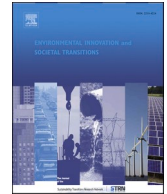


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Creating points of opportunity in sustainability transitions: Reflective interventions in inter-organizational collaboration

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ABSTRACT

This paper addresses the lack of attention for the behaviours and agency of actors in organizations in the sustainability transitions literature by focussing on practices of inter-organizational collaboration in the transition to circular construction. Practices of inter-organizational collaboration can slow down this transition and are deeply embedded in the construction regime, creating critical points of intersection. This research therefore investigated how reflective interventions can enable project actors to change their practices and support the transformation of critical points of intersection into points of opportunity in circular construction. To answer this question, we adopted a case study approach with action research elements. The results of this study contribute to the sustainability transitions literature by showing how reflective interventions can assist in the transformation of critical points of intersection through five processes, including prioritising reflection on practices, critically evaluating practices, creating a breeding ground for new practices, implementing new practices and embedding new practices in partner organizations. Furthermore, we move away from the focus on policy interventions and offer more room for the agency of actors in projects, by showing how reflective interventions can create experimental environments close to the day-to-day activities of project actors enabling them to simultaneously unlearn obsolete practices and learn new practices.

1. Introduction

Practice theory has increasingly been adopted in the sustainability transitions literature to connect actor level processes to transition concepts (Upham et al., 2021) and for considering the routinized types of behaviour of actors and actor networks (Farla et al., 2012; Köhler et al., 2019; Mossberg et al., 2018). Practice theory embraces the mundane, everyday activities that are recognizable and reproduced over time (Shove and Pantzar, 2005). Practices are understood to be ‘the social norms and routines, along with the competencies, meanings, and materials that practitioners bring together in performing and in reproducing and transforming one or more of these patterns’ (Watson and Shove, 2022: 5). Researchers adopting a practice perspective have shown that changes in practices are needed in order to bring about the needed sustainability transitions at the societal level (Laakso et al., 2021). Hargreaves et al. (2013) for example, show that there are critical points of intersection between socio-technical regimes and practices, which the authors refer to as points that constrain innovations, whether in regimes or practices, from emerging and taking hold within and across

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different times and places.

Sustainability transitions research has shown that interventions in practices targeted at critical points of intersection may transform them into points of opportunity (Hargreaves et al., 2013; Seyfang and Gilbert-Squires, 2019; Von Wirth et al., 2019). For example, Spurling and McMeekin (2014) show how policy interventions can stimulate sustainable mobility through recrafting practices, substituting practices and changing how practices interlock. The focus in these studies has been on policy interventions and their effects on consumption practices (e.g., Gazull et al., 2019), with relatively little attention for interventions in practices (Keller et al., 2022; Seyfang and Gilbert-Squires, 2019). Köhler et al. (2019) therefore called for an expanded exploration of the key social mechanisms underpinning transitions using practice theory, expanding its focus beyond its recent applications. Furthermore, Upham et al. (2021) called for an increased focus on organizational behaviour in the sustainability transitions literature, including aspects of collaboration and participation at intra- and intergroup levels.

We respond to these calls by focussing on practices of inter-organizational collaboration, building on the debate in management and organisational literature about social practice theory, inter-organizational collaboration and reflection (Huxham, 2003; Nicolini, 2012; Nicolini et al., 2003; Schatzki et al., 2001). Practices of inter-organizational collaboration can be referred to as the day-to-day acts and routinized types of behaviours that actors continually produce, reproduce and negotiate to work together (Van Marrewijk et al., 2014). Inter-organizational collaboration is seen as a key success factor in managing organizational change towards sustainability (Long et al., 2018) and in coordinating multiple actors in the transition process (Bögel et al., 2019). Collective negotiation is understood as important for changing these practices of collaboration (Björkeng et al., 2009; Van Marrewijk et al., 2014). With others (Reynolds and Vince, 2017; Yanow and Tsoukas, 2009), we therefore argue that interventions facilitating collective reflection may be particularly useful to establish a change in practices of inter-organizational collaboration.

We focus on practices of collaboration in the transition towards circular construction in this study. This transition is receiving increased societal and academic attention (Ghaffar et al., 2020; Leising et al., 2018) as the construction sector can, being one of the largest producers of CO₂ and waste (Kooter et al., 2021), significantly contribute to environmental sustainability. However, the conventional construction regime, referring to the way buildings are commonly designed, built, and regulated, remains dominant (Ghaffar et al., 2020; Leising et al., 2018). One of the major causes of the slow transition is the laborious collaboration between organizations in the construction sector (Hart et al., 2019) including issues surrounding opportunistic and defensive behaviour, confrontational attitudes, distrust, and a focus on individual company interests (Cicmil and Marshall, 2005; Clegg et al., 2023; Van Marrewijk et al., 2014). Research has shown that changing these practices is difficult as partners collectively stick to well-known traditional routines and practices (Sminia, 2011; van Marrewijk et al., 2014). To withdraw from familiar and fixed practices, it is thus essential that actors reflect upon new practices of collaboration (Clegg et al., 2023).

