

Controlling the Valves

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Controlling the Valves: Dealing with Conflict in a Transition Initiative for Public–Private Water Governance in Amsterdam



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1 Introduction

Over the past 10 years, municipalities in the Netherlands, as in many other cities worldwide, have often initiated and participated in multi-actor alliances to address their city's societal and sustainability challenges. To test new solutions and distribute responsibility on themes such as heat-stress prevention, low-carbon mobility and energy-positive districts [30, 33], many of these alliances have made use of cross-disciplinary collaboration. In this chapter, we examine one such multi-actor alliance established to explore an urban sustainability transition towards a 'rainproof' city: backed by a European subsidy, RESILIO aimed to upscale solutions for smart water retention on green urban roofs, a concept referred to as 'Blue-Green' (BG) rooftops. In addition to the complex technological and financial challenges, this innovation touches upon important governance questions as it requires rethinking accountability and responsibility between public and private actors in urban water management.

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In July 2019, the partners of RESILIO—including the municipality, the local water authority, private technology enablers and social housing associations (i.e., the roof owners)—organised a meeting they termed a ‘Hard Talk’. RESILIO had been up and running for six months and some participants were troubled by the neglect of fundamental issues in their collaboration. One of these issues, constituting a central theme throughout the Hard Talk, concerned control of the BG roofs’ ‘smart valves’, which could be opened or closed to unburden the municipal sewerage system in the event of heavy rainfall. Hoping to encourage the future involvement of both new property owners and valve (service) providers (i.e., the technology enablers), the water authority strongly insisted on the development of an open-source support system to control the valves. In response, the technology enablers expressed reluctance to endorse open-source development plans, emphasising the quality of their existing software, while most of the other partners favoured an open-source system facilitated by the water authority as a means of creating balance between the various roof-water management partners. Three years later, in the autumn of 2022, the final outcome failed to live up to the partners’ initial intentions: while the code of the support system had been made freely available, the system itself was hosted by one of the private technology enablers involved in RESILIO. Throughout this chapter, we focus on the process that brought the partners to this final result, analysing participants’ difficulty in engaging with potentially conflicting interests by closely observing interactions between RESILIO partners in the three years following the Hard Talk.

During this influential Hard Talk, partners showed awareness of the need to discuss both the alliance’s fundamental issues and the participating actors’ potentially conflicting positions. This awareness aligns with more recent scholarly work on the importance of disagreement and dissonance in transition-oriented learning processes [8, 24]. While actors’ abilities to identify and engage in potential conflict has been established as a crucial success factor in sustainability transitions, participants’ strategies for enacting such disagreements, especially in collaborative and/or consensus-oriented settings, have thus far been empirically understudied. This limits our understanding of how conflict can play a constructive role in the learning process between collaborative participants and be productive in urban sustainability transitions. We therefore examine the following central research question:

How do participants handle conflict that emerges in the context of an urban sustainability transition initiative?

To answer this question, we first introduce a discourse analytical framework in Sect. 2 that allows us to examine the interaction in sustainability transition initiatives from an interpretative perspective. Discourse analysis can help to reveal opposing positions between partners and disclose discursive strategies of partners to influence the course of the initiative. Next, we use Sect. 3 to elaborate on the idiosyncrasies of RESILIO as our research case and to introduce its Decision Support System, i.e., the software application developed to control the smart valves on BG roofs to mitigate urban pluvial flooding. Section 4 presents the results of our analysis of the interactions between RESILIO partners in conflict regarding control of the valves. Finally, we conclude in Sects. 5 and 6 with a discussion of the value of our approach for understanding and fostering learning in urban transition initiatives.

2 Theoretical Background

2.1 *A Discourse Analytical Perspective on Conflict: Combining Two Approaches*

Sustainability transition initiatives involve multi-actor collaborations in which experimentation with technical and social innovations aims to contribute to structural change towards a more sustainable system [11, 37]. The learning process of these initiatives is often understood as an ongoing interaction of meaning making between persons and their environment [24] in which participants negotiate the meaning of their knowledge, values, interests and responsibilities [4, 37]. Discourse analysis (DA) offers several approaches that enable us to relate societal-level system change to meaning-making activities at the level of social interaction within the initiatives. Furthermore, discourse analysis can aid in revealing an initiative's often-hidden and sensitive layers of conflict [18]. In this chapter, we combine two discourse analytical approaches to help us focus on conflict in the meaning-making process between participants. The first of these is a DA approach based on the work of Laclau and Mouffe which poses that contestation lies at the heart of societal change [15, 19]. The second is a discursive psychological approach that focusses both on actors' strategies for interacting in conversation and on how this influences the direction of their learning process [21, 31].

2.2 *Conflict as Incompatible Positions*

The first approach understands discourse as complex structures of meaning that constitute social orders. Such discourses are never neutral, as they frame reality and transform certain aspects of reality into comprehensible narratives [35]. According to [19], discourses become dominant when they (temporarily) succeed in suppressing alternative discourses, which represent reality differently, making the essence of conflict the struggle over power between dominant and alternative discourses (2001). This understanding of conflict is reflected in the concepts of sociotechnical regimes and niches as used in transition studies literature [16], which often refers to dominant and alternative societal practices and structures. However, Laclau and Mouffe take a more political understanding of conflict in societal change, emphasising ineradicable differences in the identities, values and stakes between competing discourses. Reflected by their conception of societal change as a process of contestation in which positions of discursive dominance are continuously at stake, Laclau and Mouffe [22, p. 756] assert that *'we have to accept that every consensus exists as a temporary result of a provisional hegemony, as a stabilisation of power, and that it always entails some form of exclusion....The idea that power could be dissolved through a rational debate and that legitimacy could be based on pure rationality are illusions, which can endanger democratic institutions.'* Conflict must therefore be understood

not only as a struggle over power, but also entails a painful struggle between incompatible stakes, norms, values, routines and other matters closely entwined with the identities of the participants in conflicting discourses. The pretence of ‘rationality’ in debate and ‘consensus’ in collaboration can lead, then, to the denial of incompatibilities between, and the underestimation of losses for, certain actors within an initiative [5, 17].

