Vaartkom (or the Canal Bowl in English) area in Leuven, a fast-changing urban neighbourhood in Leuven, for an in-depth study. For two decades, the city authorities and larger developers have been redeveloping the previously industrial neighbourhood of the Vaartkom through the Vaartopia Project. Most of the historic industry left the area decades ago, freeing up space for a more informal and underground (art) scene before the redevelopment; the neighbourhood still houses the head office and R&D facilities of the biggest brewing company in Leuven, while the actual brewing activities have moved to a neighbouring site just outside of the ring road. The ambitious redevelopment project, consisting of both new construction and revitalisation and temporary interventions such as the maakleerplek, a temporary co-working place and workshop for learning and creating, combines high-density luxury apartments and social housing units with commerce, offices, artistic facilities, and public space interventions, which result in a dynamic and ever-changing community. However, the exclusive and polished character of the project relocated certain users (like artists' workshops, a nightclub, a climbing hall, and squatters) out of the abandoned industrial neighbourhood. We approached this case at the crossroads of two interlinked dimensions: the ongoing, fast changes that the redevelopment has introduced from social, economic, cultural, political, and material perspectives and the larger dimension of the global pandemic with very local consequences.

i. Factors of change

The Vaartkom is a transforming neighbourhood influenced by different dynamics, including but not limited to the economic agendas of the redevelopment process, the political ambitions about the image of the city, the spatial changes to the previously industrial site and the resulting changing social dynamics, the comings and goings of residents, and the socio-cultural presence. With these larger changes, the old workshops, industrial activity, warehouses, fry shop, and the last local bar (now closed) made way for middle-class residents, socio-cultural organisations, restaurants and co-working spaces. To make sense of the changing neighbourhood, we looked at the concept of gentrification, the *replacement of an existing population by a gentry* (Lees et al., 2008, p.5). Its initial definition as the transformation of a working-class or vacant area of the city centre into middle-class residential and/or commercial use has

Figure 1. The Vaartkom, Leuven (Vrebos, 2022)

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expanded into broader conceptualisations over time and space in recent decades, linking it with processes of spatial, economic, and social restructuring (Lees et al., 2008), which is what is seen in the Vaartkom.

ii. Demographic evolution

To understand the changing dynamics of the Vaartkom neighbourhood in the light of the redevelopment and gentrification, a demographic analysis was conducted based on demographic data retrieved from the national register (Algemene Directie Instellingen en Bevolking, 2021). The Vaartkom is smaller than other districts and the neighbourhood had a low but stable population of 100–200 until 2010, after which it grew rapidly to over 1,500 inhabitants in 2020. While the population density was originally well below the average of the other districts, it has skyrocketed since 2010, surpassing the slowly increasing city average in 2017. This growth peak coincides with the completion of the construction of new residential buildings. In terms of nationality, the Vaartkom is historically a diverse neighbourhood compared to the city average, with the proportion of inhabitants with non-Belgian nationality sharply increasing to approximately 35% after 2015, when the Waterview student residence opened its doors. This is also visible in the age distribution (for a more elaborate graphical breakdown of age group representation trends over time we refer to Supplement 1). While the overall average age of the Vaartkom lies below the average age of the other districts, the 18–24 age group has increased significantly since 2016. The number of children, on the other hand, has been decreasing in the Vaartkom. The 25–49 age group has historically been overrepresented in the Vaartkom and has increased even further since 2010. Since the arrival of students, however, the proportion of inhabitants aged 25–49 has once again been decreasing towards the average. The 50–64 age group is consistently underrepresented. Since 2011, the 65+ age group has increased, in line with the opening of assisted living facilities.

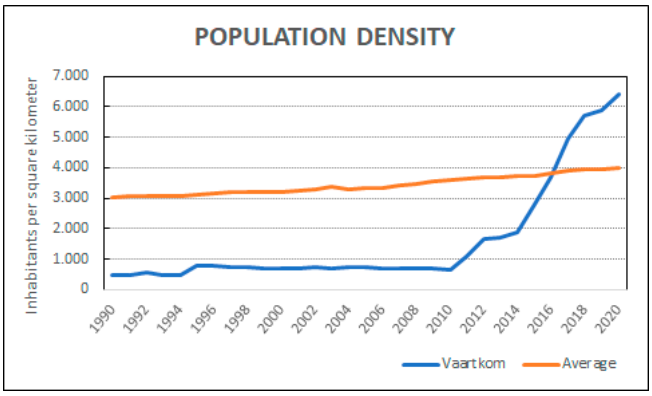

Figure 2. Population density data from Algemene Directie Instellingen en Bevolking, 2021, graph by Croughs, 2021

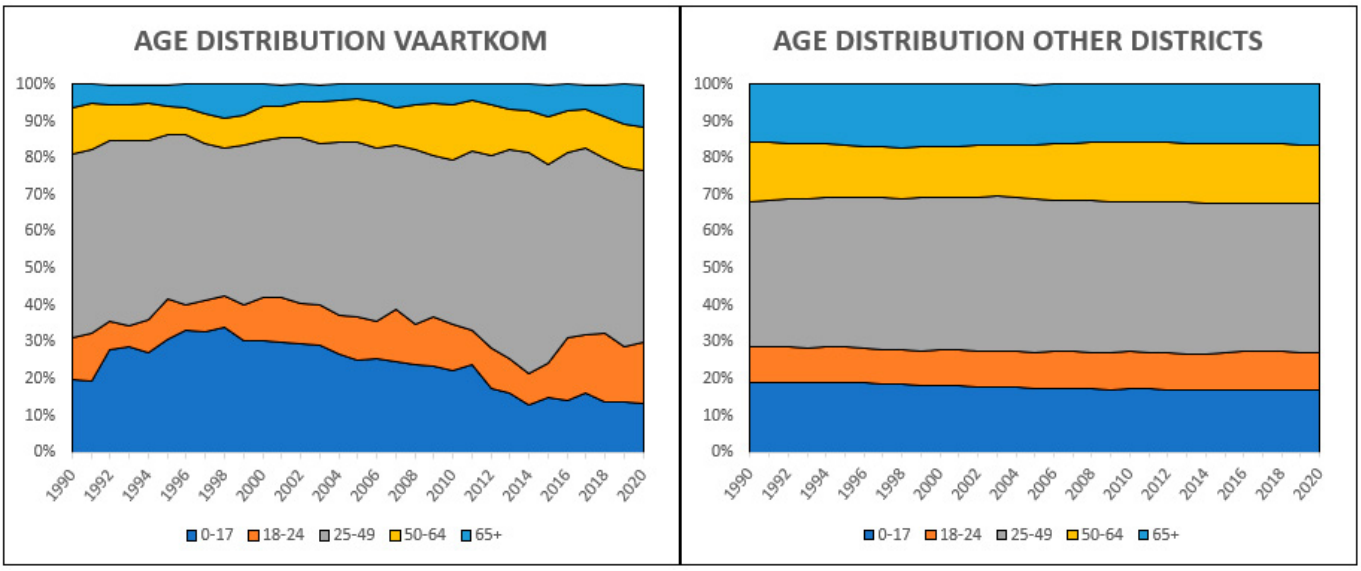

Figure 3. Age distribution Vaartkom vs Leuven population density data based on Algemene Directie Instellingen en Bevolking, 2021

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b. Objectives and research questions

Given the intertwined dynamic of a redevelopment process taking place under COVID-19 conditions in the Vaartkom, we decided to focus on public space with the following research question:

How can a changing neighbourhood be reimagined from within a transdisciplinary perspective to strengthen inclusivity?

A secondary research question we explored is:

How does the spatial location of public engagement within research relate to the collected responses?

We identify three fundamental elements in our research question that guide us to achieve our objective:
– a focus on inclusive environments and specifically how the use of public space has changed in the Vaartkom under COVID-19;
– the impact of the spatial position of researchers in the urban environment under study when engaging with citizens for data collection and interpretation; and
– a transdisciplinary research process to explore what pluralistic methodology we can use to reimagine a changing neighbourhood.

2. State of the art: inclusivity in urban development

Two concepts have guided the inquiry process and methodological approach: the dynamics of an urban ecosystem and the concept of inclusivity in relation to urban environments. They also clarified our position as researchers in the neighbourhood. Our intent was to read inclusivity into an urban ecosystem. This was mainly inspired by the observation that cities are taking up more central roles in, for example, tackling poverty reduction and climate change (United Nations Habitat, 2017). Marked by diversity and change, urban areas are complex environments that can be approached from and influenced by different drivers: economic, social, institutional, or ecological. In practice, these drivers are highly entangled, allowing for the cohabitation of a variety of unique urban lives (Koch and Latham, 2017). However, with cities shaped for supporting routine and self-focus rather than spontaneity and cooperation, contemporary urbanism is accused of stifling rather than fostering the personal development of its urban dwellers. Inhabitants are not active users or city "makers" but just passively undergo their urban existence (Sennet, 2018), with some having a more powerful position than others. Hence, Sennett points out a mismatch between the lived space (*cité*) and the built space (*ville*) and calls for reconciliation. Therefore, Sennet argues for open forms of cities in comparison to closed forms, where the built environment is not stable and provides openness and space to the dynamics of urban life and all people who actively shape its identity as citizens or casual passers-by.

Inclusive urban environments

Inclusivity is studied broadly in academic literature in a variety of disciplines: in education (Berlach and Chambers, 2011; Danowitz and Tuitt, 2011; DeLuca, 2013; Florian and Black-Hawkins, 2011), in the workplace (Mor Barak, 2000; Borghouts-Van de Pas and Freese, 2017), in economic and sustainable development (Gupta et al., 2015; Pouw and Gupta, 2017), or in research itself (Fullana et al., 2014; Barton, 2005). The interdisciplinarity of inclusiveness is illustrated by the distinctive definitions depending on the discipline and the context of the research. As such, interdisciplinary perspectives have often been bundled to create innovative frameworks fostering inclusion (Borghouts-Van de Pas and Freese, 2017; DeLuca, 2013; Pouw and Gupta, 2017). Bunnell (2019) provides an interesting analysis of what inclusivity means in the UN Habitat's New Urban Agenda, and extracts various conceptualisations based on social and economic aspects. Inclusivity can, for instance, refer to environmental as well as socio-cultural or political attributes of cities, such as universal access to housing and public services or efforts to protect inhabitants from risk and violence. Apart from this, it is applied to more specific urban areas, such as public spaces, that need to be designed in inclusive ways, for example to make the area in which they are located safe and accessible. Additionally, Bunnell assigns an economic or material connotation to inclusion, referring to inclusive sustainable economic growth, prosperity, or industrial development. Finally, inclusivity overall is considered a positive attribute in the context of urban policies, plans, and monitoring or evaluation systems. Yet, even within urban studies itself, inclusivity remains a prominent issue of concern.

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Inclusive processes

Inclusivity can also refer to processes, both in urban governance and planning and in research methodology and projects. The importance of inclusivity is exacerbated in participatory research with disadvantaged communities. Incorporating disadvantaged people into research entails significant methodological challenges (Fullana et al., 2014). Being inclusive in research extends beyond merely talking to and listening to people. A researcher who collaborates with participants and adopts the role of facilitator should be knowledgeable on the subject matter but also ensure that the research emerges from participants' own interests. Furthermore, the researcher seeks to overcome material and ideological barriers for participation in the research, especially when the subjects of the research are vulnerable people experiencing social exclusion (Barton, 2005). The concept of inclusion understood as the involvement of different populations representing different social, economic, environmental, socio-cultural, and political realities is closely related to the concept of participation.

Participation

Participation refers to public involvement in decision making and holding governments accountable. While there is a consensus that participation is an essential and positive element in inclusive processes, a variety of conceptualisations on participation exists and critically reflects on different forms of participation (Cornwall, 2008). Some conceptualisations make use of normative hierarchical models with an increasing transfer of decision making from authorities to the public, mostly based on the intentionality of the initiator of the process (Arnstein, 1969; Petty, 1995; White, 1996; Cornwall, 2000). While there is agreement on the inclusive potential of participation, implementing participation in various research and practice projects remains challenging. Criticism on participation often relates to concerns about who participates, how, when, and at what stage (Cornwall, 2008). We came to the principal stance that our research processes must include elements of working with – rather than researching on – our participants in the Vaartkom. Building on the concept of inclusive rigour to address the complexity of the inclusive urban environments, under our transdisciplinary approach to studying inclusivity in the specific environment we chose to focus on eclectic methodological pluralism, improvisation and innovation, adaptive iteration, and plural perspectives (Chambers, 2015). This has fundamentally shaped the methodology of our study.

3. Methodology

This project was an encounter that brought together a professor, two PhD students, four Master's students, and three Bachelor's students and a critical friend from the disciplines of anthropology, architecture, bioengineering, business economics, law, urban planning, sociology, social welfare and social innovation with the physical place and the dynamic community of the Vaartkom. Living through the pandemic ourselves, studying and researching in and on Leuven, we made ourselves part of this living constellation of space-time trajectories in our explorations of the temporal and spatial unfolding of the Vaartkom neighbourhood. The team worked throughout the academic year 2020–2021, with on average one team meeting to discuss and one to two working sessions per week. We reflected upon different participatory approaches to research inclusivity. The pandemic influenced the methodology for this project by restricting our interactions with participants and the field site, limiting opportunities to engage with the wider community of the Vaartkom. This section introduces the array of methods used in the inquiry process, suggesting a rather organic approach to studying our topic from within a complex constellation of partners.

An organic research process

The organic, inductive research process that the research team undertook was not predetermined. Instead, the design thinking cycle, displayed in Figure 4 was used as a framework to initiate an exploratory process while allowing for dynamic changes along the way, adapting to the changing circumstances and the input from the group, community, and context. Different moments of decision making were left open to the unexpected. Informed by inclusive rigour, we remained open, never knowing in advance what would lead our process: something a stakeholder said during an interview, an idea someone picked up during a seminar, a brainstorming session, observation, or experiment. It was only in hindsight, while bringing everything together in the development of the final video and writing up the findings that we recognised the patterns in our own decision-making process, using writing, reading

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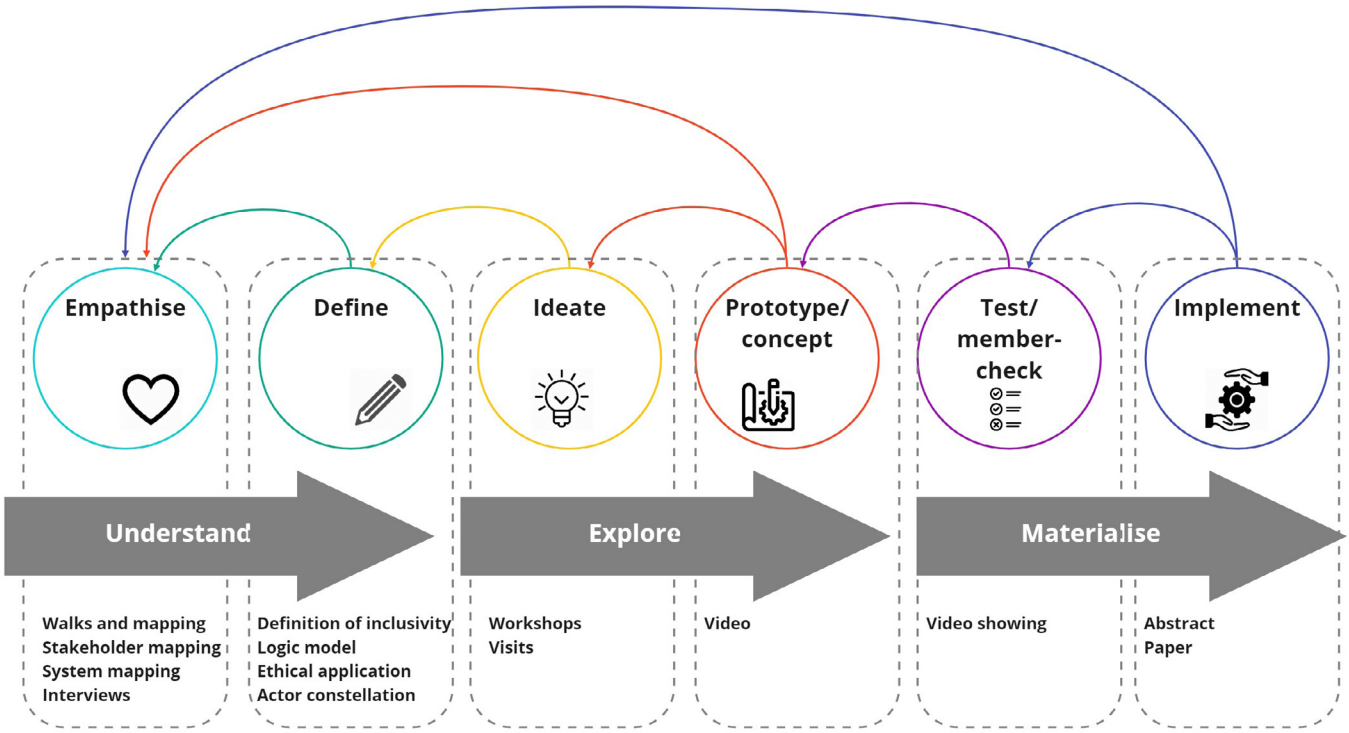

Figure 4. Our framework for the design thinking cycle (adapted from Gibbons, 2016)

and rewriting as an ongoing interpretation process of constantly (re)negotiating meaning (Savin-Baden and Howell-Major, 2013).

Mapping and observation

With varying levels of previous knowledge on the neighbourhood, we started the research with an explorative mapping exercise focusing on different dimensions of the neighbourhood and aspects that we would normally not notice. In small groups, we topically mapped the neighbourhood by hand while walking through the Vaartkom. These physical maps, digitally scanned and documented, served as a point of reference to observe future and past changes. Several other mapping and diagram exercises were done to develop a further understanding and make sense of our findings.

Stakeholder mapping and interviews

We developed a digital stakeholder map using Google Maps to develop a deeper understanding of the various stakeholders present in the Vaartkom. These fixed locations were viewed as potential entry points for community engagement and potential participants to develop a deeper understanding of the neighbourhood. Group members then contacted and interviewed key stakeholders who have been present during the transformation of the Vaartkom or who have been directly engaged in this transformation to gain deeper insights into the lived experiences in the Vaartkom from those who engage with the neighbourhood on a regular basis and to narrow the scope of the research to areas for more inclusivity.

Public engagement intervention

We built a physical mailbox that we moved around selected areas of the Vaartkom, namely Keizersberg, De Ruimtevaart, Sluispark, OPEK, Victor Broosplein, a discount supermarket (Lidl), and Stapelhuisplein. Team members stood with the mailbox and invited people passing by or lingering in the public space to share their thoughts about the change they have seen in the neighbourhood since the COVID-19 pandemic, as well as how they imagine the Vaartkom will change in the future. Their written and verbal accounts were collected in response to three prompts on paper flyers: (1) *Describe this neighbourhood in three words*, (2) *If there is one thing you could change in the Vaartkom, what would it be? And why?* (3) *Is there a change caused*

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Figure 5. A team member with the mailbox

by COVID-19 in the Vaartkom that you think may stay after the crisis is over? Posters were also attached to the mailbox with these key prompts; see the English version in Figure 7. All the materials were available in Dutch and in English.