Drawing on this theory of Laclau and Mouffe, we regard conflict as incompatible positions between actors—in our case, between participants’ ambitions for systemic change in a transition initiative. In our analysis of the data, we use incompatible positions as our first marker to identify conflict in the transition initiative.

2.3 Discursive Strategies for Position Management

Although incompatible positions function as a first important marker for conflict, such positions can be hard to recognise in the interactions between participants and fail to reveal how participants interact on these positions. We therefore use insights from discursive psychology as a second discourse analytical approach to examine the actual interactions and strategies actors use to handle conflict in conversation. Discursive psychology, in addition to the approach of Laclau and Mouffe, alerts us to markers for the emergence of conflict in interactions between, and strategies used by, participants—whether consciously or unconsciously—to manage their position and represent their reality in the discourse of a transition initiative [14, 26, 25].

Both Laclau and Mouffe and discursive psychologists refer to moments of interaction that deserve extra attention because they indicate the negation of meaning and essential changes in the development of the discourse. In discourse analysis these moments are also referred to as critical moments or episodes [36] as they are crucial in the progression of the discourse. As described below, we distinguish two additional markers—in addition to conflict as incompatible positions, to recognise the emergence of conflict as potential critical episode in the interaction between participants and to identify the strategies of participants to deal with conflict.

Grounded in these DA perspectives, our second important marker involves the emergence of alternate meanings between participants [19, 28]. Laclau and Mouffe show how the meanings of certain words, most often those referring to important concepts in the discourse, constantly change in conversation. These ‘alternations’ show how the exact meanings of words are constantly up for discussion, revealing the efforts of the involved parties to influence the meaning-making process. Especially in transition initiatives, which generally aim to form a whole new discursive community in part by creating a mutual understanding of its central concepts, negotiation of meaning is distinctly important. Discursive psychology displays a similar focus on how actors react to utterances of other participants in conversation by making small changes in what was said. These small alternations in responses can be regarded as strategic actions, for example, when a request to investigate a certain issue is reformulated by the receiver to suit their own agenda.

Informing our third marker, Potter [26] and Snejder and Te Molder [28] show how the triad of identities, stakes and accountability form an important discursive engine behind the dynamics of ‘position management’. Having distinguished three strategic discursive actions performed by actors to manage their representations of reality, we find these tactics equally relevant to the dynamics of conflict in transition initiatives:

- Identity management: actions intended to influence the development of a discourse by selectively creating or promoting particular identities; for example, by strengthening or discrediting others’ identities
- Stake and interest management: actions intended to influence participants’ positions in a discourse by selectively employing the use of stakes; for example, by accusing others of self-serving management practices and thereby weakening their position.
- Accountability management: actions intended to influence the responsibilities and roles of participants in a discourse by selectively addressing perceived obligations either to oneself or to others; for example, by accusing others not to meet up their responsibilities and drawing the attention away of ones’ own responsibilities.

2.4 *Analysing Conflict in Critical Episodes of Interaction*

Combined, our three markers constitute the discourse analytical framework used in this study to identify conflict and analyse its development, a summary of which is presented in Table 1.

Table 1 Discursive markers used to recognise conflict and identify actors’ strategies for dealing with conflict

Markers used to identify both conflict and actors’ strategies for coping with conflict
(1) Incompatible participant positions, e.g., on an issue
(2) Alternations: <ul style="list-style-type: none"> – Ongoing alternation of the meaning of central concepts in the discourse – Small alternations of meaning of specific words or utterances between partners, used by participants to assert their own perspectives
(3) Position management focused on: <ul style="list-style-type: none"> – Identity management – Stake management – Accountability management

3 Case Introduction and Methods

3.1 Research Case

RESILIO (Resilience Network of Smart Innovative Climate-adaptive rooftops, 2019–2022) focused on the potential of smart Blue-Green (BG) rooftops in urban stormwater management to reduce pluvial flooding, heat stress and biodiversity loss [1, 12]. To control water flow (see Fig. 1), smart BG roofs combine water buffers with automatically operated valves to, ideally, turn the rooftops into a ‘squeezeable sponge’ informed by weather forecasts: programmed before dry periods to retain and then slowly release rainwater, and before heavy rainfall to release all water, thereby creating extra retention capacity and reducing peak release on the central sewerage system.

RESILIO was jointly led by the municipality and the local water authority. The project was subsidised under the European Union Urban Innovative Action program. Table 2 describes the main activities and partners involved in RESILIO.

The ultimate objective of RESILIO was to develop an infrastructure of BG roofs connected through a digital network of automated valves. The roofs were provided by four different social housing associations, each of which was compensated for 80% of the total construction costs. Besides technological innovation and a feasible business case, this infrastructure required a new form of rainwater governance. The task of central rainwater management, traditionally a municipal responsibility, would need to be extended to include roof owners and technology enablers through a grid of valves managed via Decision Support System (DSS) software. Right from the start of the project, this crucial component (activity 5 in Table 2) demanded the repositioning of participating actors, implicated by the need for new BG rooftops governance protocols (activity 6).

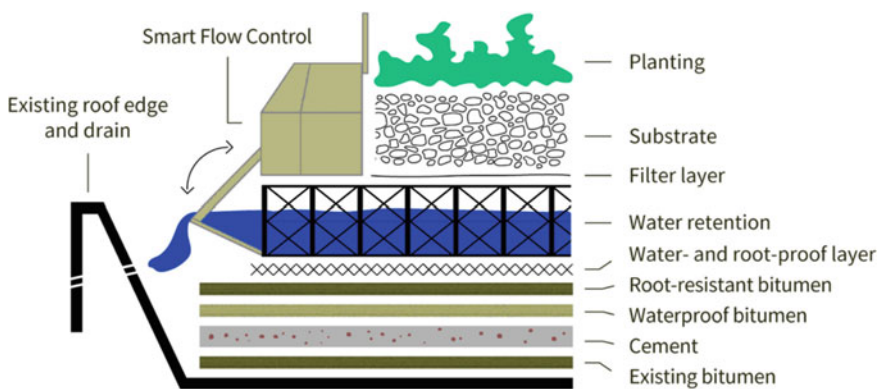


Fig. 1 Smart BG rooftop from the RESILIO final report [12]

Table 2 Main activities and partners of the RESILIO project

	Main activities	Main partners
1	Project management	Municipality: <i>Urban Planning and Sustainability</i> Water authority: <i>Water-System Team</i>
2	Creation of 10,000 m ² of smart BG rooftops on existing social housing and private real estate; communication with research and development teams	Housing associations 1, 2, 3 and 4; Municipality: <i>Traffic & Public Place</i> ; Technology enabler 1
3	Research on the climate-mitigating impact of BG rooftops, including storm water management, heat reduction, increased biodiversity and specific health benefits	Municipality: <i>Health Services</i> University: <i>Institute for Environmental Studies</i> University of applied sciences: <i>Urban Technology</i>
4	Technical innovation and product development of BG rooftops on an innovation-lab rooftop	Technology enablers 1 and 2 University: <i>Institute for Environmental Studies</i> University of applied sciences: <i>Urban Technology</i>
5	Development of an open source water-management platform (Decision Support System (DSS)) that connects to the automated valves of different suppliers	Water authority: <i>Water-Technology Team and IoT (Internet of Things) Team</i> Municipality: <i>Data Lab</i>
6	Development of BG rooftops governance protocols tailored to urban micro-level water management	University of applied sciences: <i>Urban Governance</i>
7	Social cost–benefit analysis and development of a viable business case	University: <i>Environmental Studies</i> University of applied sciences: <i>Economic Transformation</i>
8	Community involvement and communication	Technology enabler 3 Municipality University of applied sciences: <i>Urban Governance</i>

By combining micro-level rooftop data with macro information, including sewerage data and weather forecasts, the aim of the DSS was to provide individual owners and smart-valve service workers with advice on whether to open or close their valve at any specific moment for each specific rooftop water buffer, respecting roof owners' individual preferences for water use (Project Plan RESILIO). Figure 2 shows the various types of information used in the DSS.

This study focuses on participant conflict both around the design, ownership and openness of the software behind the DSS, and around the control and ownership of the BG rooftops' smart valves.

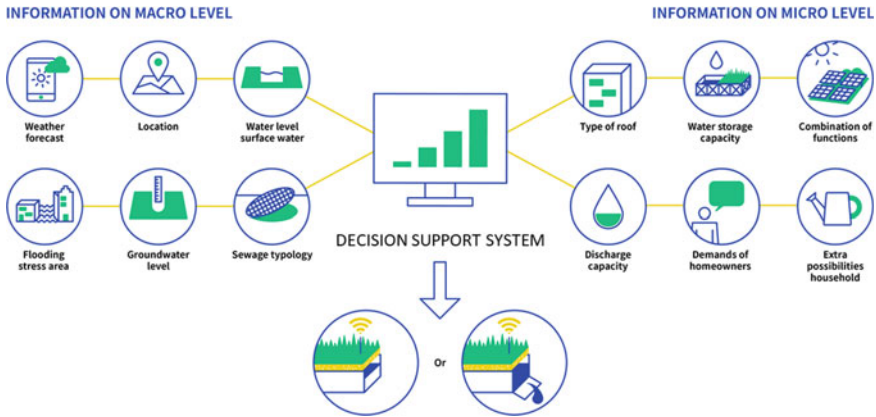


Fig. 2 Decision Support System from the RESILIO final report [12]

3.2 Data

Over the course of the project's three years, the team of researchers responsible for the development of the BG rooftops governance protocols collected data on RESILIO in a process of participative action research [3]. Data consisted of audio recordings and extensive notes made at regular (once or twice a month) central Project Team Meetings (PTM) (activity 1 in Table 2), and at dedicated work sessions for both the development of the DSS (activity 5) and new governance protocols (activity 6). In the end, we analysed a total of 19 meetings—16 of which had been documented with audio recordings and notes, and 3 with notes only—focusing on participants' discursive interactions. In addition, documentation in the form of the project's initial plan, midterm reviews, final report and presentations were analysed. Furthermore, we conducted 20 semi-structured interviews with RESILIO participants at the beginning of the project to learn about their motivations, roles and concerns. Both the interviews and documents were used to better understand participants' different positions and to corroborate the points of conflict identified by our analysis of participant interactions.

3.3 Mixed Discourse Analysis: Coding and Analysing

We used the three conflict markers (see Table 1) as a coding scheme to identify conflict and partner strategies in the data gathered on participant interaction. Based on our initial analysis of the Hard Talk in search of incompatible RESILIO positions (marker 1), we chose to focus on DSS control of the rooftop valves. Next, we examined the interviews for additional information relevant to incompatible positions on the DSS and control of the valves, and coded the agendas and notes of all PTM meetings

and work sessions for the occurrence of ‘moments of interaction’ regarding DSS development.

To further substantiate the emergence of conflict in participant interactions and strategies, we then applied markers 2 and 3 to the audio recordings of the PTM meetings and work sessions that contained moments of interaction relating to the DSS. Specifically, we first used marker 2, the occurrence of alternations, to code the critical moments that influenced the development of the DSS, of which we identified six critical episodes that spanned multiple meetings. Within these episodes, we then analysed the most important alternations in participants’ understandings of the governance protocols used to control the valves. Finally, we applied marker 3 to analyse the strategies used by participants to manage their positions, and to understand whether and how these affected the development of the discourse.