Participants and data collection

Two primary groups contributed to our research: (a) representatives of three stakeholder groups – government and urban management, economic stakeholders, and socio-cultural stakeholders – with whom we conducted preliminary interviews to scope our research focus; and (b) community members with whom we engaged around a mailbox we made in the public engagement intervention (see Figure 5). Community members were regarded not only the individuals who lived in the area of the Vaartkom but also those who frequented the area. We conducted five in-depth recorded interviews with stakeholder participants about changes taking place in the Vaartkom. For the second category of participants – those whom we engaged with at the mailbox – we opted to keep their responses anonymous because we worried requesting contact information might limit participation.

Ethical reflection: research during the COVID-19 pandemic

Due to the project's focus on inclusivity and participatory methodologies, we prioritised an ethical research approach. The team requested and received approval from the university ethical commission as part of a larger ethical research application of the doctoral research project "A post-humane perspective on the city of the future: the development of innovative models of participatory research" on participatory methods of one of the coaches (see SMEC application G-2020-2536-R2(MIN)). Building from the principles of the Belmont report, our four primary areas for ethical consideration included showing respect for all persons, balancing who benefits from the research and how participation is

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invited into the project, collecting informed consent from all participants (National Commission for the Protection of Human Subjects of Biomedical and Behavioural Research, 1978), as well as adhering to all COVID-19 regulations during our research process.

The participatory component of this research raises specific and contextual ethical questions related to gaining informed consent and securing anonymity and confidentiality where appropriate. The concept of "ethics of care" formed the baseline of our approach in which ethical decision making is directed by elements such as care, compassion, mutual benefit, and collaborative relationships (Wiles et al., 2008). In our collaborative research approach, we attempted not only to actively involve participants in the research process but also to enter into the dialogue with participants on an equal level. The team deviated from traditional consent forms and developed a visual representation of the principles of ethical care (see Supplement 2). For stakeholders who participated in in-person or virtual interactions, consent was discussed in preparation for and during interviews with stakeholders. For in-person and written responses, statements were also included on all response slips.

4. Data collection

We connected our data collection and analytical process with the three focus areas around spatial, inclusive, and transdisciplinary approaches. The spatial approach makes use of a spatial analysis to seek patterns and trends in time-space aspects behind the data collected through the public engagement intervention, in combination with the maps, explorations and existing data. The interviews were used to further define the scope of the research and get a deeper understanding of inclusivity. The data collected through the public engagement intervention was analysed thematically to reimagine the changing use of and wishes about public space. To make sense of the transdisciplinary process, we used a range of mapping techniques, such as system maps, logic models, brainstorming and writing, as well as a field visit. We made sense of these materials through ongoing visual engagement on a collaborative platform as well as through storytelling exercises via the production of a video.

a. Spatial-physical mapping and observation

For the explorative mapping, the neighbourhood was divided into five zones following the geographical structure of the area (Keizersberg, Vaartkom OPEK area, Engels Plein with the ring road viaduct, Sluispark and adjacent area, and the area immediately south of the Vaartkom). This mapping exercise was a momentary documentation of the space at the project's onset, serving as a reference point for further observations of change in the public space of the neighbourhood. Each member was given a set of base maps of each zone to map according to their chosen theme selected from a series of spatial elements, inspired by the work of various urban and public space scholars (Gehl, 2013; Lynch, 1960; Massey, 2005; Whyte, 1980), where each student selected one topic of personal interest to them: *COVID-19 and change* (observations in the environment based on pandemic effects); *Connections and borders* (physical and invisible borders, or "edges" as Lynch (1960) calls them); *Unintended use* (use and adaptation of space in ways seemingly beyond norms or rules); *Empty, unused and in-between space; Flows of people* (how people move through and interact in space); *Nature in the city* (intended and unintended expressions of flora, fauna and water) and *Grain* (the three dimensions of buildings (height, width and length) in comparison to unbuilt space and how these affect place experience). An overview of the most notable findings of both the initial mappings and the further observations is available in the analysis section below.

b. Inclusive

Stakeholder mapping

Choosing a dynamic map allowed us to think about the stakeholders involved in a dynamic way: stakeholders could be added, could change locations or categories, or could stop being important stakeholders. These stakeholders were viewed as possible points of entry into the neighbourhood which were narrowed down to a list of preliminary stakeholders for exploratory interviews. This resulted in four major groups of stakeholders – (1) socio-cultural and educational stakeholders, (2) government and urban management, (3) economic stakeholders, and (4) community members – from which we sought out individuals for our discussions.

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Table 1. Overview of data collection through the public engagement intervention in different areas

Area	Date and time	Observations on population
Keizerberg – green park on hill towards village with monastery	Saturday 3/4/21 3pm–5.30pm	Mixed – residents of the nearby village, student residents, visitors from other parts of the city
OPEK – central socio-cultural building in former customs office	Between 30 and 31/3/21	Unknown – these responses were put in the mailbox when nobody from the team was there
Victor Broosplein – square at the head of the Vaartkom, in front of OPEK	Saturday 27/3/21 1pm–3pm	Visitors of OPEK of both the cultural organisations and the cafe, as well as parents dropping off or picking up their children going to activities. Residents.
Lidl – public space at entrance discount supermarket	Tuesday 30/3/21 3pm–5.30pm	Mixed visitors of the discount supermarket chain, many people from outside the Vaartkom doing weekly groceries, or young people buying drinks and snacks to consume in the Sluispark
Stapelhuisplein – small square between blocks along path to other part of the city	Monday 29/3/21 3.30pm–5pm	Mostly young residents, people passing by, prospective buyers of assisted living facilities
Sluispark – busy park on connection to the city	Wednesday 24/3/21 3pm–5pm	Busy – many students meeting in groups to drink, socialise and play games. Also some older residents and families with kids. Explicit police presence.
De Ruimtevaart – social organisation with social restaurant	Wednesday 31/3/21 11am–1.30pm	Visitors of the social restaurant. Many willing to talk, less willing to fill in papers.

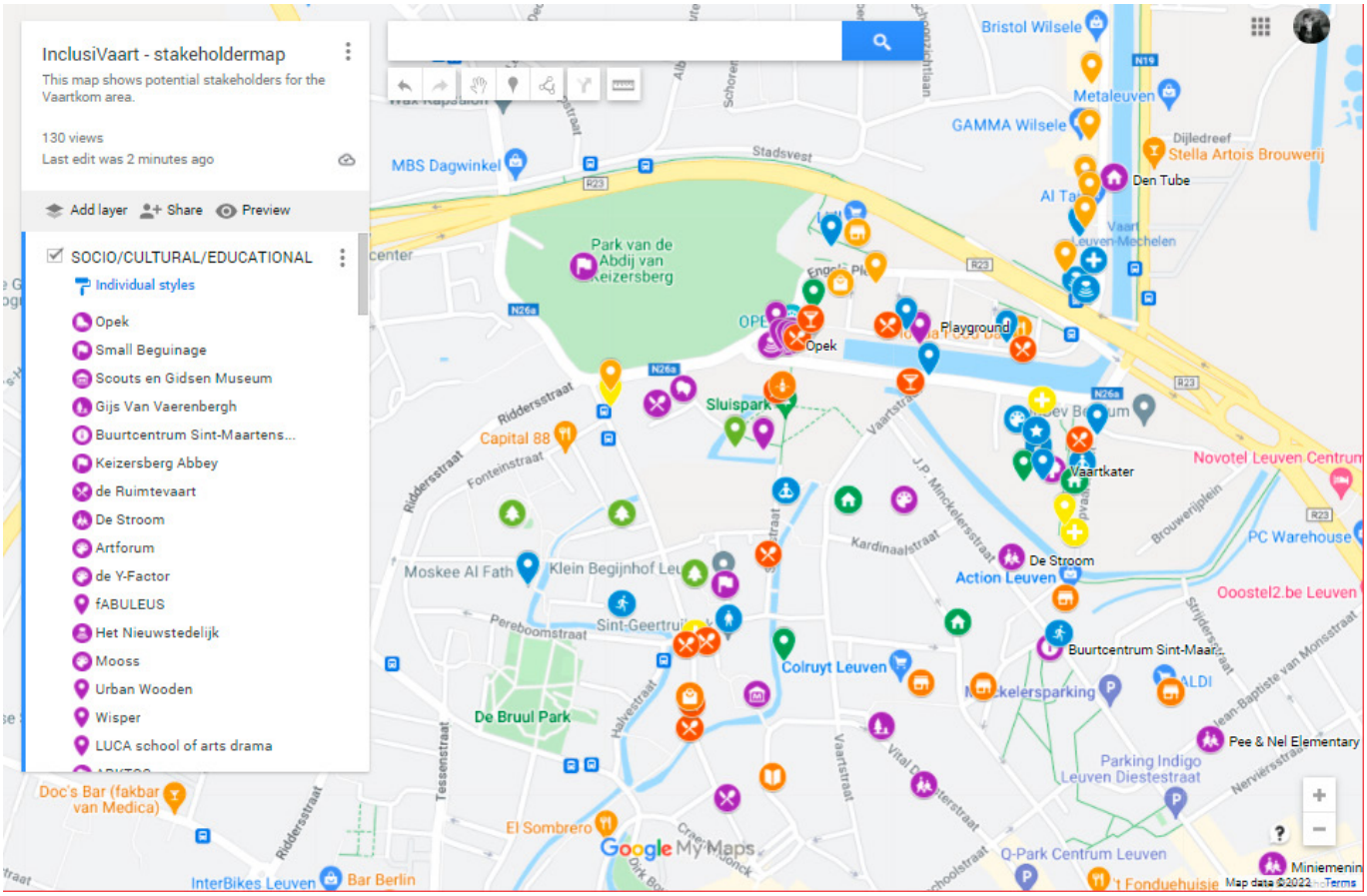

Figure 6. Stakeholder map

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Table 2. Stakeholders and their expressed concerns based on a selection of interviews

Stakeholder	Concerns
City government – alderwoman of the city	– *Gentrification, affordability and accessibility* – *History of the Vaartkom* – *Significance of public space for people living without private gardens during COVID-19* – *Connections with citizens*
Social organisation – employee	– *Wellbeing of children – access to space for children* – *Rising rental prices due to redevelopment*
Architecture firm – employee	– *Technical challenges of temporary reconversion* – *Balancing varying interests of various users and residents*

Interviews

Recorded in-depth interviews with stakeholders added additional layers of nuance to the narrative of a changing space by including the voices of multiple actors engaged in and affected by the dynamics of change. They were instrumental in assisting the team in narrowing the scope of the research project by highlighting existing challenges present in the neighbourhood, such as the use of public space in the Vaartkom, anxieties over affordability and historical preservation, as well as initiatives to make the space available and accessible to all. Interviews were conducted during a period of lockdown in Leuven. As such, most interviews were done through video calls, while some selected interviews were done in person in compliance with the COVID-19 restrictions. Two main topics were decided upon for the interviews: (1) *How has your relationship with the neighbourhood changed recently, both as a result of urban redevelopment and the pandemic situation?* and (2) *In what direction should the neighbourhood evolve? How can change translate into a future vision of the neighbourhood?* Some concerns highlighted by three interviewees are given in Table 2.

Public engagement intervention

To work with community members in identifying areas of inclusive and exclusive environments in the Vaartkom, we designed a public engagement intervention as a means of co-imagining a future of the community. The notion of imagining envisages a preferable situation in the future, which enables participants to analyse the current situation while identifying ways to move from the actual situation to the preferred one (Vidal, 2005). Through our public engagement intervention and utilising the mailbox with three prompt questions, we engaged with people living, working, hanging out, and passing through the Vaartkom. By the end of the public engagement intervention, we had a total of 105 respondents reflecting on the current state of the Vaartkom and the future they imagined for it after the COVID-19 pandemic.

Figure 7. The flyer for the public engagement intervention

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c. Transdisciplinary

A summary some of the methods that were used throughout the transdisciplinary process to create a transdisciplinary understanding of the dynamic Vaartkom context is given in Table 3.

Visit to the Bereklauw

As part of our journey to discover the various interpretations of inclusive environments and alternative perspectives, we visited the Bereklauw commune. This inspirational visit to this eco-village on the outskirts of the city introduced us to their way and principles of cohabitation, social connections within and beyond their commune, and connections to the land, resources, and the physical environment. The place is packed with tools, materials, and furniture written off in a formal context but given a second life in the community. The purpose of this visit was to reflect further on what and who we were missing and to be introduced to innovative views on inclusion. During our visit, team members were confronted with their own prejudices, despite their best intentions to keep an open mind. Before entering the commune, the team walked around the premises, from the outside spotting a structure that could be best described as an igloo with a metal casing. We started speculating on what the purpose of this structure could be, discussing potential explanations such as protection against 5G or other interference from the outside world. After entering, we found out that the structure was in fact a sauna, and a community member had covered the structure in metal plating as an art project, without any further purpose. Our guide spoke about how outsiders often view the commune as anti-society, where in fact the community actively engages with and even depends on the outside society. This conversation, after having the igloo discussion with the research team before, was an important confrontation of how powerful prejudices can be, despite our best intentions.

Table 3. Array of methods used in the transdisciplinary research process

Method	Concept	Purpose
Logic Model (Logframe)	A systematic and visual approach to planning research resources, activities, outputs, and outcomes (W.K. Kellogg Foundation, 2004)	To plan intended inputs (general inputs and investments), outputs (participants, activities, and products), outcomes (short-term and medium-term), and impact (long-term outcomes), and identify connections between them
Systems Map	An entity of interacting, interrelated and interdependent components that form a complex whole (Coffman, 2007)	To trace the dynamic relationships between the actors, establishments, and infrastructures of the neighbourhood – its residents, socioeconomic organisations, public spaces, establishments, heritage, and culture – in reference to the municipality of Leuven wherein it is located, and to the broader world.
Visual Collaboration Platform	Online whiteboarding software, Miro	To facilitate research planning, implementation, and analysis in a dynamic way and find synergy through a common language and visualisation
Brainwriting	This process asked each team member to write down an idea and, after a given period, this idea would be passed on to a different team member who would then read and add to the initial idea (Heslin, 2009)	The design of the public engagement intervention

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5. Analysis

a. Spatial analysis

Stakeholder mapping

Stakeholder mapping was set up in an online environment (Google My Maps), making it possible to layer several aspects (e.g. socio-cultural, services, habitation, medical, restaurants and cafes, retail, nature, public space, flows of people). Regarding the distribution, certain stakeholder knots became noticeable: a cultural knot around OPEK, a retail one along the Vaart, and the Balk van Beel with a service and medical knot in Schipvaart street. Our stakeholder map, with a total of 94 placed pins, is shown in Figure 6

Physical mapping and observations

The physical mapping exercise was conducted at the start of our inquiry in October 2020, at a time when COVID-19 cases were on the rise and a new set of additional restrictions had been put in place, such as the full closure of restaurants and bars, the limitation of personal contacts, and the restriction of public outdoor gatherings to four people. What follows are some of the most striking observations made by the members of our team through the mapping processes and further observations.

First, going around the site the group noticed that many businesses (e.g. clothing stores, restaurants, bars, cafes, food market), except for essential ones (e.g. supermarket, pharmacy), were closed because of the lockdown. In general, the site had very few visitors. The only passers-by had come out for physical exercise or essential movement to the grocery store. Focusing on spatial implementations, some preventive measures had been taken, like the addition of removable boards warning about keeping 1.5m of physical distance around OPEK. Another striking element was the appearance of discarded face masks on the street instead of empty bottles or plastic packaging. This limited use of space, however, changed over the duration of the research project.

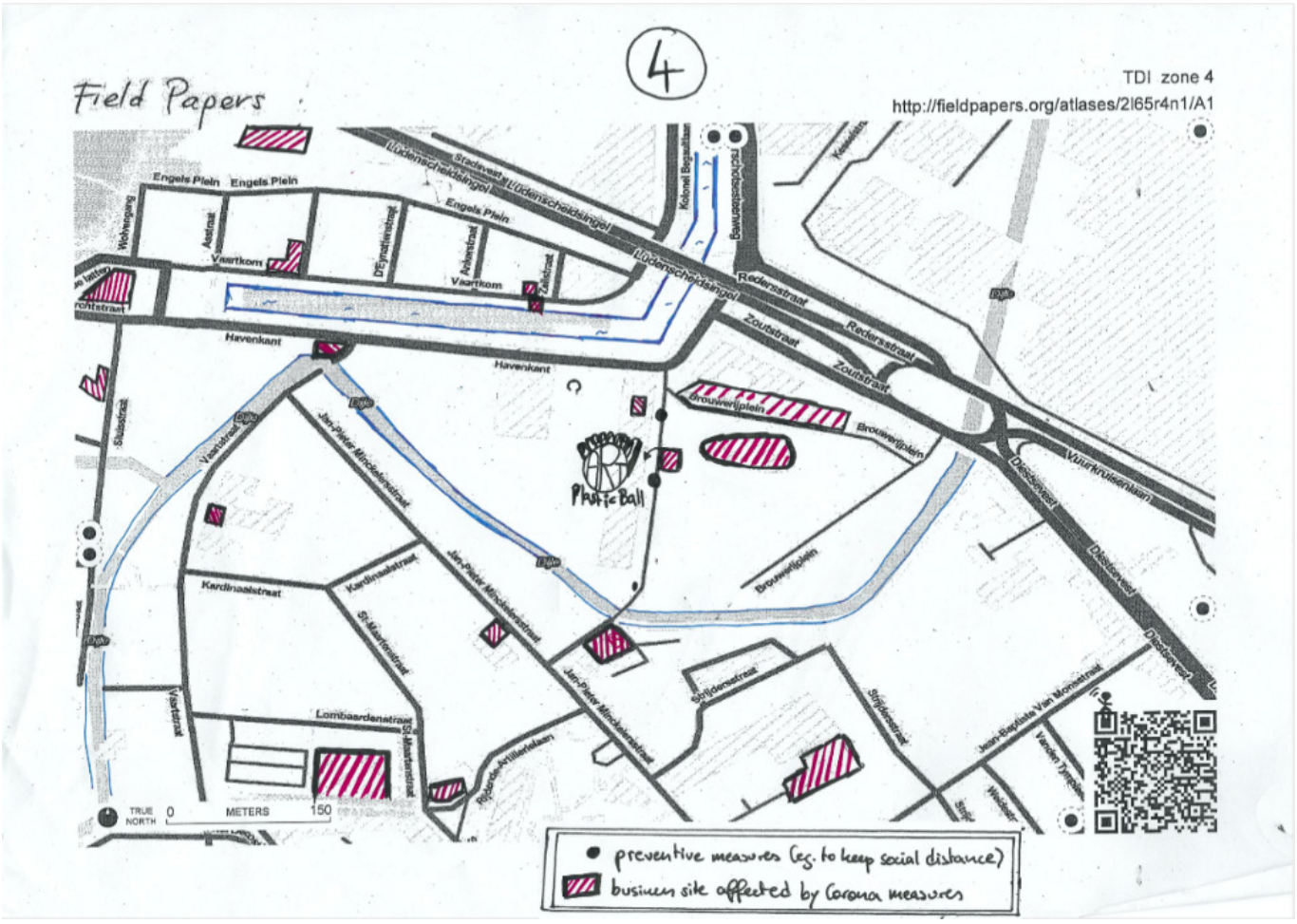

Figure 8. A map of part of the Vaartkom illustrating COVID-19 preventive measures and affected businesses

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Second, on sunny days in pre-COVID-19 times, the OPEK and Hoorn buildings extended their indoor seating with an outdoor terrace. Consequently, part of the Victor Broos square and Sluispark turned into cafe squares only accessible to users of the cafes. However, during lockdown, the empty terraces of these cafes were exposed and taken over by youth using, or reimagining, them as skate ramps or benches. Given the weather conditions in mid-October, the use of public space was limited, but when we returned to the areas on sunny days in springtime these areas, especially the Sluispark, were buzzing with small groups of students and teenagers talking, playing, drinking, and playing sports. We saw the park changing as the city introduced new facilities such as toilets, additional bins, information screens displaying rules, and stewards handing out trash bags.