4 Results: Who Will Squeeze the Sponge?

4.1 Introduction

Urban sustainable development often entails a redefinition of the roles fulfilled by public organisations. Moreover, urban sustainability challenges tend to demand the involvement of private organisations and citizens, thus reshuffling traditional divisions of rights, duties and responsibilities [11]. In this section detailing our results, we will show how the partners of RESILIO tried to negotiate change beyond the development of technological solutions for the smart valve, necessitating a serious adjustment in urban water-management responsibilities.

In Sect. 4.2, we elaborate on participants’ conflicting positions, marker 1, regarding control of the valves as these positions emerged during the Hard Talk in the early stages of the project. In the following result sections, we then focus on how conflict around control of the valve and development of the DSS continued after this influential session. Informed by marker 2, Sect. 4.3 presents an overview both of the critical episodes observed during DSS development and of the changes in discursive interactions associated with these episodes. Section 4.4 presents a small, specific selection of alternate meanings used by the water authority to deal with conflicting positions regarding the role of DSS valve control. Section 4.5 rounds off the results with our analysis of how accountability, identity and stake management, marker 3, enabled partners to manage their positions on responsibilities vis-à-vis DSS development and control of the valves.

4.2 *Emergence of Conflict: Controlling the Valves*

At the start of RESILIO, in early 2019, the first signs of conflict began to emerge in May during a project team meeting (PTM), when the DSS activity leader (see activity 5, Table 2), in contrast to the other attending partners who reported being on track, expressed concerns. Explaining the dependency of the DSS on other factors and project activities—such as the valves’ physical properties and software, the research on the BG roofs’ performance and the development of BG rooftops governance protocols—the activity leader suggested there were serious issues to discuss. Prior conversations with other activity leaders and partners had led the DSS leader to believe that important differences in participant stakes and ambitions were going unaddressed, potentially endangering the future of the project. To make these incompatible stakes and aspirations explicit, the DSS leader proposed a so-called Hard Talk. After several other attendees also recognised these concerns, the partners agreed to schedule the Hard Talk before the beginning of summer.

One of the most important issues discussed during the Hard Talk concerned control of the valves. Characterising the most important conflicting positions regarding this control, Table 3 presents the paraphrased remarks, further informed by interviews, of the Hard Talk participants. Following our first marker, these paraphrases are organised per incompatible position, with the left column presenting the positions most aligned with the initial project plan and the right an opposing position that could have potentially changed the RESILIO discourse.

Marker 1 thus reveals the partners’ incompatible positions regarding the role of the DSS in governance protocols, a concept central to the systemic ambitions of RESILIO. In search of a new urban water-management system, the water authority felt compelled to join forces with other urban actors, such as real estate owners and technology enablers, who should share in the responsibilities associated with pluvial flooding due to climate change. In their eyes, only an open-source DSS platform could adequately facilitate the participation of other actors in a responsive, micro water-management system, i.e., the independent BG roof owners and technology enablers whose connection of their valves to the DSS would be imperative to the plan’s success. In line with European funding regulations, the platform was ordered to be built on an open-source Internet of Things network to enable other parties to use, host or implement the platform in another setting after the project was finished: *‘It will allow other parties in the Netherlands, and elsewhere in the world, to replicate the network-based micro water-management support system in their own public and/or private domains’* [6, p. 55].

In sum, both the Hard Talk and the interviews uncovered several points of conflicts related to the project’s ambition to create a scalable BG infrastructure through which rainwater is controlled by the DSS; i.e., conflict between:

- (1) The water authority—who viewed an open-source network as essential to the project’s ambitions—and the technology enablers—who considered the request to share their core business unreasonable given their large investment costs.

Table 3 Paraphrased remarks by RESILIO partners indicating different positions regarding control of the valves

Participant position aligned with the initial project plan	Participant position incompatible with the initial project plan
We need to be informed on the technology behind the automated valves because we can't create a transferable model if we're missing a piece of the puzzle (water authority)	We've invested a lot of time and money in developing the valve and its software, so it's not in our interest to make that technology public. Careful consideration is imperative (technology enabler)
The valves shouldn't be controlled by technology enablers. A multi-actor decision model focused on managing the urban sewerage system as a whole should be the goal and the role of technology enablers should be to connect their valves to the DSS. (water authority)	Participating in a larger water-management system is interesting for us, but we can't just reprogram the valve according to the specificities of this particular city. We're doing our best to balance commercial and public interests. (technology enabler)
The technology enablers are currently operating in too many different positions regarding the valve: developer, innovator, producer, programmer and service provider. (water authority, municipality)	We've already developed the automated valve, giving us a front-runner position and ensuring the development of BG roofs. (technology enabler)
We're really worried that we're supposed to be developing a transferable model—using public (European) money, no less—but that, in the end, the future of the entire (Dutch) smart water grid will be dependent on a few technology enablers. (municipality)	You can't expect the technology enablers to just share their commodities. The solution doesn't have to be that complicated—the water authority should be able to work with standard protocols. (housing association)
We need to find new partners and a feasible business case to help diversify and sustain responsibilities for mitigating climate change, which includes a long-term solution for water management. A lot depends on that. (water authority, municipality)	Affordable housing is our core concern, so we can't just raise the rent because BG rooftops greatly increases the cost and complexity of maintenance. We don't want to be stuck with the valves and ongoing high maintenance costs at the end of the project. (housing associations)

- (2) The water authority—who felt hampered by their dependency on the technology enablers for control of the valves—and the technology enablers—who saw the service of providing access to (the software that controls) the valves as part of their core business.
- (3) The water authority—who believed the project's success depended on their ability to regulate rooftop water levels themselves—and the roof owners and technology enablers—who were legally entitled to this responsibility.
- (4) The housing associations—who saw the BG rooftops' extra costs and responsibilities as impeding their primary task of providing affordable housing—the water authority—who was unable to compensate the housing associations without third-party funding—and the technology enablers—whose business model depended on income from service costs for the valve.

4.3 *Critical Episodes in the Development of the DSS*

While the Hard Talk made the partners' awareness of potential conflict explicit, awareness alone was not enough to facilitate changing the existing system. Many transition initiatives encounter such 'system lock-in' as participants work towards structural change. In this section, we describe how, in the three and a half years after the Hard Talk, the RESILIO partners tried both to negotiate the terms of the DSS and to cope with conflict regarding governance of the valves.

Informed by marker 2 of our discourse analytical framework, we focused on patterns of alternations in participants' discursive interactions around development of the DSS in relation to governance of the valves. Data analysis revealed different types of alternations in participant interactions, the most important of which were all related to control of the valves and concerned: (1) new terms, (2) alternate meanings for existing terms, (3) the absence or presence of discussion, and (4) changes in participant positions (marker 1). In search of these influential interactions, we identified six critical episodes in which essential alternations were used when compared to previous episodes, using the Hard Talk as our baseline of comparison. Rather than providing extensive descriptions of each alternation, the following overview of critical episodes is meant to highlight the major alternations in participant interactions over time and identifying changes in the positions of partners by the end of the project (see Table 4).

Distinguishing these alternations in critical episodes is essential to understanding both the development of conflict and the final outcome regarding the implementation the DSS. Our analysis draws attention to the water authority as having made the most significant changes in its position towards control of the valves and in their relation to other RESILIO partners. As the project progressed, their need to initiate the development of a new system in which water-management responsibilities would be shared repeatedly forced them to reconsider their own role in a responsive micro water-management system. Their biggest switch came at the end of the project, when they redefined their role as developer and host of the DSS to instead be that of an authority responsible for issuing future standards for technology enablers. Although this redefinition and hosting of the DSS by the technology enabler seems the unexpected result of the freeze of ICT projects, it also reflects the difficulties that the water authority encountered over the project to enforce the right conditions within its own organisation and position the DSS as part of their future responsibility. Furthermore, it is important to note that these six critical episodes of discursive interaction do not encompass all changes in partners' positionings. Our prolonged engagement in the project and the examination of the final report teaches us that the water authority had—partly based on their experience in RESILIO—made additional arrangements for distributing the responsibilities associated with pluvial flooding; e.g., new rain-water regulations that force property developers to create water-retention devices on all new estates.

Table 4 Overview of critical episodes and major alternations in discursive interactions between RESILIO partners

Baseline established in episode 1	Emergence of conflict
Critical episode 1	Incompatibilities in partner positions were actively addressed for the first time during the <i>Hard Talk</i> : although the smart-valve technology was still in private hands, both the water authority and the municipality expected the DSS to become a governance instrument in the form of a transferable, open-source platform tailored to the needs of each RESILIO partner. Moreover, the water authority’s insistence on being granted control over the valves clashed with the technology enablers’ unwillingness to municipalise their software, and with the roof owners’ and technology enablers’ legal right to control the valves. Development of the DSS was moving slowly, and the DSS team and other participants attributed this to its dependency on other activities and on a lack of DSS team personnel. The housing associations argued several times for a readjustment of costs and responsibilities regarding the valve, as the current distribution was competing with their primal goal of providing affordable housing.
Main alternation in episode 2	Introduction of a new term—Roof Water-Level Agreement—to address new aspects of the valves’ control
Critical episode 2	New terms arose to address governance issues and control of the valves. One such term was the Roof Water-Level Agreement, intended to inform the DSS on each individual rooftop’s use of water. With this new term, focus on the DSS as a technical instrument for valve control shifted into a discussion about the partners’ different roles. Trying to keep the focus on the DSS as the main instrument used to distribute control, the DSS team emphasised the platform’s need for smart KPIs (key performance indicators) that would correspond with the goals of RESILIO—KPIs they promised to develop. However, this triggered discussion and confusion around which governance responsibilities should be distributed and to whom. The focus then shifted to the governance team, who was responsible for defining the partners’ roles and governance arrangements.
Main alternation in Episode 3	Introduction of a new concept—the Micro Water-Management Agreement—to disconnect ‘who controls the valve’ from development of the DSS

(continued)

4.4 *Alternate Understandings of the DSS*

The six critical episodes reveal how the water authority had found itself in the most difficult of the partners’ positions: tasked with creating a future-proof, multi-actor model for urban rainwater management, they were dependent on both property owners, such as housing associations, and technology enablers, who supplied and operated the valves. While these partners were chiefly and jointly responsible for forging structural change by constructing an agreement regarding divisions of costs, benefits, roles and responsibilities, negotiations around these divisions were difficult due to an imbalance in dependency between the partners. Moreover, alongside interactions regarding what a Roof Water-Level Agreement exactly entailed and what

Table 4 (continued)

Baseline established in episode 1	Emergence of conflict
Critical episode 3	<p>One main goal of RESILIO was to establish a funding programme for the development of the rooftops owned by housing associations—but also for those of private citizens and business owners. To distribute the associated rights and obligations among the involved parties, the water authority and a researcher from the governance protocol team developed an instrument called the Micro Water-Management Agreement. This agreement would require roof owners who had received a BG subsidy via the water authority to request connection of their valves to the DSS. Because only the technology enablers could facilitate this connection, the water authority became both acutely aware of this dependency, and motivated to discuss the ins-and-outs of connecting the valves and its software to the DSS</p> <p>Meanwhile, DSS development was proceeding swiftly, but seemed to be disconnected from discussions about responsibilities, interests and roles. Over the course of the next seven months, there were no partner interactions concerning the relationship between who should be responsible for controlling the valves and development of the DSS. The governance team was increasingly solicited as the partner responsible for creating suitable governance protocols, but the partners themselves continued to have different expectations of the project and the governance team had difficulty solving this conundrum</p>
Main alternation in episode 4	Absence of discussion and use of alternate meanings—terms of ‘problems to solve’ were replaced by ‘productive collaboration’ in discussions concerning the relation between the water authority and the technology enablers
Critical episode 4	<p>Choosing to focus on ‘progress above problems’, the conflicting interests of the technology enablers and the water authority had become a ‘non issue’ in their interactions. During this phase of development, both parties recognised their mutual dependency and engaged in active collaboration, mentioning how the work of one reinforced the progress of the other. Finally allowing the technology enablers to connect their valves to the DSS, a new application interface was finished and the first version of the user dashboard was launched by the DSS team</p> <p>Nonetheless, in a joint session on the DSS, it became clear there were still no normative KPIs for determining and informing the use of rainwater and the DSS team and other participants from the water authority had difficulty embedding the DSS in their regular ICT structure</p>
Main alternation in episode 5	Resurfacing of discussion—old positions vis-à-vis control of the valves were reconfirmed when the BG roofs were finished and the valves were ready to be connected to the DSS