Third, the redevelopment of the Vaartkom has brought about a new connection with the city centre. Soft traffic (bicycles and pedestrians) easily flows from the city centre to the Vaartkom via the Vaartstraat, the Stapelhuisplein and car-free Schipvaartstraat. Some visitors to the area slow down and linger around the green Sluispark or OPEK square, some seek refuge climbing the Keizersberg and some run/bike following the canal further north, away from the city. The Engels Plein carries quite a number of visitors as well. However, many quickly passed through without pausing, on their way to or from the shops (e.g. the supermarket Lidl).

Fourth, there are traffic flows that do not have the Vaartkom as a destination but merely pass through the neighbourhood. It appears considerable efforts have been made to regulate traffic flows, with a clear effort to separate bikes/pedestrians and cars. There seem to be plenty of meeting places in the neighbourhood as well. Some of these are natural meeting points, like the park on the Keizersberg, while the city has also made specific efforts to create meeting points to bring people together in other areas. Neighbourhood info boards and media messages also informed us of the ongoing design project to redevelop the banks of the Vaartkom.

Spatial analysis

As we set up our mailbox at various locations (i.e. Keizersberg, De Ruimtevaart, Sluispark, OPEK, Victor Broosplein, Lidl, and Stapelhuisplein) in the neighbourhood, we recognised that dynamics varied according to the location. As we specifically decided not to collect personal data with the flyers to make participation as simple as possible, we used alternative ways to compare locations: through observations and a spatial content analysis.

First, we noticed the difference in the number of responses per location: certain locations yielded a much higher response rate than others. More responses were triggered by direct interaction and informal conversations between researchers and passers-by on the spot in the different parts of the Vaartkom than by people picking up a form and posting it in the mailbox. This observation is potentially also linked to the personality of the researchers reaching out next to the mailbox and the length of the conversations. However, we noticed certain people were more or less likely to respond to our questions based on their current activities. People in the park or on the Keizersberg, for example, were more likely to be enjoying their free time compared to people in front of the supermarket who were purchasing their weekly groceries, affecting their willingness and depth of participation. This suggests that our answers are potentially biased as participants self-select whether they participate, and this self-selection is dependent on their activity at a specific moment. This, as well as the times of year and day, has led to an overrepresentation of students, especially in the Sluispark.

Second, we noticed a variation in diversity based on mailbox locations; for example, the population at the supermarket was more diverse than on the Victor Broosplein. This is further illustrated in the spatial distribution of the thematic analysis of survey data on the adaptations to the place due to the pandemic and the dreams about the future discussed below. A trend that becomes visible in Figure 9 is that the pandemic impacts that respondents discussed in front of the supermarket or social organisation were of a more practical or social nature compared to the focus on the use of public space mentioned in other locations (Keizersberg, Victor Broosplein, Sluispark and Stapelhuisplein). For the responses about visions of the future, we noticed similar and opposing trends. While the demand for green space and various facilities appears in several locations, there are certain locations (in front of the discount supermarket and amid the buildings of the Stapelhuisplein) where there seems to be a bigger concern over affordability and inclusivity.

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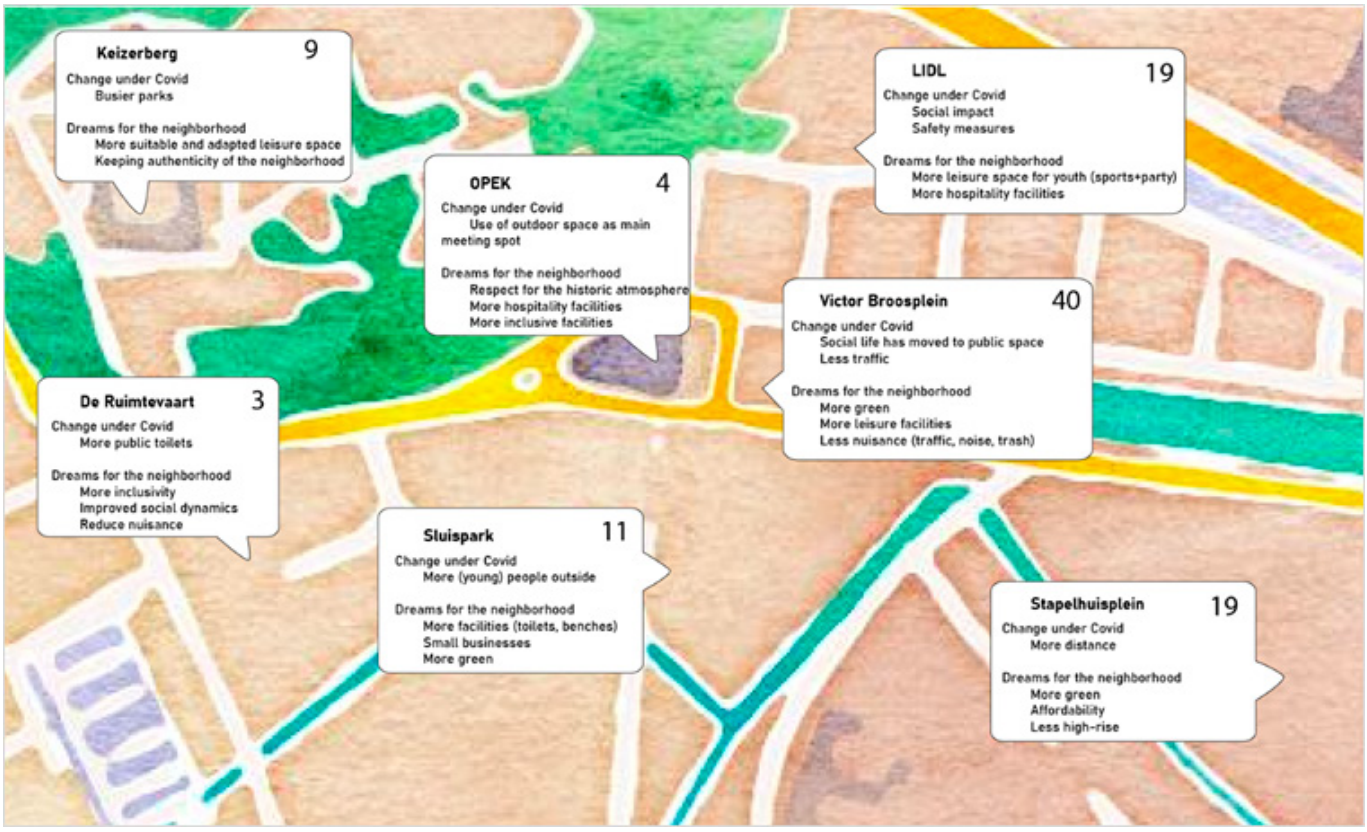

Figure 9. Spatial analysis of the data from the mailbox outreach

b. Thematic analysis

With the aim of identifying patterns or themes from the responses collected from the public engagement intervention, thematic analysis was used to systematically analyse the qualitative data. Word frequency analysis was used to initially gain an approximate measure of the emerging trends in responses. The responses to the first question were translated into a word cloud. The 210 responses for two prompt questions were coded into units of analysis, and through the process of categorisation yielded respectively 15 and 19 themes for the prompt questions (2) *If there is one thing you could change in the Vaartkom, what would it be? And why?* and (3) *Is there a change caused by COVID-19 in the Vaartkom that you think may stay after the crisis is over?* Responses underwent a modified version of the constant comparative method, an iterative procedure to develop concepts from the data by coding and analysing at the same time (Taylor and Bogdan, 1998). This qualitative analysis of text is primarily based on grounded theory (Glaser and Strauss, 1967; Kolb, 2012). We first identified the different discernible concepts that emerged as the primary units of analysis. These units then underwent the process of categorisation, that is, units with similar meanings are grouped together under a theme, based on a rule of inclusion. These thematic analyses were implemented using Microsoft Excel. The themes were then further analysed by location to see geospatial patterns and frequency distribution in the responses in reference to the total number of responses, which aided in the analysis of the most prevalent issues and concerns that the respondents had (see also Spatial analysis).

When asked what they would like to change about the Vaartkom, a clear trend among the responses was the wish for more green and recreational spaces and HORECA (i.e. hotels, restaurants, and bars) in the area. Additional areas of concern included the planned construction of and eventual access to a swimming pool as part of the redevelopment of the banks of the Vaartkom. Responses reveal opposing attitudes to the project, linked to the ongoing neighbourhood activism against the pool (Clays and Vandenbroeck, 2021). Many respondents also expressed a desire for less car traffic and more pedestrian traffic, as well as mixed emotions about the redevelopment. Attitudes were mostly positive about the meeting opportunities of the area.

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Table 4. Overview of coded themes

Question 2	
Theme	**# codes**
Historical atmosphere	6
HORECA	**17**
Leisure, leisure space, leisure time	**24**
Social behaviour	10
Litter	4
Green	**27**
Swimming pool	12
Renovation	2
Affordability	5
New construction	10
Traffic	12
Noise/crowded	3
Other businesses	5
Public toilet	2
Other	5
Total	**144**

Question 3	
Theme	**# codes**
Green	3
Social behaviour	**23**
Public toilet	2
Local discovery/appreciation	7
Calmer/quieter	5
Digital lifestyle	5
Noise/crowded	**22**
Leisure space	**26**
Other	2
Safety measures	8
Traffic	5
HORECA	5
Discovering/enjoying hobbies	6
Litter	2
Renovation	1
Swimming pool	1
New construction	1
Other businesses	1
Total	**125**

In response to what changes caused by the COVID-19 pandemic they expected to remain after the pandemic has ended, some participants indicated concern over the shared use of public recreational spaces. Respondents largely agreed that people would continue the increased use of available green spaces once restrictions on social distancing have ended. This highlighted a few areas of tension. With more recreational spaces, green spaces and establishments in Leuven closed due to the pandemic, the Vaartkom has seen a shift in the number of people who access these available places. There was a division between those who viewed this increase in the use of available space as a positive change, as a way to bring life to the area, and those who view it as a negative change, referring to an increase in noise levels. A notable observation with these responses is that participants who recently moved to the neighbourhood or were there for leisure reasons chose to be there due to the perception of it as a vibrant, up-and-coming area, full of life. On the other hand, the residents that moved into the neighbourhood at the start of the redevelopment tended to have more concerns about the neighbourhood's changing dynamics and growing use of public space.

This highlights the conflicting expectations among the people who live, work and spend time in the neighbourhood – those who moved in a decade ago and those who live along the canal have been sold the narrative that they live in a quiet and residential space; those who visit or moved in more recently perceive the neighbourhood to be vibrant and new, full of spaces for public engagements; and finally, long-term residents remember the Vaartkom as the industrial heart of Leuven, full of industrial buildings and jobs. Distinct understandings of who is part of the neighbourhood and who is out-of-place in the Vaartkom challenge the idea of an

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all-encompassing notion of an inclusive environment, as different perspectives centralise different groups.

c. Reflection on the transdisciplinary process and our methodological trajectory

Video

At the end of the project, the team produced a video to present findings and insights. This video served as a prototype to gather and test ideas. This production process, as well as the continuous visual documentation on the Miro board, helped to structure the multiplicity of impressions and information into a more coherent story while reflecting on the complex case (Nielsen et al., 2019). The video can be found on YouTube.[1]

6. Discussion

The purpose of our inquiry was to develop an understanding of how aspects of inclusion and exclusion change through different dynamics, focusing on *how a changing neighbourhood can be reimagined from a transdisciplinary perspective to strengthen inclusivity.* The dynamic nature of the Vaartkom introduced us to a multiplicity of uses and users of space, including residential, work, cultural, leisure and social, with sometimes conflicting demands and expectations. Our study suggests that changing needs and expectations can potentially lead to tensions. Conflicting expectations are made visible in the tensions and debates over the use of public space. These expectations stem from various sources. First, they stem from the different social groups that have acted in the Vaartkom area in recent decades, from the working class in the times of the industry, to the wealthy middle class that has recently started to move to the area or the students lingering in the Sluispark. Second, COVID-19 has had a substantial impact on the area and the way it is used. Finally, the spatial variation in responses, such as the purpose of the participant's activity and environment, has also contributed to this diversity in expectations. The opposing opinions over the construction of the swimming pool and the simultaneous desire for more HORECA options for socialising, facilities, and green spaces suggests a shared interest in the development of more social spaces within the Vaartkom across the community but opposing opinions on how public space should be used and who it is for. This suggests there are multiple understandings of "the Vaartkom" or perhaps multiple Vaartkoms. In these findings, we can relate to Massey's (2005) understanding of space as relational, with the possibility of multiplicity and constant change, as we recognise the Vaartkom as a product of interrelations between the various users, as a sphere of multiplicity, and as constantly evolving. While the ongoing redevelopment has significantly changed the spatial dimension and use of the public space in the neighbourhood, COVID-19 has had a significant impact on the intensity of the way public space is used.

Our public engagement guided us to reflect further on the temporal-spatial methodological aspects of our participatory outreach, in line with the idea of setting up a polylogue in which place enters the conversation, carried out on more or less equal terms with those inhabiting it, with the question: *How does the spatial location of public engagement within research relate to the collected responses?* The selected locations where we engaged with community members played a role in who we did and did not reach in the community, providing us with an understanding of the relationship between the location of public engagement and the collected responses, both in terms of diversity of participants as well as the content of the responses. This insight into the spatio-temporal aspects of engagement illustrate the magnitude and consciousness of the participatory effort that is required to be truly inclusive. For future research we propose that researchers observe where, when and how people use space and then select spaces that have heavy foot traffic from the various demographic groups in a neighbourhood. We identified spaces where people meet their basic needs as the most practical location for reaching a broader range of community members; this makes it an interesting location to position future research or community engagement efforts. However, since people were there for grocery shopping, some were less interested in participating.

Addressing the concerns raised during the preliminary interviews on inclusive accessibility, affordability, connection between citizens and authorities, the history of the site and balancing various interests, we reimagine the Vaartkom as a more inclusive environment through a few pathways. The first one relates to the physical space, which should cater for a multiplicity of users and their needs. An inclusive urban space can serve

1 https://www.youtube.com/watch?v=0sIuXIaDxbQ.

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as a bridge in a diverse society through the availability of various facilities, multiple potential uses, and green space, while keeping an eye on potential physical or hidden barriers. The second pathway we see aims to acknowledge the dynamic nature of place: neighbourhood change through iterative steps using temporary trials instead of final and static urban interventions allows for an ongoing renegotiation of public space based on progressive insights through an open dialogue. The visit to the Bereklauw illustrated the potential of a community embracing change with respect for the past. In the Vaartkom, the new maakleerplek already shows an example of this potential. Lastly, the transdisciplinary process confirms the need to create a shared understanding and a shared commitment to overcome fragmentation (Conklin, 2006). An ongoing open dialogue is necessary that actively reaches out to engage out-of-place groups.

Limitations

By being present in some areas over others and at specific times of day, we unintentionally limited ourselves to only those who spent time in those spaces or were able to do so during the hours we were present. Specifically, we found a less diverse audience in the constructed community spaces in the Vaartkom than we found in front of the supermarket. This suggests that speaking with people in areas where they meet their basic needs would yield a wider variety of responses than speaking with people when they are on a recreational walk through some of the other zones. Moreover, while we heard stories about nuisance from the late-night get-togethers of youngsters and police encounters around the Vaartkom, we, for example, did not manage to visit the area at these times and engage with these groups. This shows that at least during the times of day we were present in the community not all community members are using those spaces. This mismatch has, despite our substantial efforts to make our process as inclusive as possible, led to a less diverse group of respondents than we would have liked and illustrated the complexity of a truly participatory inquiry and polylogue. Moreover, while reflecting on the responses and engagement we received in the Vaartkom, we identified a lack of involvement from more established residents whom we identified as being vulnerable to displacement by the development and increasing cost of living in the area. At the same time, the voice of the most powerful actors for and in the neighbourhood (i.e. the developers or InBev) has not been made explicit in this inquiry either. Considering the power dynamics in participatory processes, it is crucial to get all sides of the story and bring together top and bottom to influence existing power inequalities.

7. Conclusion

At the start of the project, there was a consensus that we wanted to work in and with the community and the environment of the Vaartkom itself, quickly realising the entangled relation between inclusive environments and inclusive processes. We decided to focus on the transformation processes in the neighbourhood, both on the dimension of the long-term redevelopment and on changes in response to the pandemic. Given the changing government restrictions addressing the dynamic pandemic risk, the research trajectory was centred on the changing dynamics of public space under COVID-19 in relation to wider transformation processes, acknowledging the socio-spatial entanglement. This culminated in key learnings both on the topic of inclusive environments as well as on the research process.

First, by exploring the changing use and understanding of public space during the COVID-19 restrictions, the team gained insight into the tensions following the pandemic induced by the increased use of public space. While the redevelopment has caused an extensive physical renewal of the public space, this transformation was accompanied by new users and uses, leading to changing social dynamics and sometimes conflict. The appropriation of public space for people to fulfil their social and leisure needs during pandemic-related restrictions has amplified conflicting notions about and uses of public space. With the closure of cultural, social, sports, festive, drinking and eating facilities, these activities moved to the public space. In the Vaartkom, this intensified use of public space at various times of the day against a larger gentrification process clashed with the stricter narrative of some users as a place of clean, calm, and relaxation, or with certain uses that fit into the residential or planned vision. We propose diverse and inclusive public spaces that serve as social bridges, iterative neighbourhood change and an ongoing dialogue about this change process that reaches out to the different groups of people that have links to the place.

Second, we developed key learnings from the research process itself: the choice of location affects public space engagement, confirming the central role of place

in research with participants (Coemans et al., 2020). This spatial trend was illustrated by both the varying response rate and diversity between different locations, as well as in the responses themselves. Responses showed certain similarities in relation to the desire for more green space and appropriate facilities, as well as differences: locations that attracted a more diverse user base (such as in front of the supermarket) depicted a clearer concern over social issues and affordability.