(continued)

Table 4 (continued)

Baseline established in episode 1	Emergence of conflict
Critical episode 5	Just as the first roofs were about to be delivered, discussions during a PTM made clear that the BG rooftops had not yet been connected to the DSS, triggering the re-emergence of conflict. This was attributed in part to the roofs not yet being fully ready, but also to obscurities regarding the BG rooftops governance protocols. The housing associations complained that both service contracts and instructions on how to control the valves had still not been provided by the technology enablers. Hesitant about the trustworthiness of the DSS ground rules, the technology enablers expressed feeling unable to formalise the connection between their valves and the DSS in a contract. The water authority claimed to also feel hesitant about its own role towards individual roof owners, whose valves they no longer aspired to service in future developments of the DSS. In response, the main RESILIO project leader announced a call for a special session—to be held immediately following summer holidays—to fix the major obstacles impeding valve connection. During the summer, however, the water authority was temporarily forced to stop all experimental ICT projects due to a negative cyber safety evaluation.
Main alternation in episode 6	Change in participant positions—unable to continue with the project, the water authority changed its tactics, seeking a way to assign further DSS development to the technology enablers.
Critical episode 6	Because of the water authority’s freeze on experimental ICT projects, the partners of RESILIO were forced to find a quick solution for the DSS that would be viable for at least the next five years. The most obvious partner to host the DSS for the next five years was a technology enabler who had been part of RESILIO from the beginning. Hesitant to develop two software applications at the same time, the technology enabler proposed instead to focus on the improvement of their own software. The water authority formulates an agreement that ensured the hosting of DSS for at least five years as separate modules to which BG roof owners can be connected within the software of the technology enabler. The final arrangements outlined which new future BG roofs would be serviced through the DSS and that the open-source code would be provided on request through the general RESILIO website. The development provoked a new discussion between the water authority and the technology enablers regarding the role of the water authority as a service provider in competition with the technology enablers. Both partners were inspired to continuing brainstorming about new possibilities, such as the application an open standard for protocols for smart BG rooftops as used in smart traffic devices.

needed to be arranged by the Micro Water-Management Agreement, the meaning of, and terminology used to refer to, the DSS as a governance instrument was constantly changing as well. With most alternations coming from the water authority and the municipality, our analysis shows how these were often both related to the positions presented in Table 3, and affected the strategies used by the water authority and the

municipality to deal with conflicts regarding control of the valves. Table 5 illustrates these main alternations.

This overview highlights not only how the water authority's conception of the role of the DSS changed over the project's three-year period, but also how these changes affected the water authority's position and accountability in the final outcome of RESILIO. Having determined that their wish to control the valves was unfeasible,

Table 5 Main alternations on the role of the DSS in governance of the valves

Dates	Summary of alternate meanings regarding the role of the DSS in controlling the valves
April '19	<p>Role of the DSS according to the water authority: <i>a smart, open-source governance instrument that balances and translates all partners' stakes into real-time advice on how to control each BG rooftop valve while also incorporating each roof owner's individual preferences for water usage</i></p> <p>Consequence of this role: the water authority viewed the DSS as central to BG rooftops governance and the technology enablers as mere service providers for execution of the water-usage agreement between roof owners and the water authority. The municipality followed this representation of the DSS</p>
Sept. '19	<p>Role of the DSS according to the municipality: <i>just one of the many assets used to inform BG rooftops governance, along with data on the design of each individual rooftop and its: valve, water-retention system and amount of water contained</i></p> <p>Consequence of this role: having become aware of the full complexity of BG rooftops governance, the municipality realised that DSS development could not be the only or main vehicle used to negotiate the partners' conflicting positions. While the DSS activity leader initially protested, by the end of 2019 the DSS team had also started downsizing the role of the DSS; although they still felt responsible for formulating the KPIs upon which the rules for control of the valve would be based</p>
March '21	<p>Role of the DSS according to the water authority: <i>one of multiple water-management instruments, with the definition of its KPIs remaining the most important (unanswered) question. Despite the water authority having already built the DSS, the partners had yet to decide on how to use it: which users need a dashboard and who should be able to control the valves through the dashboard?</i></p> <p>Consequence of this role: partners were surprised and confused by this major shift in the water authority's conception of the DSS. While the DSS was technically 'ready to perform', it remained unclear who was actually in charge of controlling the valves. Discussions on the matter moved in circles. The DSS team felt they had done all they could, given the partners' lack of clear instructions regarding which system was dominant: that of the technology enablers or the DSS. The housing associations only wanted a button to empty the rooftops in case of emergency, but were unsure whether the DSS provided that. The technology enablers were hesitant to connect the roofs to the DSS given this lack of clarity</p>
Oct. '21	<p>Role of the DSS according to the water authority: <i>instead of focusing on development of the best algorithm for valve control, the DSS should focus on supporting the market and stimulating other companies to adopt a DSS model</i></p> <p>Consequence of this role: part of a larger conversation between the water authority and the municipality, this change in focus corresponded with the assignment of DSS host to one of the two technology enablers. Although initially triggered by the water authority's temporary suspension of all innovative ICT projects, this switch also resonated with a deeper insight by the water authority that it could not and did not wish to service all future BG roof owners in control of their valves</p>

the water authority changed its position towards the technology enablers. Each alternation can be seen as an attempt by participants to influence the discourse to suit their own position.