Third, by the end of this research, we recognised that we, as researchers and individuals, and our understandings of the terms inclusivity and transdisciplinarity, were more transformed by our time in the Vaartkom than the community was transformed or influenced by us and our presence thus far. The transdisciplinary process allowed us as researchers to acknowledge and appreciate the pluralistic perspectives and diverse approaches that helped us to expose blind spots and biases. We propose that, moving forward, the organisers of spaces and events for various community stakeholders come together to brainstorm the future of the Vaartkom, taking into consideration the changes which took place under COVID-19, while preparing for other changes and challenges to come. This idea of setting up a truly open, transparent, and neutral dialogue reflects what Dierckx and colleagues (2020) call a "Third Sphere", allowing not only imagining a collective future but also building bridges and expanding on each other's ideas to develop projects, even small-scale ones, that can make sure community members feel heard and empowered to contribute to the creation of a more inclusive post-COVID environment.

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List of Supplements

Supplement 1: Additional graphs comparing demographic data of the Vaartkom to the city of Leuven
Supplement 2: Ethical considerations: mindmap and Four core principles

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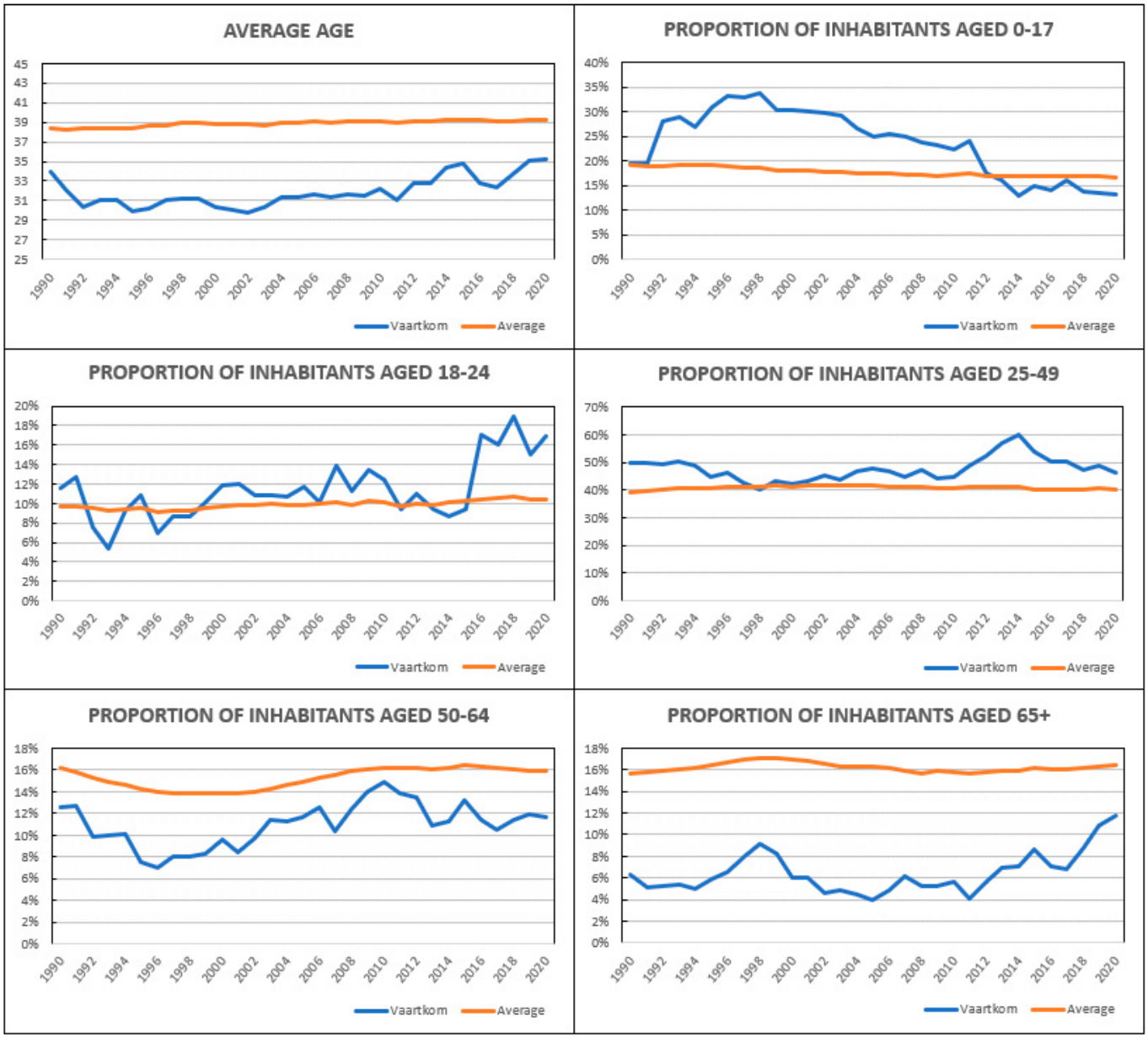
Supplement 1: Additional graphs comparing demographic data of the Vaartkom to the city of Leuven



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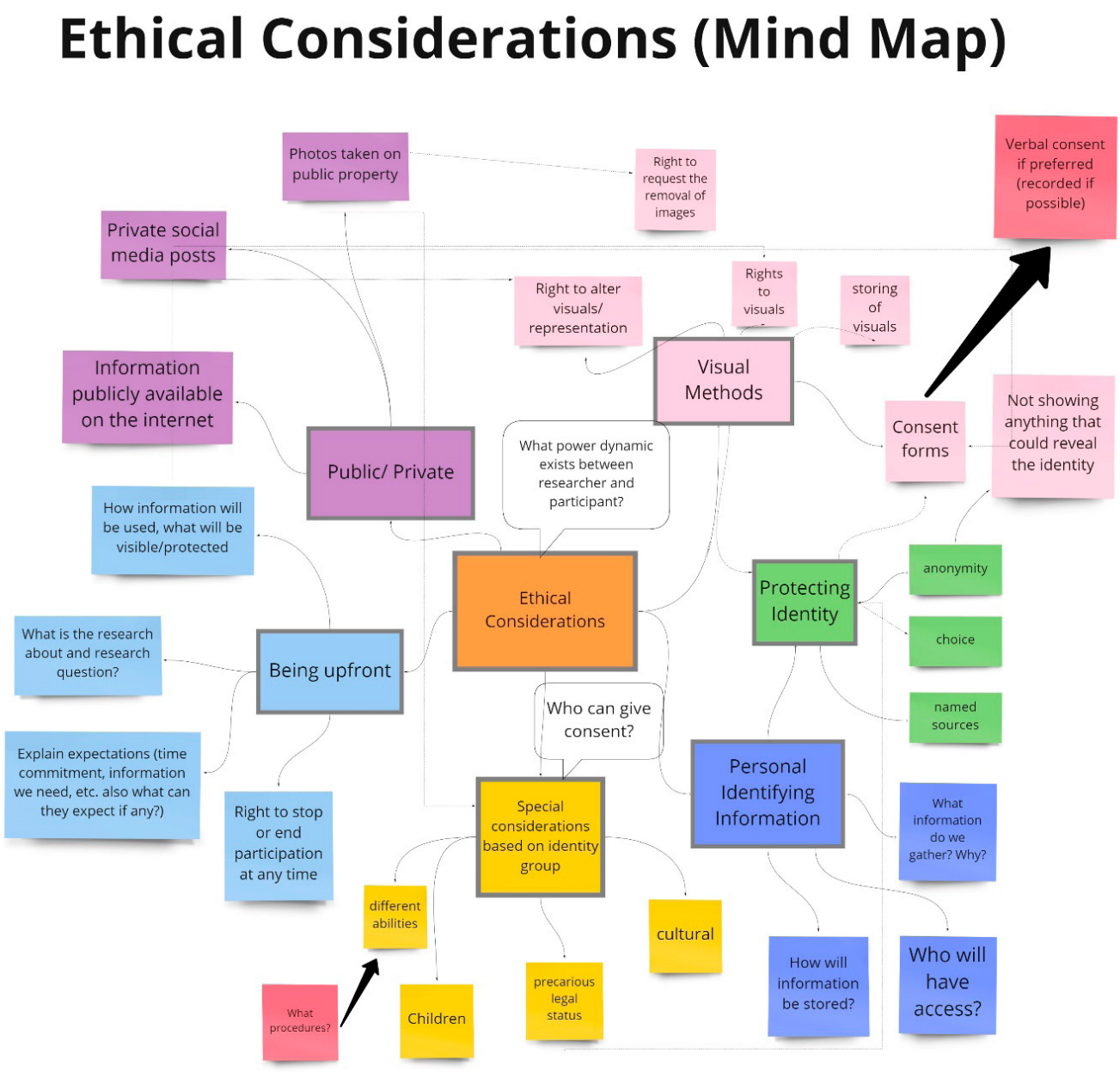
Supplement 2: Ethical considerations: mindmap and Four core principles



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Four Core Principles

Primary source: Canadian Institutes of Health Research, Natural Sciences and Engineering Research Council of Canada, and Social Sciences and Humanities Research Council of Canada, **Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans,** December 2010.

Respect for persons

We respect the intrinsic value of human beings and the respect and consideration that they are due.

We respect the autonomy of person. Autonomy includes the ability to think and make decisions, and to act based on those decisions.

Respecting the autonomy of persons means to seek their free, prior, informed and ongoing consent.

For those unable to exercise their autonomy (youth, children, cognitive disabilities), we will ensure additional measures to protect their interests and to ensure that their wishes (to the extent that these are known) are respected.

Concern for Welfare

We aim to protect the welfare of participants, and, if possible, to promote their welfare in view of any foreseeable risks associated with the research.

Welfare of a person is the quality of that person's experience of life in all its aspects. A person's or group's welfare is also affected by the welfare of those who are important to them.

We will provide participants with enough information to be able to adequately assess risks and potential benefits associated with their participation in the research.

Social Value

As much as possible, the research should be relevant to the community needs and priorities.

As much as possible, the research should benefit the participants and participant's community, as well as extend the boundaries of knowledge.

Collaborative research approaches, (e.g. participatory research) may help in the exploration, articulation and application of ideas specific to a community or communities.

Our aim is to contribute to the advancement of knowledge for future generations that may positively affect the welfare of society as a whole.

Justice

We aim to treat people fairly and equitably. Fairness entails treating all people with equal respect and concern.

We recognize that there may be power imbalances among participants, and may also exist in the relationship between researcher and participant.

NOTE: Treating people fairly does not always mean treating people in the same way. One important difference that must be considered for fairness and equity is vulnerability. **Vulnerability** is often caused by limited capacity, or limited access to social goods, such as rights, opportunities and power. Individuals or groups in vulnerable circumstances have historically included children, the elderly, women, prisoners, those with mental health issues and those with diminished capacity for self-determination. People or groups whose circumstances cause them to be vulnerable or marginalized may need to be afforded special attention in order to be treated justly in research.

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Community Resilience to Muddy Flood Disasters in the Dijle Catchment Region, Belgium: Study Cases of Bertem and Beauvechain Municipalities

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Abstract

In a context prone to flood-related disasters, communities living in vulnerable areas within important catchments like the Dijle in central Belgium have been developing strategies to mitigate, prepare for, respond to and recover from the consequences of these extreme events. The present study analyses the structure of the local governance model and community resilience systems concerning muddy floods in the municipalities of Beauvechain (Wallonia) and Bertem (Flanders). Data was collected through semi-structured and open-ended interviews with governmental and non-governmental stakeholders. The analysis reveals that both communities have developed resources, actions, competencies and infrastructure to prevent and act when muddy flood disasters occur. In this context, municipalities are at the centre of the flood-disaster risk reduction management strategy; however, stronger collaborations with local communities and other stakeholders could be developed to build resilience against future events of high magnitude. This paper recommends harmonising existing policies to foster participation, community empowerment and knowledge exchange to provide an enabling environment and conditions to collectively build resilience against upcoming climate change-induced disasters like muddy floods.

Key words

Central Belgium, communities, governance, muddy flood disasters, resilience, sustainability

1. Introduction

Muddy floods describe water flowing from agricultural fields, carrying large quantities of sediments that in some cases result in damage to property, roads and watercourses (Boardman et al., 2006). In Belgium, muddy floods caused by soil erosion processes in the central part of the country result in immense challenges for communities that reside in the lowland areas of villages (Evrard, 2008). This situation is likely to worsen due to climate change (EASAC, 2018).

In this context, communities need to work to reduce their vulnerabilities and adapt to the changing circumstances to prevent, respond to, mitigate and alleviate the consequences of hazards like muddy floods. Concerning this problem, a regenerative, more sustainable solution can come from improving capacities and

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mechanisms for community resilience. What usually differs between one context and another is how resilience assets and governance structures are constructed and operate to allow space for socio-ecological transformations (Bakema et al., 2017). However, even if transformative processes of this kind must take place at a larger socio-environmental scale, recent literature recommends improving resilience at a local level, wherein communities, their state institutions and territories can take the lead in more sustainable and innovative examples of change. The case study undertaken in this article tries to understand these aspects through how muddy flood disasters have been addressed at the local level in central Belgium.

The present paper aims to assess the local governance model and community resilience systems concerning muddy flood disasters in the Bertem and Beauvechain municipalities in central Belgium and to propose policy recommendations from a sustainable development perspective. It does so by assessing the performance of community resilience systems in relation to muddy floods, analysing the structure of the local governance models operationalised during muddy flood events, and proposing sustainable pathways for improving community resilience systems in the event of future flood scenarios. The main questions that motivated this research were focused on knowing what role was played by communities in the governance structures in place for reacting to, mitigating and preventing the impact of muddy floods, what its main characteristics are and how theoretical developments on "community resilience" can contribute to discussions on areas of improvement, in the face of the climate change-induced challenges for the upcoming decades.

For that purpose, the contextual background describes the occurrence of muddy floods in Belgium as socio-natural disasters and the strategies of regional governments to cope with them in general. The conceptual framework presents the main concepts to be used as analytical categories, followed by the methods and the indicator-based approach that was used for the assessment of the resilience of the two communities selected for study. The results of this methodological approach are presented afterwards, preceding a discussion of results where different aspects of resilience that both communities present are considered. Finally, conclusions explain the main reflections and suggestions that emerged from our analysis.

2. State of the art: contextual background about soil erosion and muddy flood disasters in Belgium

Given Belgium's variety of landscapes, topography and tendencies for soil erosion, at least three regions can be distinguished. Central Belgium falls within the Loess belt, which is characterised by high richness in nutrients, moisture and drainage capability. The soil in this part of the country provides an enabling environment for agriculture development, even though many factors like soil erosion are gradually contributing to soil degradation. While there are studies that provide historical evidence for soil erosion in central Belgium, it is more important to look at the impact of contemporary erosive processes that are triggered by the combination of human actions and the effects of climate change. These processes have recently increased the frequency and intensity of off-site consequences, such as muddy floods, water pollution and sediment deposition (Verstraeten & Poesen, 1999; Verstraeten et al., 2006).

While it is important to understand why soil erosion constitutes challenges for agriculture in central Belgium, it is also essential to analyse its linkages with events occurring away from cultivated lands and hilly areas because of their social and environmental impact on a local scale. Verstraeten and Poesen (1999) found that municipalities situated downstream of large rivers are generally more likely to be affected by muddy floods in central Belgium. In fact, in the downstream direction, discharge tends to increase in volume with the addition of water from tributary streams and groundwater; subsequently, the discharge will rise in width, depth and average velocity (Nelson, 2016). Such floods originate from heavy rainfall provoking water runoffs that transport significant amounts of sediments from intensively cultivated lands (Boardman & Vandaele, 2010).

While muddy floods generally occur in valleys without permanent watercourses, surveys conducted in southern Flanders and Wallonia have estimated that roughly 56% of the municipalities across the hilly Loess area of Belgium have to deal with runoff from arable land (Verstraeten & Poesen, 1999; Bielders et al., 2007). The erosive processes have increased the frequency and intensity of the impacts of muddy floods on local communities like those in the Dijle river catchment. These have resulted in damage to public infrastructure and financial losses for people. Housing and road infrastructure represent a significant part of the total damage

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caused by all types of floods. According to Verstraeten et al. (2006: 403), "around 55–70% of the municipalities in the central part of the country are affected by muddy floods at least once every 1–5 years, and 15–20% several times a year".

To prevent all forms of floods, as outlined by Verstraeten and Poesen (1999), several measures have been undertaken in Belgium. Between 300 and 400 retention ponds have been constructed in recent decades in Wallonia and Flanders to prevent flooding and trap sediments coming from runoffs. However, the mean cost for building a retention pond amounts to EUR 380,000, and maintaining them is expensive (for example, dredging alone, which is indispensable to maintaining the efficiency of ponds, costs between EUR 12 and 24 million per year in Belgium).

According to the institutional framework of responsibilities related to muddy flood disaster management, Belgian regions are responsible for environmental issues; hence, soil conservation and vulnerability reduction policies are handled differently in Flanders and Wallonia. In Flanders, a soil conservation policy was initiated in 2001, called the "Soil Erosion Decree", which subsidises the creation of an erosion control management plan by municipalities in hilly areas. In 2005, the Flemish Plan for Rural Development started to provide grants to prevent soil erosion (Verstraeten et al., 2006). Additionally, the decision of the Flemish Government on erosion abatement came with a series of policies in the municipalities, such as the Soil Erosion Plan, the support of an erosion coordinator for the municipality, or the financing of small-scale mitigation infrastructure, including, for example, the construction of small dams, retention ponds or grass buffer strips (technical measures) in cultivated lands (Vermang et al., 2014).

In the Wallonia region, since 1993, the Public Services Department of Wallonia has promoted and partially subsidised the creation of river contracts (*contrats de rivières*) along with GISER (*Gestion Intégrée Sol – Erosion – Ruissellement*), which act as coordination platforms for managing hydrological resources and other related aspects, such as flood risks at a basin/catchment level (SPW, s.d.). Ten years later, the Regional Government of Wallonia launched the PLUIES Plan. This plan aims to improve regional actions toward preventing and managing flood-related risks, vulnerabilities and hazards (Gouvernement Wallon, 2003). In 2007, the Regional Government decided to strengthen this plan's implementation by providing funding for local authorities to carry out actions against soil erosion and muddy floods. Nevertheless, obstacles to the implementation of the plan have been attributed to limited knowledge of the plan at the local level and its budgetary limitations (RWDR, 2011). Other measures have been undertaken in practice, such as early alarm systems and real-time messages for locals (Van Camperhout et al., 2015). Additionally, the Territorial Development Code of Wallonia was approved in 2017 to ensure that every new urban project complies with the necessary measures for mitigating flood risks (SPW, 2017).

3. Conceptual and theoretical background: resilience construction for sustainable development

This research was based on an analysis of the governance responses and the vulnerability and resilience of the local communities to sudden events such as muddy floods. The aim is to understand to some extent the reasons why such hazards can turn into a disaster. In that sense, it is understood that disasters emerge due to human factors that need to be studied.

Following Bakema, Parra, and McCann (2018), this article understands disasters as natural and social constructs that emerge from spontaneous, sudden and, for the most part, unpredictable events. The vulnerability can be shaped by socio-economic conditions that put some individuals or groups in a more disadvantaged position when facing the effects of natural hazards. When this happens, disasters emerge and, depending on the governance systems' capacity to respond – as much as on the quality and effectiveness of that response – their impact can be aggravated. This level of complexity allows disasters to be characterised as "multi-layered phenomena" due to issues with multiple origins coming together (Bakema, Parra, & McCann, 2018). Therefore, it is especially relevant to analyse disasters as social creations where governance plays a key role.

According to Bakema et al. (2017), governance refers to the regulation and coordination scheme that interrelates multiple state and non-state actors' interactions, both formal and informal, considering their different roles and responsibilities and the power dynamics between them, within a specific spatial and temporal context. This understanding of governance recognises that societies, at any level, are governed by the multi-directional and multi-scalar interactions arranged

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between interdependent actors based in a territory (Parra & Moulaert, 2016; as cited in Bakema et al., 2017).

In the context of disasters, societies must develop a proper set of discussion, negotiation, coordination, collaboration and decision-making codes and procedures that continue to function before the disaster occurs, immediately after, and ex post, even if it is perceived that the impact of a disaster has been mitigated (Waschinger et al., 2013; as cited in Bakema et al., 2018); in other words, a well-structured and functional governance system is key. One aspect that is crucial for a governance system with said characteristics is trust, to be built through openly participatory and democratic decision-making processes, as suggested by Lazzeretti and Cooke (2016; as cited in Bakema et al., 2018). Another important aspect is, as Bakema, Parra, and McCann (2009) put it, that governance schemes have the potential of enhancing the capacities of affected societies to recover and learn from those experiences, to transform those learnings into new adaptation measures and to become more sustainable societal systems, with the ability to react, recover and mitigate more promptly and adequately the impact of similar threats in the future.

Based on these elements, Parra (2013: 145) defines governance with "social threads that connect society and the natural environment" that are responsible for ensuring societal dynamics that are sustainable in both a social and environmental sense. Literature on community resilience that highlights governance as a key element is based on the idea that governance helps to shape how communities handle crises derived from disasters through enabling mechanisms for guaranteeing infrastructure and services, or spaces for public involvement and support (Patel et al., 2017). This can lead us to discuss how governance systems relate to local processes of building resilience within communities under disaster risk, either as a fixed and predetermined goal to achieve or as a transformative process.

From academia and on-field practice, the predominant scope of disaster risk management debates has shifted from an exclusively reaction-oriented approach to one more focused on resilience development. Resilience can be understood as the ability of socio-ecological systems to transform themselves to respond more effectively to disturbances and shift towards new, re-adaptive development pathways when post-stress recovery is necessary (Bakema et al., 2017). This inevitably means that building resilience refers to a transitional, ongoing process with learning potential, instead of an initiative that just takes place once or "bounces [the system] back" to a pre-disaster stage.

Governance systems embody the rules and institutions (i.e., families, communities, local authorities, etc.) policing interactions within these socio-ecological systems and their resources. When the outcomes of those interactions undermine the social and ecological performance of the entire system, disturbances such as disasters can occur. While there is still an ongoing debate on the definition of community resilience, authors that place governance at the core of their definition believe that communities can play a role in the construction of resilience, as they constitute a key feature of the entire socio-ecological system, and "roles, participation/engagement, and front-line leadership during a crisis are clear at the local level" (Patel et al., 2017). Said process, which we will refer to as "community resilience", can help communities by engaging them in the transformation of their socio-ecological systems and relationships (Paton & Johnston, 2001). Moreover, resilience should be conceived as a process that can be leveraged by communities putting a range of social, economic, cultural and political attributes into a function to attain more sustainable interactions within a given socio-ecological system (Cutter et al., 2008). This means that, as argued by Bakema et al. (2019), communities are not mere recipients of resilience or an outcome of enhanced resilience, but key actors in the process of co-creating it.

In general, as is mentioned above, governance systems, along with local knowledge, community networks, relationships and resources, among other cross-cutting elements, are altogether linked to community resilience processes, as Patel et al. (2017) also outline. We intend to employ these categories for our analysis of how communities that were part of this study can play a role and contribute to reduce vulnerabilities, mitigate risks, respond to disasters, specifically muddy floods, and enhance future preparedness for their territories, in the long run.

4. Methods

The following section elaborates on the choice of the study areas, and the methods used in the research and explains the process of data collection and analysis. The study area was defined according to the location of

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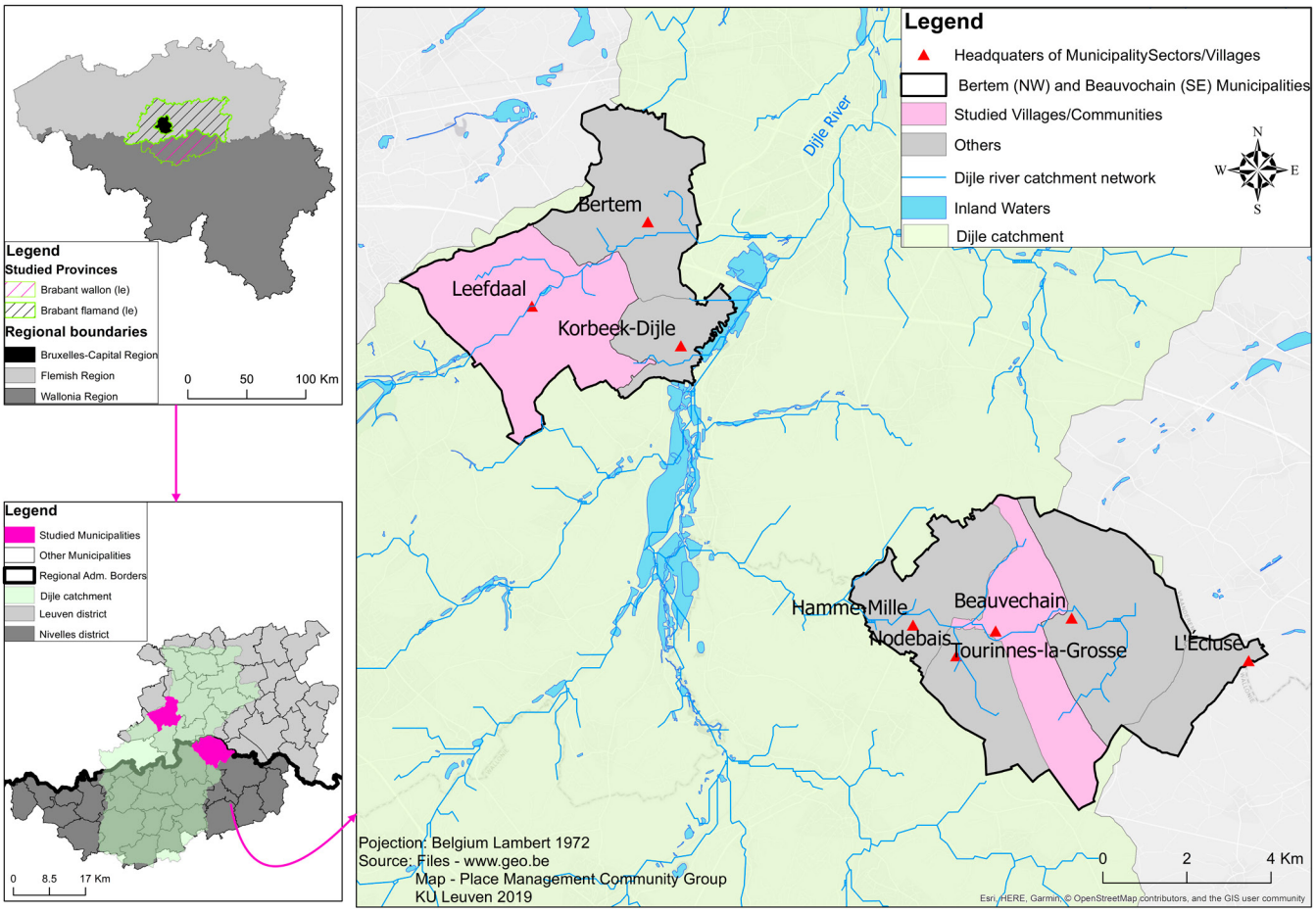

Figure 4.1. Studied municipalities within the Dijle catchment area. Source: own elaboration.

the Leefdaal and Tourinnes-la-Grosse communities, in the municipalities of Bertem and Beauvechain, the districts of Leuven and Nivelles, the provinces of Vlaams-Brabant and Brabant Wallon, in the Flanders and Wallonia regions of Belgium, respectively (Figure 4.1). The population of Bertem and Beauvechain is estimated at 9,958 and 7,222 inhabitants for a population density of 331.9 inh/km^2 and 187.3 inh/km^2, respectively (Government of Belgium, 2018).

These sites were identified as particularly vulnerable to muddy floods, based on the literature review, preliminary interviews with key informants, for example academics and government officials at the provincial level, such as erosion coordinators, and initial site visits to Korbeek-Dijle, in Flanders, and Nodebais, in Wallonia. These were finally chosen because of accessibility and the proximity of the municipalities amongst community members and key stakeholders planned for interviews. We used Kais and Islam's (2016) collected notions of a community as a geographically and effectively delimited unit that, in the context of resilience assessment, has the capacity of collectively identifying problems to take decisions and act upon them, gathered by a sense of belonging, identity or network of relations. Considering this definition of community, households affected by muddy flood disasters were selected among the flood-prone communities and interviewed. Interviews were also done with local government representatives dealing with the issue at the municipality scale. Moreover, other actors of secondary importance were identified and interviewed because of their relevance to understanding the entire context of the study. These were: (i) erosion coordinators (Flanders); (ii) technical assessment actors (Cellule GISER, Université Catholique de Louvain); (iii) provincial governments (Vlaams-Brabant); and (iv) regional governments (Flanders).

Concerning the methods, following Maes et al. (2018a; 2018b) and Yin (2003), we opted to use a mixed qualitative/quantitative approach. The qualitative research involved conducting 24 open-ended and semi-structured interviews. Secondary data collection and observations were used for the present assessment,

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whereas the quantitative assessment consisted in the partial measurement of the resilience and governance processes. Observations were fundamental to understanding respondents' feelings and trust amongst actors. Photographs were used to identify measures or actions implemented, in order to describe as much as possible different coping scenarios, such as the decision to leave houses in vulnerable areas inhabited, the existence of storm basins, and adaptative farming practices, among others.

For data collection, field visits took place between March and April 2019. The main phases consisted of identifying local stakeholders, creating the resilience and governance assessment frameworks, designing and testing questionnaires, conducting the interviews with key respondents, and interpreting the results. In total, out of the 24 key respondents that were interviewed, 19 were households/families/inhabitants from both municipalities; ten (10) from Leefdaal in Bertem and nine (9) from Tourinnes-la-Grosse in Beauvechain (see Annex 3). Two of the respondents were farmers. Semi-structured interviews were administered to the local communities, whereas open-ended questions were administered to the other stakeholders. The main purpose of the interviews was to find out what the role of each actor in responding to natural hazards was and how they interacted with communities as an important stakeholder, as communities were the unit of analysis. All interviews were recorded with the respondents' consent.

To assess the performance of community resilience systems with regard to muddy floods, a set of context-based indicators were devised that attempt to describe communities' strategies to cope with and adapt to change, and their capacity to build resilience through innovation (UNU-IAS, 2013: 11). The indicator-based assessment approach was ideal for the present assessment because resilience and governance building amongst communities is a dynamic process that merits being expressed quantitatively to allow for comprehensive interpretation and comparability. However, quantitative measurements alone cannot measure the resilience and governance processes holistically. Therefore qualitative information was indispensable to support and explicitly elucidate findings.

The choice of indicators was based on a literature review on concepts and methods of resilience and governance assessment that were considered applicable from a community's perspective (Kais and Islam, 2016; Patel et al., 2017). The indicators were equally chosen because they could be assessed by analysing community and stakeholder opinions. Variables and indicators focused on the actions which can enable communities to be active participants in building their resilience mechanisms, based on UNU-IAS (2013), Patel et al. (2017) and Kais and Islam (2016). Assessing governance at the local level requires consideration of the embodiment of social relations, human agencies and politico-administrative systems (Parra & Poesen, 2017). We relied on the identification of actors who could have key roles in determining responses to muddy floods locally. Components that appear regularly in discussions on governance were identified and used in identifying the strength of ties (if existing) between stakeholders (adapted from Ritchie et al., 2013; as cited in Bakema et al., 2018, and Bakema et al., 2017). Table 4.1 summarises our attempt to interrelate both sets of components.

Table 4.1. Interrelations between main elements of community resilience and governance systems

Main elements of community resilience	Main elements of governance systems
Multi-scalar decision-making processes for local disaster management; institutional competencies for disaster management; social infrastructure and public services	Spaces for discussions (could be consultative, formal and informal); negotiation (in any formal setting); coordination and collaboration (formal and informal); decision-making codes and power (capacity to decide and hierarchy)
Community organisation; social cohesion; actions implemented; learning processes; access to resources	Trust

Source: own elaboration.

Illustrating multi-directional interactions between interdependent actors based in the studied municipalities could elucidate the structure and strength of the governance system. The following actors were identified: communities affected, communities not

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affected, municipality, civil society/private sector, the local government, regional government and insurance companies.

Based on community reactions to the problem of muddy floods, communities were divided into those affected (those located downhill in flood-risk areas and directly concerned by flood situations) and those not affected (those found uphill in the same village and showing very little concern for the issue). The resulting ties were interpreted to understand the existence of the ties, the actor(s) at the centre of the interaction process and the density/strength of networks between the actors. The resulting interpretations allowed for the formulation of governance-related recommendations. Note that fundamental governance components like accountability and transparency were not assessed in the present research.

For data analysis, first, recorded interviews were transcribed, classified by attributes (answers to each question), and clustered accordingly using the software NVIVO 12. With that information, a Likert scale was developed per indicator to quantify the rates of muddy flood prevention, response or recovery/preparedness as perceived by the respondents. The clustered responses from the interviews were interpreted, and the corresponding outcomes were allocated on a scale (1–5) depending on the level of satisfaction. Once the scores for each indicator were obtained, the mean was computed for each variable assessed. These mean scores indicate the performance of the resilience system and were plotted per municipality on a spider diagram using the surface graphics tool in Microsoft Excel to visualise global differences between the studied municipalities.

Trends were understood as the motivations in terms of conditions and willingness of the communities to improve the current resilience system in place, adapted from UNU-IAS (2013). Accordingly, four trends classed were identified: (i) stagnant (denoting no conditions or willingness of communities); (ii) requirements for slow improvements (a strong potential exists amongst community agents); (iii) willingness for slow improvements (communities find it essential to improve but yet are not undertaking any measures to do so); and (iv) conditions and readiness for fast improvements (a future scenario in which actions that improve the system currently in place are being designed and/or planned).

For the governance analysis, a matrix of interactions was constructed in Microsoft Excel and served as a tool to assess the ties existing between the different actors. Ties between stakeholders were analysed by building a one-mode network in UCINET 6.0 to display their interactions in the event of muddy floods. Ties were developed following a binary system of relations:

– 0 tie: if in the event of muddy floods, no relationship exists between two actors concerned with the situation, meaning that in the network constructed, no line will link the two actors; and,
– 1 tie: if in the event of muddy floods, two actors concerned by the situation had at least one relationship, meaning that a line will connect the two actors in the network constructed.

If a relation existed (i.e. tie = 1), the strength of the relationship was determined by the number of governance components satisfied by each connection between the two actors (Likert scale approach in UNU-IAS 2013): (i) spaces for consultation or discussion; (ii) negotiation; (iii) coordination and collaboration; (iv) decision-making processes; and (v) trust. These five criteria were chosen based on key features that are important in a sound governance system in the context of disasters (Ritchie et al., 2013; as cited in Bakema et al., 2018). If all the five components could be depicted in the relationship between two actors analysed in the event of muddy floods, then the ties between both actors were given scores according to the following scale in Table 4.2:

Table 4.2. Score scales

1	2	3	4	5
Very weak	Weak	Fair	Good	Very good

The resulting networks allowed the visualisation of the actor(s) at the centre as more interrelated in multiple directions, while actors positioned at the margins are those with fewer interactions with the rest of the stakeholders in the network. The types of businesses, level of involvement per actor and prerequisites for strengthening ties (requirement of good governance models) between actors could equally be depicted and further justified using the assessment of resilience variables and other stakeholder interviews.

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5. Results

To understand the governance structures in place in the municipalities of Bertem and Beauvechain in the event of muddy floods, emphasis was placed on the interactions between these stakeholders. Table 5.1 describes the stakeholders identified and directly concerned with muddy flood disasters.

Drawing from this list of stakeholders, a matrix of interactions showcasing the relations between them in both municipalities was developed. The quality of the relations between stakeholders was based on the score of the number of governance components satisfied when a tie between the stakeholders existed. It is worth clarifying that these diagrams do not aim to show the type of relationship that might exist or the level of interest of stakeholders. Figures 5.1 and 5.2 illustrate the social ties between stakeholders and elucidate the strength of relationships between them for the municipalities of Bertem and Beauvechain.

It appears from Figures 5.1 and 5.2 that the existence of interactions among different types of stakeholders, including communities, with respect to how muddy floods are dealt with in the two municipalities studied, is confirmed. Even if communities, both affected and unaffected, do not appear to interact with all stakeholders when muddy floods happen, they are still identified as part of the network of relevant actors at the emergence of said events. It should be noted that, in Beauvechain, the regional government plays a stronger role, mainly due to the river contracts (*contrats de rivière*) set up and operationalised at the regional level, and the affected communities have no relation with civil society organisations (CSOs) or the private sector in the event of muddy floods. In Bertem, the provincial government has comparatively stronger ties with the other stakeholders and affected communities relate more strongly with CSOs and the private sector in the event of muddy floods.

However, no significant differences between both networks of relations are identified in terms of the

Table 5.1. Description of stakeholders

Type	Stakeholder	Description
Local stakeholders: Located at the local level	*Municipal government*	They are the local representatives of the residents in the municipalities of Beauvechain and Bertem. This category includes all the staff working in the phases of response, recovery, preparation and mitigation.
	Communities affected by muddy floods	Households or groups of families that reported any type of effect due to muddy flood events.
	Communities not affected by muddy floods	Households without any type of effect from muddy flood events. They have a different perception and behaviour from the ones affected.
	Civil society (NGOs, academia)	In Bertem this is the NGO Natuurpunt; in Beauvechain, Charles Bielder, expert of the Université Catholique de Louvain-la-Neuve.
Non-local stakeholders: With some influence in the municipality but not located there	*Provincial government*	Staff of the provinces of Flemish Brabant and Walloon Brabant with responsibilities relating to an incidence in resilience to muddy floods.
	Regional government	Staff of the region of Flanders and Wallonia with responsibilities relating to resilience to muddy floods.
	Insurance companies	Private actors who signed mandatory insurance contracts with the residents of Bertem and Beauvechain and who are obliged to pay them compensation for damage caused by muddy floods.