4.5 Managing Positions Through Accountability, Identity and Stakes

The main goal of our research was to understand how participants actually engage in, or avoid, conflicts that are inescapable in light of a transition initiative's overall ambition, as was the case with RESILIO. Because the summaries in Table 5 are merely paraphrases of what was actually said in the process of meaning-making regarding control of the valves, they fail to reveal how participants attempted to steer these alternations in personal interactions. For an analysis of the strategies used by participants in personal interactions, following our third marker, we now turn to our conversational data samples.

Data Sample 1 presents a discussion between the DSS team and the governance team about what was needed for RESILIO to achieve its goals—a telling example of how partners made use of accountability management (marker 3) to affect perceptions of responsibility. Occurring during a session organised by the DSS team to discuss the role of each partner in further DSS development, the team expressed its concern about the governance protocols' lack of a clear focus, going so far as to suggest making DSS development dependent on the activities of the governance team. Furthermore, they pointed to an acute need for structural funding in the form of a viable business case and a need for strengthened political support. By asking whether or not these issues were part of the plan of the governance team, the DSS team was essentially attempting to assign these responsibilities to the governance team, whom for their part avoided accountability by suggesting that a feasible business model would be part of the end product—still more than two and half years down the line—and that the 'money conversation' was in fact the responsibility of the project management team.

Although the accountability management in this data sample can easily be explained as responsibility- and conflict-avoidance, the participants' discursive actions also represented their perspectives: willing to develop an instrument but sensing a lack of ownership for future upscaling and its necessary fundraising, the DSS team passed on these responsibilities to the governance team, who felt unable to assume these responsibilities due to their 'neutral' role as researchers, resulting in further passing to the project management team. Participants' constant shifts in accountability management should therefore, we argue, not only be seen as strategies for avoiding conflict or responsibility, but also as offering insight into a deeper issue within the transition initiative of RESILIO: the importance of clear political choices and support as a necessary condition for actual change.

Data Sample 1 Accountability and identity management relating to the success of RESILIO (Nov' 19)

<p>Marker 3—accountability management by the DSS team</p>	<p>P1 DSS team: [1.10.58] There's a bit of a feeling that we're always beating around the bush. I get that it's difficult. So that's why I'm actually asking: what is the scope [of the governance model]? Are we going to literally [claps hands] say to the aldermen of the city: 'Look these are the KPIs, this is the plan'? [Short silence] What is the process [of the governance team] to get to results? I'm very curious about that. If those things were clear, DSS development would go so much more smoothly. That's what we're depend... DSS is actually an instrument that shows how a model works. Those facts are the facts</p>
	<p>P2 DSS team: That's why we haven't delivered anything yet. As I said before, we could have delivered already, but that doesn't feel right—as if that changes anything. Is that what you want to deliver—as a group, for five million [euros]? That wouldn't feel fulfilling to us</p>
	<p>P3 Governance team: Yes</p>
	<p>P1 DSS team: I don't see it settled in the governance, that people won't end up being trapped. Something really needs to change. And we need to start talking about the money side of things—like, for example, a conversation needs to be had with the aldermen in which you say: 'Tell me what you need to make this eligible for subsidising.'</p>
	<p>P2 DSS team: Yes, 'on what basis would you provide funding?'</p>
	<p>P1 DSS team: Yes, 'on the basis of what?' Then you have to actually—then the city becomes a stakeholder and yeah—</p>
	<p>P2 DSS team: Is that also in your governance model? Is that in it—in your scalable business model?</p>
<p>Marker 3—accountability and identity management by the governance team</p>	<p>P3 governance team: Yes, it is. We've talked about it with the project management team, they want to be able to go to the aldermen at the end of the project and explain: 'This is working, this is not working, and these are the benefits.' Their goal is in the context of the city. From our role, I think—as far as I'm concerned, as a researcher—it can also include other cities, to be able to say, 'This is what works in this city and here are the context-specific elements that make it different from Copenhagen or Barcelona.'</p>
	<p>P2 DSS team: Yes exactly, I have no idea about the rest of Europe. Do they also have housing corporations? And so on, I don't know</p>
	<p>P3 governance team: And to gain insight into specific pros and what should be done differently. I see that as an important advantage of a project like this: that you can learn and that you can compare different rooftops. [1.13.49]</p>

In Data Sample 2, we present another example of position management, this time by the housing associations. In the context of RESILIO, participating housing associations were reimbursed for 80% of the initial construction costs of BG rooftops. They owned, and were responsible for maintenance of, the valves for a period of five years. During RESILIO meetings, the housing associations repeatedly pointed out a lack of direct interest for them—their top priority being to provide affordable housing. Re-allocation of stakes and responsibilities was then, in their eyes, necessary for the long-term sustainability of the project’s ambitions. Data Sample 2 shows how the housing associations tried to change their position both by emphasizing their lack of direct stakes and by highlight those of others, e.g., those of the water authority.

By referring to their primary responsibility of providing affordable housing, the housing associations made a strong argument for shifting their role from funder to ‘access giver’. However, the housing associations also repeated such discursive attempts to re-allocate responsibilities over and over throughout the entirety of the project, without substantial impact. This suggests that the initial EU funding had perhaps not only been essential to starting the innovation project, but also that it may have enabled the ongoing neglect of opposing financial positions. Furthermore, the funding conditions left little room to translate the lessons learned throughout the project into changes to the initiative’s financial structure. The temporary financial support from the EU, and its strict conditions, may have in fact enabled the other participants to functionally ignore discussions concerning the position of the housing associations.