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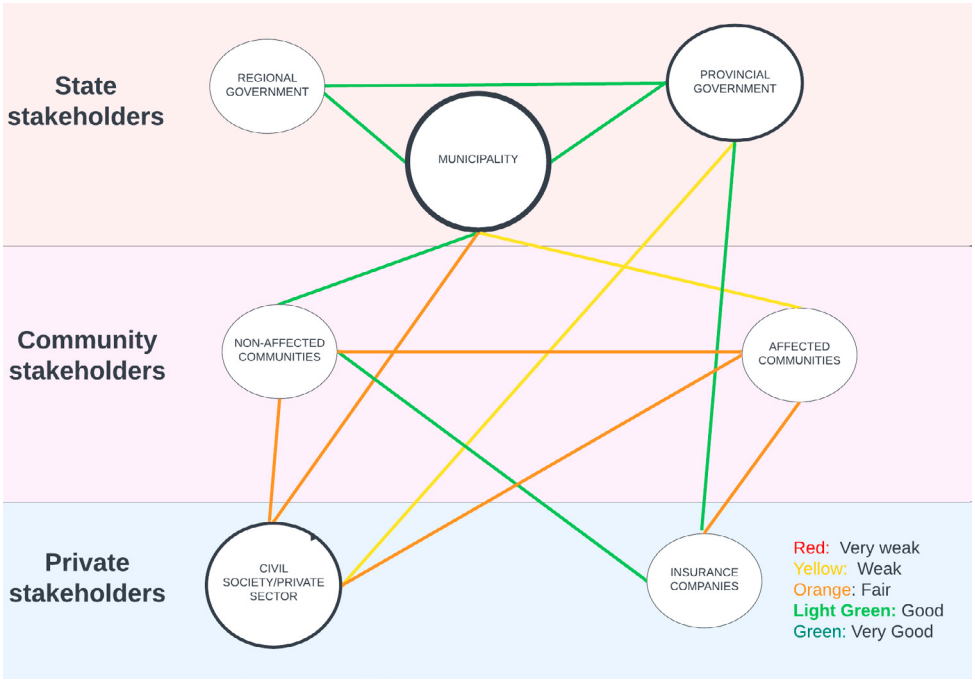

Figure 5.1. Governance structure in the municipality of Bertem
Source: own elaboration.

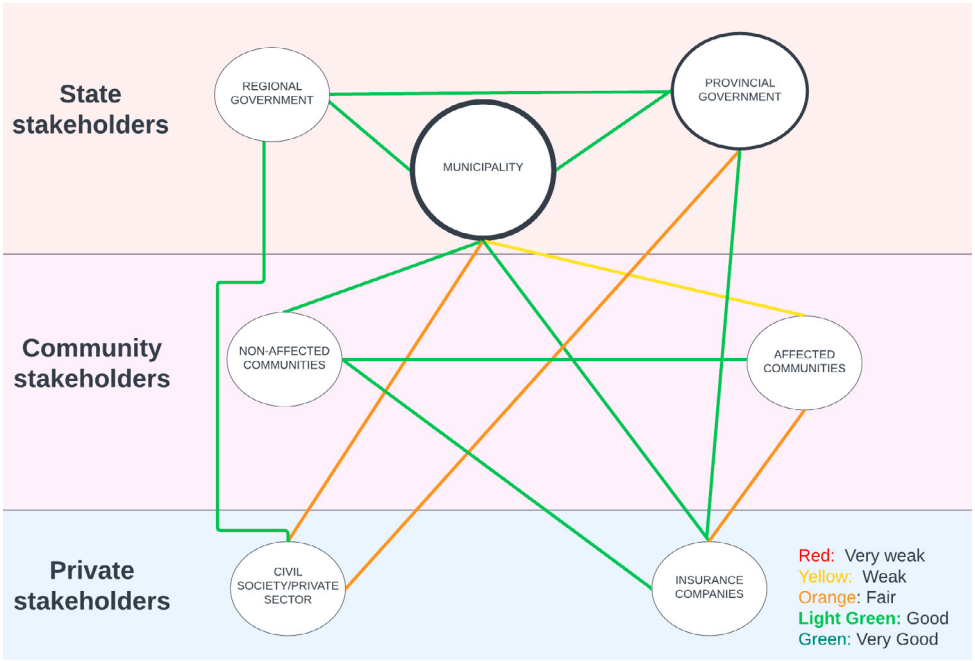

Figure 5.2. Stakeholders' relations in the municipality of Beauvechain
Source: own elaboration.

role played by municipalities (local authorities), since they are in both cases placed at the centre of the relations between all stakeholders and therefore have the strongest influence over decisions in the event of muddy floods. These findings are further justified by the outcomes of resilience analysis, where the best-ranked variables were those related to the role of governments (institutional capacities, social infrastructure) and the lowest scores were assigned to communities (organisation, social cohesion or participation).

Now, before assessing the performance of the community resilience systems, it is important to identify the

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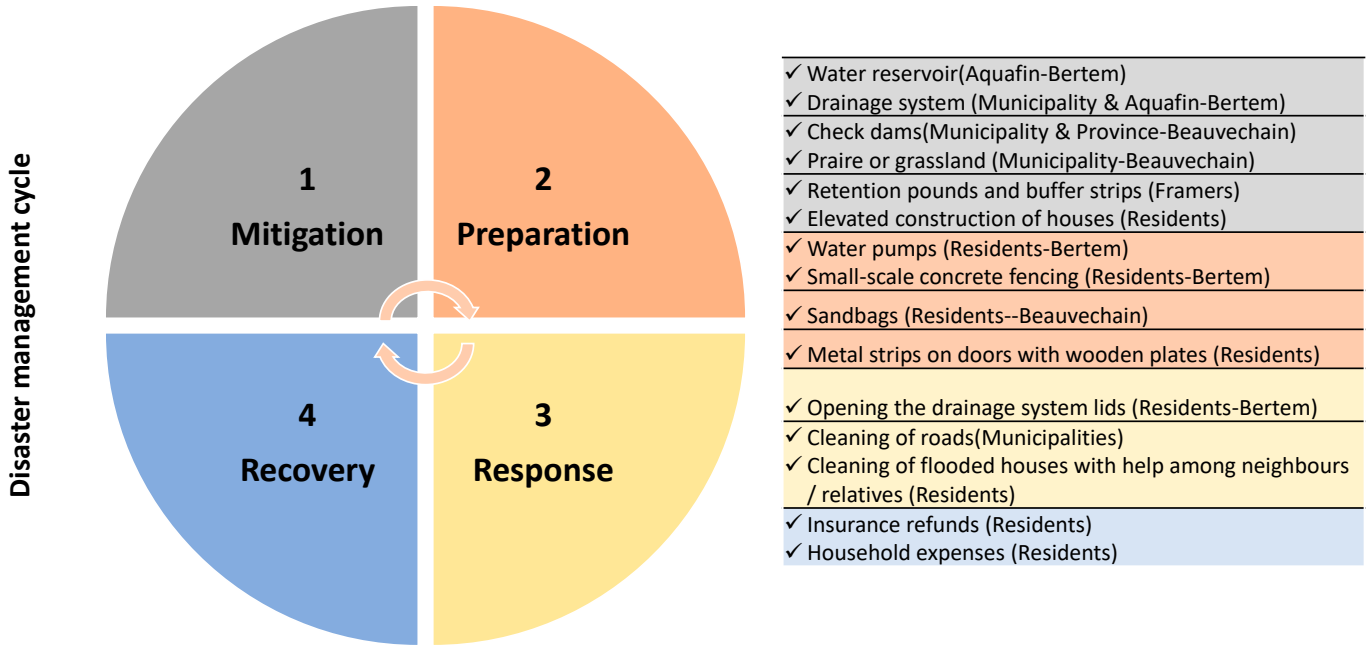

Figure 5.3. Measures implemented by local actors per disaster management stage in t[he municipalities of Beauvechain and Bertem
Source: own elaboration.

main measures that local actors in both municipalities have put in place for disaster management. Measures or actions, as explained before, are one of the key elements that describe how community resilience can be built upon (Patel et al., 2017). A set of measures at different stages are taken by municipal governments, residents and farmers illustrating how every actor has been contributing to reducing the recurrence and impact of muddy floods in the most vulnerable areas. It can be noted that, while the municipality is active in developing mitigation and post-disaster response measures, residents are more likely to act on preparedness and post-disaster recovery (see Figure 5.3).

All these resources and actions reveal that the communities studied possess assets and skills that can contribute to the construction of a community resilience system, as suggested by Patel et al. (2017). Key aspects of resilience for the selected communities were assessed with regard to their performance in absorbing, responding to and recovering from muddy flood disasters. Given that the last major events at both municipalities occurred six to ten years ago, communities' performance was equally analysed in terms of prevention and preparation for future scenarios. The outcome of the analysis drawn from a scoring process (see Table 4.1) for each municipality is illustrated by Figure 5.4.

Overall, both communities and their institutions have developed resources, actions, competencies and infrastructure that allow them to perform well at preventing and preparing for muddy floods affecting the most vulnerable areas. However, in terms of learning, social cohesion, community strength and involvement in decision-making processes, communities do not show sufficiently developed assets and skills for the enhancement of resilience.

Both communities and their institutions have been able to internally ensure access to most resources required for developing measures through public and private investments. The combination of actions undertaken and the constructed disaster prevention infrastructure appear to be addressing the local needs of mitigation of, preparation for, response to and recovery from the impact of muddy flood, and most actors consider that the incidence rate of muddy flood events has notably decreased in the last decade because of this. The perceived effectiveness of those measures, along with a high level of access to social and public services that guarantee safety and health in post-disaster situations, have shaped a low perception of risk among the studied communities before muddy floods, even if heavy rainfall is an extreme event that happens every year and vulnerable areas remain inhabited.

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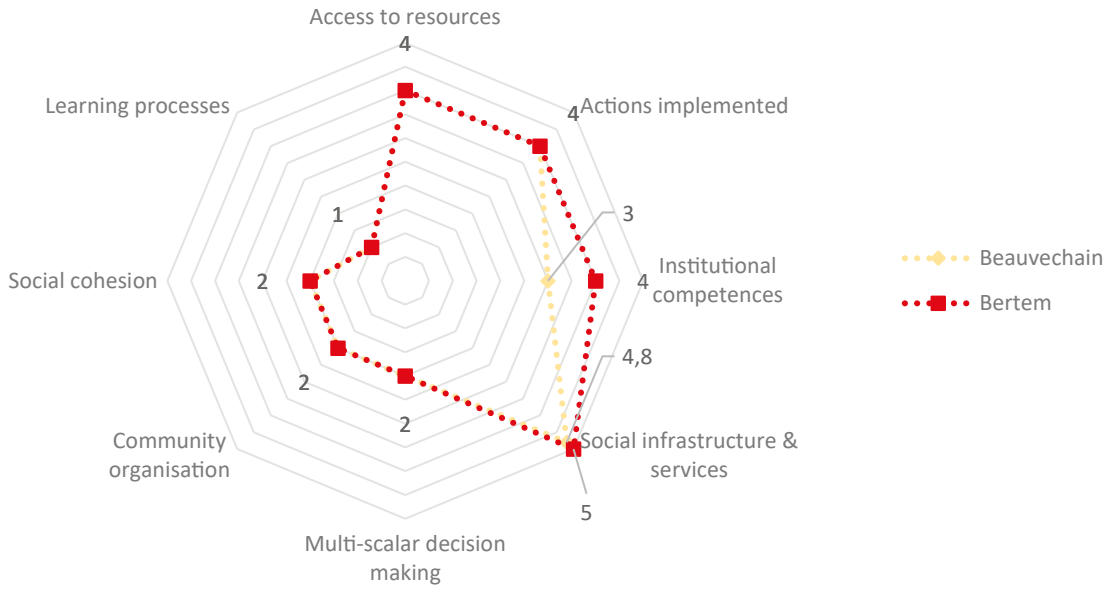

Figure 5.4. Comparative view of resilience scores per variable in the municipalities of Beauvechain and Bertem
Source: own elaboration.

The main weaknesses that were identified in communities' resilience systems are related to the almost non-existent participation of the most vulnerable residents in local decisions regarding mitigation and prevention of muddy flood disasters. As Patel et al. (2017) put it, public involvement and support are key for governance schemes to function in disaster prevention and mitigation contexts, but mostly for community resilience processes. Even if residents might have a voice in the municipality through their elected representatives and formal procedures opened to receiving proposals, the existing governance schemes do not allow communication and discussion of decisions to be multi-directional or fluid, unless extreme events occur and authorities approach residents from affected areas. Quoting one community member: "We have participated in meetings with the provincial government in 2018, wherein no voice or space of discussion was allowed. Activists among community members were ejected from the meeting hall".

In any case, initiatives coming from residents to change these coordination mechanisms have not been that many. They are more led by isolated individuals who suffer the worst impacts from muddy floods, as another community member states: "I try to help impacted neighbours voluntarily without the involvement of any organisation." Overall, both communities show signs of weak social cohesion, even in the most affected areas, given that spaces of community interaction are scarce and sporadic. Besides, most recent flood-related disasters (from the last ten years) have never exceeded or undermined the residents' capacities and resources to recover from damages.

On another note, the analysis of the communities' trends regarding different aspects of resilience explains whether local actors are likely to take any initiative that changes their resilience situation in the future. It shows that neither of the communities demonstrates any signs of planning measures to address weaknesses that pertain to building community capacities or skills, internalising learnings or assuming a preventive approach to the topic. A generalised perception of low risk of muddy floods, scarce support from local governments and other actors (i.e. civil society), and even socio-cultural norms that enhance individualistic decision-making and little interest in strengthening social or community cohesion, among others, could be among the reasons for these trends of communities showing no willingness to become more engaged or active participants in their resilience system.

However, the fact that similar scores were assigned to both communities does not mean that the same conditions, strengths and weaknesses for constructing and enhancing resilience were identified in the two systems. Some differences identified between the two cases are important to highlight for analysing further how different the challenges might be in the two communities if they decide to address their weaknesses and develop their potential to improve their resilience mechanisms.

Beauvechain's residents from some vulnerable areas still recognise muddy floods as a risk for the community

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because disaster prevention infrastructure is poorly maintained. As stated by an inhabitant of Beauvechain, "post-flooding, there are usually pump trucks which come to evacuate the submerging water volume from basements for instance … [T]he local government should rather improve the foresight of flooding events … to install/have cofferdams at our disposal". They have grown more conscious of and alert to the issue, a necessary condition for improving community participation at multiple scales of decision-making and coordination. However, the municipal government has not yet shown signs of willingness to act upon it. While reasons for this could be linked to budgetary limitations (not for developing more participatory spaces of dialogue with the local population, but for infrastructure maintenance), it could also be that the municipality is not yet clear on its competencies in terms of disaster prevention and how it can better engage residents to coordinate local action.

Bertem's residents were more satisfied with the municipal government's work in terms of disaster management than Beauvechain's; therefore, they expressed much less interest in organisation and political engagement than the Wallonian inhabitants, specifically concerning muddy floods. Bertem's municipality has indeed developed far more effective disaster prevention infrastructure and at a larger scale, while also addressing other sustainable urban management aspects. Separate redirection of excess rainwater through the drainage system and the development of biodiversity urban sanctuaries through water storage reservoirs are two relevant examples. They also receive regular maintenance and performance monitoring by technical personnel. The local legitimacy level the municipal government has among residents represents a strength that can enable changes in the current governance mechanisms with a local population that fails to recognise the importance of multi-scalar coordination for enhancing resilience.

6. Discussion

The major findings reveal that both municipalities are performing relatively well in various dimensions of resilience, for the most part, except for several governance components that are key for resilience processes, as stated by the authors previously cited. Their transition towards more resilient governance still faces some challenges in relation to the structure of local communities.

First, while both studied cases have succeeded in taking appropriate actions, with available resources, towards improving disaster mitigation infrastructure and emergency services at the local level, it is the influence of local governments alone, in both municipalities, that appears to be of more relevance when muddy floods have to be mitigated or prevented. Said level of importance seems to be linked to their articulatory role with the rest of the stakeholders and their legal obligation to prevent and act when muddy floods occur. In the event of muddy floods, municipalities have relations with almost all stakeholders and act as a bridge/platform for interaction between them. Their power and influence, portrayed by their central role in the model, are further justified by the non-existent or weaker ties between the other stakeholders in both municipalities. Another factor that explains the influence of the municipalities in this structure is the quality of their relations with the other stakeholders. The municipalities share a vertical relationship with other stakeholders, including the communities affected. Throughout surveys, there was limited evidence of instances wherein the affected communities participated in processes of discussion, negotiation or decision-making with other stakeholders.

Furthermore, the analysis did not identify spaces for dialogue between municipalities and communities. In the current state, communities are informed of municipality decisions but negotiations or consultations take place only in rare individual cases. The examination identified local elections as the only space where the communities can have the power to decide who represents their interests in the local decision-making processes.

Disasters are phenomena with multiple origins coming together, depending significantly on natural, socio-economic and governance features (Bakema, Parra, & McCann, 2018). Objectively, it was possible to observe various measures from the local governance structure aimed to reduce the vulnerability to and the impact of natural hazards like muddy floods. Favourable socio-economic conditions from residents and the availability and use of the local authorities' resources could explain how the analysed villages have prepared themselves to face these hazards and avoid disasters. Indeed, according to the findings, among inhabitants, the social perception of risk they have developed in relation to muddy floods is low. This might be a consequence of the sporadic frequency rate, the general assessment of the local

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government measures as effective, and the high level of access to social and public services.

In more recent years, muddy floods have caused little damage, which has been faced with sufficient community capacity for recovery. Given that this is not a priority for them, community members do not have enough incentives to be informed, meet as a community or become politically engaged to address the topic. Regardless of this perception, heavy rainfall is still an extreme event that happens every year and which is likely to increase in frequency and intensity due to climate change (EASAC, 2018). Neglecting these circumstances could increase the vulnerabilities and subsequently the risk of these communities suffering the impact of a natural hazard.

According to the literature, governance means going beyond giving the best response possible to disasters (Waschinger et al., 2013; as cited in Bakema et al., 2018). To enhance their local resilience, the Beauvechain and Bertem communities need to improve their mechanisms of multi-scalar discussion, negotiation, coordination, collaboration and decision-making, even if muddy floods do not represent a disaster threat anymore. As mentioned, optimal functioning of governance systems depends on trust, through openly participatory, democratic decision-making and learning processes (Lazzeretti & Cooke, 2016; as cited in Bakema et al., 2018). An official from the province of Vlaams-Brabant mentioned: "further training in participatory approaches is required for provincial staff, especially those accredited to elaborate management plans". Although they are not the majority, for most affected residents in the areas studied, the absence of an open dialogue with the local authorities regarding muddy floods and how to mitigate them has diminished their level of trust in municipalities. In both cases, these are the main bottlenecks.

When a muddy flood event occurs, the inhabitants affected rely on individual means and measures to cope with its impact, like savings or housing insurance. In fact, those persons have little knowledge of the municipalities' actions, which in general are more prevention-oriented. It is perhaps the case that the municipalities' actions have been effective in decreasing the intensity and magnitude of damages. In some cases, individuals were not aware of the events that affected houses on the same street or village. This also demonstrates a poor level of social cohesion within these communities. Nevertheless, the lack of coordination of knowledge and learning between stakeholders, particularly the absence of discussion spaces related to disasters and climate change, allows for concluding that an important aspect of resilience is missing (Bakema et al., 2018).