Data Sample 2 Stake and accountability management by housing association 2 (Sept ‘20)

<p>Marker 3—stake and accountability management by housing association 2</p>	<p>P1 housing association: [1.02.56] And furthermore, what I’m now seeing is that the maintenance and management costs of the valves are extremely high and that—as a result, if you don’t directly benefit from this [the rooftops] yourself—you might ask yourself whether this responsibility would be more appropriately placed on someone else. That maybe, as a roof owner, you need to make your roof accessible—make your roof available, so to speak—to the water authority so that <i>they</i> can further arrange for the system to work</p>
	<p>P2 researcher: So you would prefer to be unburdened completely—and preferably at little or no cost?</p>
	<p>P1 housing association: Yes, of course. You have the cost of the roof itself, but extra costs—for optimising water storage while the benefits are for another party—yes, that’s not interesting for a roof owner. [1.03.42]</p>

5 Conclusion

The key challenge of RESILIO—to explore new forms of rainwater management instead of just creating a new market for one specific technical innovation—necessitated a search by participants to define the project's collective, and each partner's individual, responsibilities. This shows the ambition of the experiment: to develop a new pathway for (system) change, including several new propositions for governance arrangements. Hence, it may not come as a surprise that our discursive analysis shows a relationship between the potential for conflict and participants' attempts to redefine positions, including these positions' related responsibilities and interdependencies.

Having shown that the main conflicts were caused by incompatible positions between the water authority, technology enablers and housing association, we identified when the conflicts in the collaboration emerged by focusing on the alternations in participants' discursive interactions regarding control of the valves. This resulted in six critical episodes in the discussion on the redistribution of the responsibility for urban water-management, that revealed ongoing position management by participants to handle these conflicts in their joint meaning making process. Participants alternated on central concepts regarding the control of the valve, trying to manage not only their own positions, but also those of others and, of course, of the initiative as a whole.

Additionally, our analysis increased our understanding of how the partners strategically (albeit not necessarily consciously) addressed conflict or avoided overt confrontations. Appearing to be participants' dominant strategy for engaging in conversations that involved incompatible positions, accountability management offered participants a way to both protect their own position, and explore possible new arrangements and the roles of others.

As a case study, the transition initiative of RESILIO serves as a good example both of urban experimentation and of participant learning—in this case about how to increase the resilience of urban systems and mitigate the effects of climate change. Diverse organisations were involved, all of them willing to spend time discussing possibilities for realising the new BG roofs, for how to overcome hindrances and for how to take experimental action. Thus, conditions that are considered key for urban experimentation seemed to be in place [27].

RESILIO was, under the pressure of European subsidy constraints, successful in achieving its direct innovation goals. However, as our discourse analysis showed, participants often found it difficult to work through and transform conflict, though the presence of conflict was sometimes acknowledged, for example in the Hard Talk. As a result, the more fundamental long-term impact of the project, in this case a more future-proof decentralised urban water-management system, remained out of reach. Our results also suggest that a valuable, and perhaps even necessary, first result of any urban experiment may be 'nothing more than' participants gaining a better understanding of their seemingly intangible conflicts and incompatible positions. Discourse monitoring between partners may provide a possible method for making this happen.

6 Discussion

Urban transition initiatives, or urban living labs, as they are also called, have become common in the repertoire of urban experimentation and policy innovation [29, 33]. This concept, in which local governments seek cross-disciplinary collaboration to create shared responsibility for sustainability transitions, is regarded as a positive development that stimulates multi-actor involvement and reflexive governance [29]. At the same time, these urban transition initiatives also face ongoing criticism in terms of their transformative potential. Research shows that participants in transition initiatives often find it difficult to address the political character of sustainability challenges, tending instead to reproduce existing structures of power and dominant perspectives [20, 32]. Scholars have therefore urged that, to increase their transformative potential, research on learning in transition initiatives and transition theory should focus more on the nature and role of conflict in pathways to sustainability transitions [7, 36].

Many of these initiatives seek to change dominant structures, relations and practices by developing alternatives while, at the same time, interacting with these dominant systems [4, 9]. This interaction with the dominant system forms an essential component both of participants' learning processes and of the conflicts they encounter. Our combined discourse analytical perspective helps us identify not just any kind of learning, but especially learning related to structural change: its focus on incompatible positions between partners connects participants' learning to the transformative goals of a transition initiative. In that sense, it presents a more purposeful way of framing learning in transition initiatives compared to other approaches and helps practitioners and researchers reframe conflict as a potential source of learning within the initiative.

Many traditional learning approaches advocated in both transition initiatives and the literature consider joint learning to be a deliberative process in which different perspectives are confronted and united in a shared problem-analysis [13, 34]. Our perspective and focus on conflict affirm that this conceptualisation of participant learning within transition initiatives often presents an overly optimistic view of reality. The results of this chapter illustrate that there was limited space for actual change in the governance over the valves; changes that were crucial in the light of the transformative ambitions of the transition initiative. Our approach can thus provide a more open approach to investigating participants' learning—an approach focused on a process of meaning-making and struggle over defining the hegemonic discourse between an initiative and its environment. In so doing, our discourse analytical perspective also extends dominant definitions of learning, which tend to presuppose a progressive, positive process of increased mutual understanding, to a process of discontinuance of relationships and selective reframing of problems and potential solutions [17].

Although our approach proved useful for examining potential conflict and the strategies participants used to address these conflicts, our results also evoke a need to more precisely analyse whether and how participants' ideas and positions actually

change throughout the process of a transition initiative. While alternations in meaning proved to be a reliable indicator for the emergence of conflict, it is unclear whether they could also be used to mark processes of progressive insights among the participants. If so, such an approach, in conjunction with existing learning theories, may help us gather concrete evidence of participant change. For instance, a (re)framing perspective on learning—as often used in theories of policy learning—could help shed light on how initiative participants broaden the problem-definition and whether or not new issues and perspectives were integrated into it [10]? A social learning perspective may help reveal whether new cognitive understanding on the division of responsibilities for water management and new relationships emerged [23]? Such additional research may support transition initiatives both by helping participants realistically reflect on their joint learning processes, and by contributing to a further empirical and theoretical understanding of how to foster participants' learning to support sustainability transitions.

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