In general, it is hard to affirm that inhabitants in the most affected areas feel that they are organised as "communities", that is, as an organ that belongs to a socio-ecological system that should be engaged in the construction of the resilience of the system (Ostrom, 2009). When an event happens in the area, the inhabitants affected rely on the help of neighbours and other spontaneous reactions, but this does not mean that there is strong social cohesion or active engagement, except when emergencies occur. The perception is that it is not necessary, as inhabitants, to be more involved in discussions about muddy floods since it is a sporadic phenomenon that is above all the responsibility of the local government representatives.

It must be noted that the local authorities have the confidence and trust of the majority of the people consulted. Nonetheless, the residents' perception probably contributes to an underestimation of the importance of organising and institutionalising dialogue between governance scales. Such dialogue allows for taking advantage of all the available local resources, including non-governmental ones (Mehmoud & Parra, 2013). It seems that local resources coming from communities (all non-governmental actors, i.e. NGOs, academics and residents) have not been taken into account by institutions, which hinders the possibility of these resources becoming institutionally adopted.

Finally, it is noteworthy that the analysed governance systems, which can be characterised as municipality driven, are not bad or good *per se*. Many of the interviewed residents understand that they are already organised through their representatives in the local government. Although the actions undertaken by the local government institutions in all disaster management phases (particularly those of prevention, mitigation and post-disaster) are generally effective, the need to further organise among residents seems necessary to cope with less and less exceptional events, such as the July 2021 muddy floods in Wallonia.

7. Conclusions

The resilience process that can take place in a community, or by initiative, determines the type of response it has to natural hazards, such as muddy floods. A key component of said process is a well-structured and

functional governance scheme that relies on the participation of the most relevant actors, including communities, as the ones most affected after disasters take place. In this paper, we have tried to contribute to the understanding of these processes by analysing both governance and resilience elements of two communities located in the Dijle catchment region, in Belgium, in relation to muddy floods. While the importance of local authorities turned out to be at the centre of this governance analysis, results show that a weak social cohesion between inhabitants is these communities' most significant flaw, given that it undermines their capacity and willingness to develop into a more relevant actor in the governance scheme that relates to prevention and mitigation of muddy floods.

Moreover, the lack of local spaces for participation that encourage dialogue and collective decision-making interferes with the transition to a more optimal governance system. It can be argued that the existence of local and regional public policies could be an effective mechanism to counteract the effects of disasters. However, these mechanisms can be seen as a top-down approach to public policy. The conceptual framework in this article suggests that the involvement of local communities is key to mitigating and adapting to such events in a sustainable manner, every time this emerges as a proposal from communities themselves, in open dialogue with the respective authorities. For the cases studied, a well-recognised interaction between local residents and government institutions can be a first step to taking advantage of the trust that exists to gain and spread knowledge related to muddy floods, address different needs and identify the best mitigation strategies for the whole territory. In that sense, future research could deepen the identification and characterisation of better ways to create participatory processes that facilitate dialogue and enable better and faster coordination between different actors in society.

The fact that, in 2021, Belgium and Germany had to face the dreadful impact of floods should draw the attention of local authorities to the importance of considering residents in their disaster mitigation plans, considering that said events will increase in frequency and intensity induced by climate change, as well as to the interplay between natural events and social interactions. Disasters can have multiple manifestations, but they occur with greater force where participatory governance is weak and community resilience processes are not very well consolidated. By setting up governance modalities that ensure socio-environmental justice, the challenges currently hindering the creation of more sustainable development pathways could be dealt with more efficiently using the creativity, knowledge and actions that can be undertaken at community level.

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Learning for the Future: A Case Study of Transdisciplinary Collaboration to Improve Pandemic Preparedness

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Abstract

Since the World Health Organization (WHO) announced the COVID-19 pandemic, attention has turned to the impact of societal initiatives and what can be learned from them for the future beyond COVID-19. Little attention has been paid, however, to how 'learning for the future,' as an organizational process, is concretely accomplished. This paper offers a collaborative autoethnography of our team's project to 'learn for the future' through transdisciplinary collaboration during the first year of the COVID-19 pandemic, where our broader goal was to help improve future pandemic preparedness for Belgium and beyond. We engage practice theory, with its processual, relational ontology, to understand the empirical phenomenon of 'learning for the future' as a practice or set of relational activities and artifacts that constituted our experience and collective sense that we were 'learning for the future' in a transdisciplinary way. Our interpretive analysis uncovered three relational activities: *inclusively broad sharing*, *participatory concretizing*, and *collective suspending of sense*. The analysis further revealed that, at the same time, these activities were the means through which the tension our team repeatedly experienced between

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the present and future (i.e. making an impact on the present pandemic versus taking a step back from the present to 'learn for the future') was being reproduced. This explains why our team's repeated attempts to clarify priorities and reestablish the focus on the future did not simply resolve the tension. From a processual, relational perspective, 'learning for the future' emerged through ongoing efforts that relate to making a difference in the present. We discuss what our theoretical perspective and findings may mean for organizing for a more resilient society and future directions for research.

Key words

Transdisciplinary collaboration, learning, pandemic preparedness, autoethnography, practice theory

Introduction

> *We have selected you to contribute to an experimental transdisciplinary effort in order to better understand the complex interactions between scientific knowledge, medical practice, government decisions, societal impact, industry involvement, to further the best possible health for all citizens in the short and in the long run. We aim to learn from each other and from the events that will unfold during the next year, taking as case study Belgium, in order to construct a roadmap for a better preparedness for future pandemics. Your efforts will contribute to a roadmap that WHO is preparing. […] We do not expect to have a big impact on the upcoming pandemic.*
>
> —Excerpt from project description introducing new team members to the Coronavirus Pandemic Preparedness Transdisciplinary Challenge (Supplement 2)

The COVID-19 pandemic ushered in a new era marked by magnified vulnerabilities, extended polarization, heightened sensitivity to uncertainties, and, importantly, hope for a future world that is more resilient. This hope is bolstered by not only the wave of innovative societal initiatives and responses around the world but also by the universal expectation that the lessons of this pandemic will be applied in the future beyond COVID-19 (e.g. Atkinson & Page, 2022; Frueh, 2020). The importance of learning from the pandemic is also evidenced by society's frequent references to previous health crises (e.g. Chua et al., 2021; Hargreaves et al., 2020; Smith & Upshur, 2020; Webster, 2020) and by its critiques of the lack of COVID-19 pandemic preparedness (e.g. Sirleaf & Clark, 2021; The Lancet Respiratory Medicine, 2022). Little attention has been paid, however, to what it concretely means to 'learn for the future,' particularly through collaboration between different societal actors. This paper offers a case study to shed light on this empirical phenomenon.

The case of the Coronavirus Pandemic Preparedness Transdisciplinary Challenge

Two weeks before the declaration of the pandemic and in anticipation of it, a volunteer team[1] of academics and practitioners (both from various disciplines and backgrounds) in Flanders, Belgium kicked off a yearlong journey to 'learn for the future,' in order to improve the way pandemic preparedness is done and to contribute to the WHO's work on roadmaps for this. Named the Coronavirus Pandemic Preparedness (CPP) Transdisciplinary Challenge (see Supplement 2), the project idea had been conceived by three people during a WHO meeting in February 2020, two of whom would later become part of this team. KU Leuven's Institute for the Future[2] (IF), led by one of these attendees, took the lead to launch the project. Supplement 2 details the aims and scope of this project, which every team member had to sign.

In the prior three years, IF had been running a transdisciplinary honors course, where self-organized, interdisciplinary student teams (supported by dedicated coaches and an academic team) tackle a 'wicked problem' over the course of an academic year. The CPP project, however, was IF's first attempt at creating a professional-level transdisciplinary collaboration between academics and practitioners. Similar to the student course, where the learning process is emergent, this project did not have a predetermined or preset process, but the team followed the guiding principles of transdisciplinarity that had been used in the course.

1 https://rega.kuleuven.be/if/pandemicpreparedness/learningteam#Previous%20Learning%20Team
2 https://rega.kuleuven.be/if

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These principles of transdisciplinarity – embracing systems thinking and engaging diverse members of academia and society – were applied by the team in its efforts to understand the current pandemic and draw lessons for the future, based on transdisciplinary exchanges. What type of lessons they should be was initially left open, and team members were informed that this was an 'experimental transdisciplinary effort in order to better understand the complex interactions between scientific knowledge, medical practice, government decisions, societal impact, industry involvement, to further the best possible health for all citizens in the short and in the long run' (Supplement 2). As this 'experimental transdisciplinary effort' was not mandated by a governmental agency or policy-making body nor was it funded when launched, the team did not have specific accountabilities related to the current pandemic and was relatively free to design and adapt to its changing circumstances.

IF was the primary organizer throughout the project's duration, but in August 2020, several months into the project, two other academic institutions (which already had members on the team), the Institute of Tropical Medicine Antwerp and Vrije Universiteit Brussel, became formal collaborators when all three received a grant from the King Baudouin Foundation (KBF) to fund the aims of this project. The first aim aligned with the project's original purpose: to observe the challenges of the pandemic and identify what could be learned to improve pandemic preparedness in the future. By this point in time, the team had also developed two other specific aims for the funding: to develop insights on the learning process for pandemic preparedness and to develop insights on decision-makers. The funding effectively expanded the original 'core team' of KU Leuven members (responsible for managing the project) to include a current team member from each of the two partner institutions. Receiving this grant created a new level of accountability; however, given the open nature of the transdisciplinary process described in the grant proposal, the team still maintained much flexibility in its process. Months later, in January 2021, the team and funder agreed on a set of deliverables, which include workshops (related to a study of the residential care homes) to take place during the first year of the project and reports on the team's insights to be delivered after the first year of the project. The project planning and deliverables evolved over time. Although the project was formally extended for several months after the first year, this case study covers the activities during the first year, after which the team members and the project aims changed; henceforth, 'project' in this paper refers only to this first year.

This article uses this project as a case study to offer insights into the work of collaboratively 'learning for the future' and suggests implications for organizing for a more resilient society. More specifically, it addresses the research question: how is 'learning for the future' in a transdisciplinary collaboration accomplished as a relational practice? 'Learning for the future' was the aim of the project, and this study reveals how this was concretely done by the team.

Understanding 'learning for the future' as a relational practice

On this project, 'learning for the future' was conducted through collaboration. More importantly, to the team this project was specifically a 'transdisciplinary effort.' Referring to Mittelstraß, Hirsch Hadorn et al. (2008) state that such collaboration aims to 'transcen[d] disciplinary boundaries to address and solve problems related to the life-world' (p. 20). This emphasis on collaboration beyond disciplines inspired us to seek a theoretical perspective that not only sheds light on the relational work of collaboration but that also 'transcends' theoretical boundaries.

Following Steyaert and Van Looy (2010), who consider collaboration a 'relational practice,' we apply practice theory (Gherardi, 2016; Schatzki et al., 2001) to understand the empirical phenomenon of 'learning for the future' through transdisciplinary collaboration. Practice theory embraces a processual, relational ontology, which means social phenomena are seen as being emergent and ongoing and as being constituted by relations (Feldman & Orlikowski, 2011), which is a post-dual perspective that departs from individualism and societism (Janssens & Steyaert, 2019). The unit of analysis is practices, instead of individual and interpersonal behavior (i.e. individualism) or discourses (i.e. societism) (Janssens & Steyaert, 2019). We follow Gherardi's practitioner-oriented view of practices (2009, p. 117):

> 'Seen from the inside, practice is a knowledgeable collective action that forges relations and connections among all the resources available and all the constraints present. Performing a practice therefore requires knowing how to align humans and artefacts within a sociotechnical

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> ensemble and therefore knowing how to construct and maintain an action-net (Czarniawska, 2004), which is interwoven and deployed so that every element has a place and a sense in the interaction.'

Using this lens and taking guidance from Resch and Steyaert's (2020) study that sheds light on the relational practice of peer collaboration, we consider 'learning for the future' as a practice or bundle of specifically relational activities and the artifacts involved in accomplishing those activities.

Methodology

This qualitative study of our team's experience of 'learning for the future' follows an interpretive approach, which moves away from 'discovering truths and toward processes that will more effectively illuminate possibilities for thought and action' (Thorne, 2014, p. 109). This approach aims to discover 'new ways of seeing and understanding that might advance our capacity to know a phenomenon in a manner that is, in one respect or another, better than we did before' (Thorne, 2014, p. 109). This means that our study does not provide universal truths or generalizations for a roadmap of how to 'learn for the future;' rather it renders this phenomenon in terms of the orchestration of bodies, words, and materials (Nicolini, 2017), such that we can gain a new relational language for discussing the lived experience of those involved, with its complexities and situatedness.

More specifically, embracing the value of sharing reflexive, narrative accounts of transdisciplinary learning (e.g. Wall & Shankar, 2008) and discovering 'from the inside,' we developed a collaborative, authoethnographic account that engages with the team's lived experience of 'figuring out what to do, how to live, and the meaning of [our] struggles' (Bochner & Ellis, 2006, p. 111). Roy and Uekusa (2020) argue for 'utilizing self-narratives of [researchers'] experiences during the pandemic as a rich source of qualitative data for further delving into the socioeconomic, political and cultural impacts of the pandemic' (p. 383), and they advocate for collaborative autoethnography as a way to do this. Chang et al. (2013) describe collaborative autoethnography as 'a qualitative research method that is simultaneously collaborative, autobiographical, and ethnographic' and suggest picturing 'a group of researchers pooling their stories to find some commonalities and differences and then wrestling with these stories to discover the meanings of the stories in relation to their sociocultural contexts' (p. 17).

This study draws on autoethnographic data produced by the team during and after the project and also on additional reflections by the core team members – who dedicated a substantially greater amount of time to planning the team's process and executing most of the tasks – during the drafting of this paper. Throughout the project, reflection and dialogue about the team's experience were a routine part of the work, but they were also stimulated and documented in more deliberate and focused ways through individual surveys completed by the team (at three points in time during the year) and four reflection sessions (the final full team meeting and three core team meetings). In addition to this, one of the team's final workshops was focused on envisioning learning teams for the future; this workshop drew on the team's own experience and is thus also a part of our autoethnographic data.

The writing of the collaborative autoethnography for this study was initiated by the first author – an active team member who participated in all (core and full) team reflection sessions and who had reviewed all team survey and workshop results – through the process of reflecting on and addressing the research question: how did the team accomplish 'learning for the future' in a transdisciplinary way, through relational activities and artifacts? Reflecting on both personal experience and what was shared in surveys and team discussions, the first author identified three relational activities through which 'learning for the future' appeared to be accomplished in this transdisciplinary collaboration: *sharing*, *concretizing*, and *suspending of sense*. In writing the account, she further specified how each activity was done in a transdisciplinary way: *inclusively broad*, *participatory*, and *collective*. She also explained the ways in which artifacts enabled and shaped these activities. Other core team members then reviewed the initial account and contributed to it by sending in their feedback (via email or edits to the text itself) or by engaging in reflective dialogue about the account. The core team members confirmed that the description and analysis captured the essence of their personal and shared experiences. Although the full team also had an opportunity to provide feedback on the account, the core team, who remained engaged after the project ended, contributed more substantially to the account. Thus, we acknowledge that this study is relatively centered on the voices of the (academic) core team members.

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Findings

Our analysis identified three relational activities – and their related artifacts – that comprise the practice of 'learning for the future' in a transdisciplinary collaboration: *inclusively broad sharing*, *participatory concretizing*, and *collective suspending of sense*.

The analysis further revealed that 'learning for the future' was consistently experienced by the team members as a tension between their shared desire to take action that would make a difference to the current pandemic and the original project aim to take a step back to 'learn for the future.' This tension was evident from the beginning, when personal aims were shared at the start of the project, and it continued to shape the remainder of the project. In this section, we additionally explain how the tension between wanting to make an impact on the present versus thinking about the future emerged or unfolded through these activities.

(1) Inclusively broad sharing (or 'sharing broadly' for short) of knowledge

Guided by the transdisciplinary principle of thinking systemically, the team welcomed knowledge about any aspect of the pandemic or society, whether in Belgium or in other parts of the world. All topics were engaged in the team's online discussion space, making this a relational activity. We consider this sharing as 'inclusively broad,' meaning that what was shared was monitored and typically acknowledged for the potential value it brought to the team's perspective or opportunities.

The team shared a broad range of content or topics; these tended to reflect what was currently being discussed in local, national, and global news. For example, this included: modeling of the pandemic, contact tracing apps, vulnerable groups (e.g. elderly people), vaccine hesitancy, and schools. The team also shared a broad range of types of content, such as scientific findings, academic perspectives, news reports, opinion articles, social media, and personal experiences.

Sharing was also accomplished broadly in terms of space/mediums and time, both of which extended beyond team meetings to the virtual chatting and archives of the Slack app[3], the team's online discussion space and knowledge depository. Given the large number of meeting attendees and the limited meeting time, sharing during meetings often occurred through solicitation by the project lead 'going around the table.' In contrast, on Slack, team members voluntarily shared content, often as soon as they found the content, and commented on each other's posts; and they did so 'around the clock.' On Slack, discussion channels were created to separate administrative topics and files, academic references (versus 'other' references), sources of inspiration for the team's work, and interesting events. In addition to this, some of the team's aforementioned pandemic topics earned their own discussion channel; these topics of interest were not predetermined but rather emerged as the pandemic unfolded and the national concerns in Belgium shifted. Slack, which expanded the team's sharing space and time, was a key artifact through which the relational activity of 'sharing broadly' was accomplished in a fixed place, especially as the team composition and member participation were changing during the project.

While 'sharing broadly' was valuable for building a systemic view of issues related to the pandemic, this activity contributed to the team members' sense of widening scope and lack of focus on fewer topics that could contribute deep insights on 'learning for the future.' Ironically, keeping an open and flexible perspective – as a key part of sharing broadly – contributed to the emergence of an opportunistic way of working, which in our case meant that the team jumped at chances to make a difference in the current pandemic.

One example is the team's engagement in the topic of contact tracing apps. At the start of the project, the team aspired to develop a systems map of the pandemic to synthesize the array of observations and insights about complexity that could contribute to better future pandemic preparedness. The topic of contact tracing apps, a 'hot topic' at the start of the pandemic, soon grabbed the team's attention. Contact tracing apps became a topic with a dedicated channel in the team's Slack app, where the members quickly discussed from different angles issues that should be considered in creating and implementing such apps. Team members from various backgrounds and disciplines then developed an article outlining the numerous factors that decision-makers should consider about contact tracing apps[4]. Related initiatives soon followed. The team also welcomed a

3 https://slack.com
4 https://rega.kuleuven.be/if/tracing-tools-for-pandemics

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new member, an entrepreneur who had faced obstacles in getting enough institutional support for the contact tracing app that his team had pioneered in the early phase of the pandemic. Then a national, academic effort to bring together perspectives on societal issues related to the pandemic offered the team an opportunity to submit a transdisciplinary essay on contact tracing apps for a collective publication (Vandamme et al., 2020), which led to a correspondence in Nature that could have a broader audience (Vandamme & Nguyen, 2020). For a period of time, it was unclear to the team how involved in this topic they would continue to be, and some concern existed about not making enough of a meaningful impact on the current pandemic for this topic. The opportunity to make a meaningful impact was greatly reduced after the Belgian government made key decisions about how it would move forward with contact tracing apps; subsequently, the team's attention to this topic quickly waned. However, articles on this topic continued to be shared in Slack for the remainder of the project, and at times, some team members wondered if more impact could have been made for this topic. The topic of contact tracing apps is one of several examples of where the activity of 'sharing broadly' created fertile ground for the team to jump at the opportunity to make an immediate impact.

(2) Participatory concretizing

The process of making ideas, dialogues, and visions concrete created practical opportunities for team members to play a role in co-creation, another transdisciplinary principle that guided the project. In this way, concretizing is a specifically relational activity that we characterize as participatory. We highlight here the activity of 'participatory concretizing' rather than co-creating, because it was through the team's work becoming more concrete that members came to experience the project as being present- and/or future-oriented. In the following, we elaborate on how this activity was accomplished in different ways and through the use of artifacts.

The team's initial vision of concrete output for the project was the future-oriented idea of a 'roadmap for pandemic preparedness,' and although sharing broadly was valued, team discussions lacked depth and concreteness. The team tried to address this by forming 'breakout' groups that would dive into specific topics and come back together to share. Two breakout groups maintained a more future-oriented view, in the sense that they were not focused on discussing issues currently in the news; one looked into the definition of different stages of pandemic and potential gaps associated with them, and the other one adopted a 'helicopter view' of pandemic preparedness. Two other breakout groups each focused on unpacking current issues related to a specific topic: entrepreneurship (a broader framing inspired by the topic of contact tracing apps and their developers) or the elderly in need of care (both residential and informal home care); the latter was a second emerging 'hot topic' which again led the team to bring in a new practitioner member who had expertise in that topic.

In contrast to other types of collaborations where a template for a roadmap may have directed the work, the purposes of tasks, and the division of labor, this transdisciplinary collaboration evolved and became concrete in a participatory way, through members not only identifying opportunities to take action but also volunteering to take action. When the team learned of a research tool that could be used to collect stories from the public, more of the team's attention shifted to the possibility of going deeper with the topic of residential care facilities. Several members of the team worked with external stakeholders to develop an online survey to collect stories about personal experiences with the crisis for the elderly in need of care. Using research to get closer to people's experiences provided the team with not only a more concrete sense of existing issues to learn from but also opened up again the possibility to make a meaningful impact on the current pandemic.

In order to gain financial support for the project, the team was compelled to make their current impact more concrete and communicable. Despite the project's potential contribution, the team struggled to find grant opportunities where their transdisciplinary collaboration to 'learn for the future' would qualify and be valued. Funding became a new topic with a dedicated Slack channel. During this crisis, the biomedical and other hard sciences were especially prioritized for research funding due to the explicit potential of producing immediate solutions or impact. In communication with the Research Foundation – Flanders (FWO) funding body, the team began to advocate and negotiate for the funding of social science research and transdisciplinary collaboration (Wenmackers, 2020). To make their work more concrete and possibly shareable, the team began developing a report – or the 'gaps document,' as the

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team called it – describing the societal issues observed thus far and the need for transdisciplinarity in pandemic preparedness. The document included short-term recommendations for current issues but also incorporated future thinking through preliminary long-term recommendations. During the period in which the team was developing this report, a member of KBF expressed a unique interest in enabling collaboration that looked broadly towards the future. To complement this future orientation, the team also shared concrete, interim findings from its ongoing study on experiences in residential care facilities. Thus, even when pursuing funding for 'learning for the future,' concrete learnings from the present were a practical part of moving forward.

A major shift in how the team concretely accomplished 'learning for the future' occurred when it began using Miro's online collaborative visualization boards[5]. Midway through the project, the team sought ways to better connect and collaborate online; the face-to-face dialogue and exploratory exercises that would have been typical of transdisciplinary collaboration had been simply replaced by conference calls due to the COVID-19 measures. Miro's online boards created a real-time work space the team could continually return to, building on their work over time, with greater participation. In this space, more 'helicopter view' questions (e.g. what are the common or deeper causes of several of the gaps, where are we in our transdisciplinary process, which societal actors are we lacking among our team members, is a transdisciplinary advisory group possible during an acute crisis such as a pandemic) were posed for the team to work through, in terms of brainstorming and articulating individual and collective perspectives. In the final two months of the first year, the team worked in a more focused, structured, and future-oriented way, advancing through a series of four Miro-based workshops, each focused on one of four topics: the concept of pandemic preparedness, advisory teams, learning teams, and Pandemic Preparedness Goals. Each workshop was prepared beforehand using answers from questionnaires, where individual team members had the opportunity to articulate their perspectives on the topic. The activity of 'participatory concretizing' evolved over time and through artifacts to shift the tension from making an impact on the current pandemic to 'learning for the future.'

(3) Collective suspending of sense

Reflection is a key part of the transdisciplinary process, as it allows for sense-making and adaptation; as previously mentioned, what was particularly striking in this project was the ongoing, collective struggle with making sense of the tension between present and future, in light of how the project had been described at the start (as being future-oriented with little impact on the current pandemic expected). We highlight the relational activity of 'collective suspending of sense' (rather than 'collective sense-making'), because the practice of 'learning for the future' entailed moving forward without the work necessarily making sense to team members, even though they engaged in ongoing dialogue to make sense of it. The 'sense' was suspended.

Over time, as initiatives around topics such as contact tracing apps and the elderly in need of care were launched, the rationale emerged (explicitly from the project 'lead') that 'learning for the future' would come from actually experiencing the current pandemic and likely running into obstacles and challenges while trying to make a difference. Interestingly, while the team understood this rationale for engaging in present-oriented initiatives, it did not substantially resolve the tension between present and future, especially for the core team members, who were conducting the preparations for each meeting and advocating that a clearer and more structured methodology was needed. As core team members spent extra time reflecting on their experience, some of them additionally connected on the side, often one-on-one, to make sense of the various initiatives and ideas, in informal ways. This way of relating allowed them to share frustrations and 'get things off their chest.' Through this process, they realized that their sense-making frustrations were shared by other members, which then led them to accept the situation and maintain the suspension of sense regarding priorities, tasks, and purpose. This helped to alleviate moments of paralysis that some experienced.

When measures were relaxed in the autumn of 2020 in Belgium, the core team of eight members decided that they critically needed a face-to-face meeting to engage in more effective dialogue around persistent questions and to align on how to move forward. A sub-group extensively planned the full-day meeting, designing mixed modes of initiating and engendering

5 https://miro.com

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dialogue. This included walking discussions with rotations between pairs of core team members – some of whom called in by mobile phone, because they could not attend in person – and 'positioning exercises,' where participants had to position themselves on an axis on the ground (according to how they viewed a specific statement). The tension between present and future was particularly evident when the team was deliberating about what to do next regarding the study of the elderly in need of care: should the team 'go deeper' to deliver more insight and greater impact on a certain topic in the current pandemic, or should they take a step back for the remainder of the project and think more broadly about pandemic preparedness and transdisciplinarity? The intense discussions led the full team to agree to go more deeply with this study, while suspending focus on other questions. They soon discovered after the event, however, that it was unclear whether present impact or future-oriented impact was more important to the funder; different contacts from the funder had expressed different priorities. It appeared that the team was not the only one experiencing this difference or tension.

Moving forward in this transdisciplinary collaboration meant continuing team discussions and initiatives without concerted effort to predetermine specific steps that could normally bring the clarity that team members desired. Suspension of sense shaped the way the collaboration unfolded and how the team came to 'learn for the future.' The tension between present and future persisted until the final stage of the project, where structured workshops, using Miro, helped the team focus on the big questions and to bring the first year to a close.

The project's conclusion

The tension between wanting to make an impact on the present versus thinking about the future led the team to one of its key conclusions at the end of the project: 'Learning to improve pandemic preparedness and advising decision-makers during a pandemic require separate skills' (e.g. reflecting versus acting, focusing more on qualitative investigation versus more on quantitative knowledge gathering, focusing more on the long-term impact on preparedness for the next pandemic versus short-term impact for the immediate crisis). The team stated this conclusion and elaborated on it in the report it submitted to the Belgian Parliamentary Commission, which included an expanded understanding of pandemic preparedness, recommended strategies to improve pandemic preparedness, and guidance on creating Pandemic Preparedness Goals[6]. More specifically, the team recommended that in the future there be a dedicated learning team that is composed of members who do not belong to other teams directly advising policy-makers. The rationale shared in the report was that based on the team's experience, trying to both advise policy-makers while also reflecting and identifying lessons for future pandemic preparedness can create tensions, confusion, and unrealistic expectations.

Discussion

This study examined a transdisciplinary collaboration during the COVID-19 pandemic – where the team understood its aim and work as 'learning for the future' to improve preparedness for future pandemics – through a collaborative autoethnography by the team members. We applied practice theory to show how this empirical phenomenon of 'learning for the future' is a relational practice. Our empirical account of this practice suggests that the phenomenon of 'learning for the future' deserves further dialogue, research, and conceptual development.

We revealed that our experience of 'learning for the future,' through transdisciplinary collaboration during the pandemic, had very much to do with the present, not only in terms of extracting lessons from the present (or past) for the future, but also in terms of how 'learning for the future' was understood by the team and how it unfolded through making a difference in the present. Through viewing this phenomenon as a relational practice, we demonstrated the relations among bodies, words, and materials that work together to give an ongoing sense of and meaning to 'learning for the future.'

This picture of the emergent, connective nature of 'learning for the future' through transdisciplinary collaboration suggests that a predetermined roadmap of pandemic preparedness (similar to what currently exists today for influenza) that lays out progressive stages of concrete tasks, for example, is likely to fall short of expectations. We observed from our experience during this crisis that the situation under analysis (i.e. the COVID-19 pandemic in Belgium) changed rapidly, sometimes unexpectedly, with little that we could firmly

6 https://rega.kuleuven.be/if/pandemicpreparedness/introducing-pandemic-preparedness-goals

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rely on for planning purposes. What we want to highlight here, more so than the uncertainty or unpredictability, is how we continuously re-oriented ourselves in relation to the tension discussed and in relation to the constantly evolving content (e.g. topics, issues, research questions). Our experience was punctuated by moments of clarity, achieved through deliberative sense-making and artifacts (e.g. apps, documents), but these moments of clarity did not shape how the project unfolded as much as we believe it would have in non-crisis, non-pandemic times, when the tension between present and future may be less pronounced. Our team's work and process during this project were iterative, and we made sense of it based on how connections, opportunities, and pressures emerged, in combination with how artifacts played a role in moving us forward.

During a crisis – from which a more resilient society hopefully emerges – we suggest that deeper and more responsive insights and learnings may develop if there is more investment in building the 'muscles' or skills for navigating uncertainty, information overload, and knowledge diversity than investment in designing and executing a template for 'learning for the future.' Based on our experience and analysis, we imagine that this muscle would enable team members to pause during the process and recognize how the tension between present and future is being reproduced by the team through its activities of inclusively broad sharing, participative concretizing, and collective suspending of sense. In such pauses, new ideas may emerge or new contexts may be constructed.

The team was not charged with crisis management; however, our case could inspire conceptual developments and new ways to study transdisciplinary approaches to crises (e.g. Cole et al., 2022; Lawrence, 2021; Steiner et al., 2020), crisis management (e.g. Mitroff, Pauchant, & Shrivastava, 2006), organizational learning from a crisis (e.g. Smith & Elliott, 2007), crisis learning (e.g. Hur & Kim, 2020), and in particular what Antonacopoulou and Sheaffer (2014) conceptualize as 'learning in crisis (LiC)' or the '*ongoing practising in the midst of everyday action*' (p. 8, emphasis in original). They point out that 'the relationship of crisis and learning is founded on the assumption that a better understanding of what causes crises and opportunity to learn from past crises can prevent the reoccurrence of future crises' and that this assumption 'attributes crisis to managerial shortcomings' (Antonacopoulou & Sheaffer, 2014, p. 8). Our project team did not have a formal role in managing the crisis, but as we reflect on our experience being in the midst of the crisis, we agree with Antonacopoulou and Sheaffer's (2014) argument that identifying shortcomings (e.g. judgmental errors) is not sufficient for addressing or preparing for future crises. They argue that 'we need to understand better how learning and crisis are interrelated' (Antonacopoulou & Sheaffer, 2014, p. 8). Our study may inspire further conceptual development of 'learning in crisis,' and likewise the conceptual development of 'learning for the future' may benefit from current work on 'learning in crisis.'

Conclusion

We had to ask ourselves: how do we navigate the necessity and challenges of 'losing ourselves in the present to learn for the future'? As we did, future learning teams taking a transdisciplinary approach will be asked to continuously reflect on the question of whether they are learning what they aim to learn and how to do so. These questions deserve more dialogue not only within and between learning teams but also among academics and other members of society. This paper initiates this dialogue by engaging practice theory to provide a picture of what it concretely meant to our team to be 'learning for the future,' particularly through collaboration between different societal actors, in a context where making a difference in the present was 'inescapable.' Such a dialogue could support societal resilience by moving dialogue beyond 'what to learn' and 'how to learn' to 'how to see' and 'how to support' learning through transdisciplinary collaboration.

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7 https://rega.kuleuven.be/if/pandemicpreparedness/stakeholder_advisory_group

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Supplement 1: Shared authorship – Members of Coronavirus Pandemic Preparedness Learning Team 1

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Supplement 2: Challenge document: Coronavirus Pandemic Preparedness Transdisciplinary Challenge Information

CORONAVIRUS PANDEMIC PREPAREDNESS TRANSDISCIPLINARY CHALLENGE INFORMATION

SECTION 1 OF 5 – General information about the challenge
Dear participant,

Welcome to the Coronavirus Pandemic Preparedness Transdisciplinary Challenge.

This is an initiative from the Leuven Institute for the Future (LIF, www.institute-for-the-future.be). LIF joins people concerned about the future and gathers them around scientific challenges. These challenges typically revolve around a specific society, environment, and/or business problem or opportunity that needs to be addressed by a transdisciplinary research team. Transdisciplinarity refers to the process by which knowledge regarding a problem is gathered from all possible angles, including from those experiencing the problem, with the intention to come closer to a solution. The philosophy is that a 'wicked problem' needs a systems approach, and that is why you as team member may be a scientist, or a member of society, or someone from industry, or have even other credentials.

We understand that you are concerned about the preparedness of Belgium for a potential new coronavirus pandemic. We have selected you to contribute to an experimental transdisciplinary effort in order to better understand the complex interactions between scientific knowledge, medical practice, government decisions, societal impact, industry involvement, to further the best possible health for all citizens in the short and in the long run. We aim to learn from each other and from the events that will unfold during the next year, taking as case study Belgium, in order to construct a roadmap for a better preparedness for future pandemics. Your efforts will contribute to a roadmap that WHO is preparing. From here on you are called 'researcher'.

We invite you to join us in 2-weekly sessions of 2hrs each, preferentially face-to-face in Leuven but videoconferencing is also an option. We expect you to commit to an additional 2hrs exercises or tasks during the intermediate week between the sessions.

In the next section you will learn more about your fellow researchers.

SECTION 2 OF 5 – Team members
The expertise of the team members is very varied, reflecting the disciplines and stakeholders we feel are needed for this challenge. The team members are assigned in person, the team dynamic requires you to be present as much as possible face-to-face. While you can consult or give tasks to colleagues, family or friends, you cannot be replaced during the team meetings by someone else of your environment.

Up to now, the team members are the following people.

[Names removed for publication]

It is possible that during the first meetings we decide to add or replace members.

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SECTION 3 OF 5 – About the coronavirus pandemic

We expect the new coronavirus to become pandemic very soon. Pandemic preparedness roadmaps have been drafted mainly considering medical, epidemiological and operational issues. The consequences for society have been less investigated, and societal actors are less involved in understanding the impact of a pandemic on the society, and in drafting the roadmaps taking that impact into account. Transdisciplinary methodologies are very well placed to map the societal impact and advise on potential unintended consequences of pandemic preparedness measures. Transdisciplinary teams in general work slower, but more effective. That is why we need to learn from the current pandemic to be better prepared for the next pandemic. We do not expect to have a big impact on the current pandemic. We do expect that every pandemic is different, and transdisciplinary work will stay needed.

SECTION 4 OF 5 – About wicked problems and transdisciplinary teamwork

'A wicked problem is a problem that is difficult or impossible to solve because of incomplete, contradictory, and changing requirements that are often difficult to recognize. It refers to an idea or problem that cannot be fixed, where there is no single solution to the problem. The use of the term «wicked» here has come to denote resistance to resolution, rather than evil. Another definition is «a problem whose social complexity means that it has no determinable stopping point». Moreover, because of complex interdependencies, the effort to solve one aspect of a wicked problem may reveal or create other problems.' Source: Wikipedia (https://en.wikipedia.org/wiki/Wicked_problem)

Pandemic preparedness is a wicked problem, which needs a systems approach (https://en.wikipedia.org/wiki/Systems_theory) and transdisciplinary team work. The Leuven Institute for the Future has developed a methodology for transdisciplinary teamwork. One of the first exercises of the team is to see whether the current team is appropriate for the task, and whether we need additional team members, or connections with other disciplines and stakeholders.

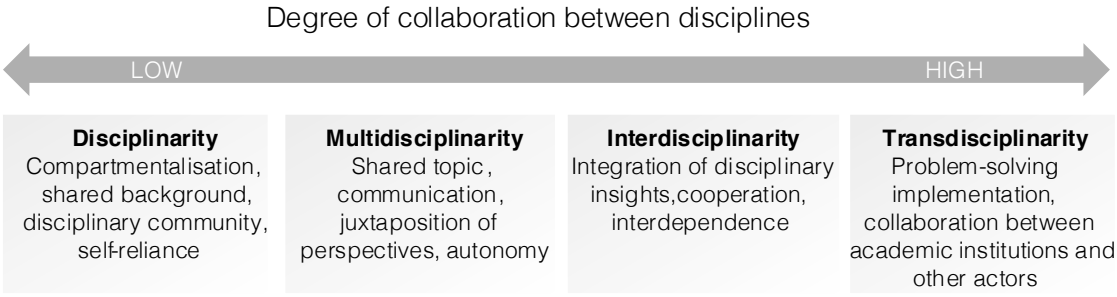

Figure 1. Key concepts for collaborative research between disciplines (interdisciplinarity). Inspired by Klein (2014). https://www.leru.org/files/Interdisciplinarity-and-the-21st-Century-Research-Intensive-University-Full-paper.pdf

SECTION 5 OF 5 – Terms of engagement

I, _____ (full name), am committing myself to advance to the best of my abilities the research on the challenge CORONAVIRUS PANDEMIC PREPAREDNESS. This entails the following:

1. I will dedicate on average 2 hrs/week on this project, and plan to be present during the team meetings, mostly face-to-face.
2. I will sign and respect the challenge terms and conditions (will be available soon)
3. I will sign and respect the confidentiality terms and conditions (will be available soon)