This research will address the following main research question: *How can reflective interventions stimulate a change in practices of inter-organizational collaboration and support the transformation of critical points of intersection into points of opportunity in circular construction?* To answer this research question, we used a case study method (Yin, 2013) with action research elements (Susman and Evered, 1978), investigating the adoption of reflective interventions in three circular construction projects. Data was collected through 17 in-depth semi-structured interviews, document research, the observation of team meetings and organization of 10 reflective sessions. Based on the findings from the respondents we identified four practices of inter-organizational collaboration that can hinder the transition to circular construction and five processes through which reflective interventions can enable actors to change these practices. By moving away from the focus on top-down policy interventions, we contribute to the sustainability transitions literature (Farla et al., 2012; Keller et al., 2022; Köhler et al., 2019; Mossberg et al., 2018) by showing how actors can change their practices of inter-organizational collaboration through reflective interventions, giving them a central position in transforming critical points of intersection into points of opportunity.

The structure of the paper is as follows. First, we will draw on the literature combining practice theory and the MLP to understand how critical points of intersection can be identified between practices of inter-organizational collaboration and the construction regime, requiring targeted interventions to unlock the circular construction transition. We will then adopt insights from organization and management literature to understand how reflective interventions may enable a change in practices of inter-organizational collaboration, transforming critical points of intersection into points of opportunity. Second, the used case study, action research approach and data collection methods are described and discussed. Third, the findings are presented. The paper concludes with a discussion of the implications for three academic debates and possible avenues for future research.

2. Literature

2.1. Practices and sustainability transitions

Practice-based approaches can enrich and even shift perceptions of how sustainability transitions unfold (Strengers and Maller, 2015). We understand sustainability transitions here as “long-term, multi-dimensional, and fundamental transformation processes through which established socio-technical systems shift to more sustainable modes of production and consumption” (Markard et al., 2012: 956). In particular, we build on the multi-level perspective (MLP) which proposes that socio-technical transitions are caused by a dynamic interplay of processes within and between three different levels: niche (protected spaces in which radical innovations can develop), regime (the dominant order in a societal system, including dominant technologies, institutions, routines and cultures) and landscape (societal developments, including external factors and pressures) (Geels, 2002). Several scholars have called for a combination of social practice theory and the MLP, as complexes of practices are one of the key components of transitions, either slowing down the transition due to sticky constellations or enabling transformative change (Keller et al., 2022; Laakso et al., 2021).

In order to study practices in relation to sustainability transitions the approach of [Shove and Pantzar \(2005\)](#) has frequently been adopted (e.g., [Hargreaves et al., 2013](#); [Seyfang and Gilbert-Squires, 2019](#)), which builds on [Schatzki et al. \(2001\)](#) and [Reckwitz \(2002\)](#). [Shove and Pantzar \(2005\)](#) describe practices as routinized types of behaviour which consist of several interconnected elements, including meanings (norms, cultural conventions and expectations), competences (skills and know-how necessary for the successful performance of a practice), and materials (objects, tools, technologies and infrastructures). These three elements are dynamically integrated to form practices by skilled practitioners through regular and repeated performance ([Shove et al., 2012](#)). However, applying this perspective to sustainability transitions is not without challenges and has been contested by several researchers (e.g., [Shove and Walker, 2007](#)), as the MLP takes a nested hierarchy approach for understanding increasing levels of structuration, whereas social practice theory adopts a flat ontology in which practices are interlinked and self-reinforcing ([Hargreaves et al., 2013](#)). Furthermore, whereas the transitions literature emphasises change, describing it as resulting from interacting niches, regimes and landscapes, practice theory focuses on explaining routines, reproduction and normalization processes ([Keller et al., 2022](#)). Despite these challenges, there are nuances in the debate and studies are increasingly combining social practice theory and the MLP ([Keller et al., 2022](#); [Svennevik et al., 2022](#)). For example, [Geels \(2011\)](#) has provided nuance by noting that: 'levels [of the MLP] refer to different degrees of stability, which are not necessarily hierarchical' ([Geels, 2011](#): p. 37).

One method for combining the two approaches has advocated exploiting the differences between the MLP and practice theories by studying the critical intersection points between socio-technical regimes and practices ([Keller et al., 2022](#)). [Hargreaves et al. \(2013\)](#) describe these points as instances where embedded practices hindered the wider development of a sustainable innovation in a socio-technical system, and where the regime constraints the wider diffusion of more sustainable practices. An example of such a point in the banking sector is the intersection of long-term banking practices with regime elements such as payment systems which lock-in these practices, constraining the diffusion of the values-based banking niche ([Seyfang and Gilbert-Squires, 2019](#)). These constraining, critical points of intersection may be transformed into points of opportunity at which new and more sustainable regimes and practices symbiotically coevolve. Combining the MLP and practice theories thus offers useful insights as together these approaches can pinpoint the intersections that are critical for understanding where innovations in regimes and practices meet resistance in the other, preventing niche innovations and novel practices from growing ([Keller et al., 2022](#); [Seyfang and Gilbert-Squires, 2019](#)). This generates insights for practitioners and policy-makers to focus action and potentially unlock systemic transformation ([Seyfang and Gilbert-Squires, 2019](#)).

Researchers have emphasized the importance of interventions in practices targeted at critical points of intersection to accelerate sustainability transitions, mostly focussing on policy interventions in consumption practices ([Hargreaves et al., 2013](#); [Spurling and McMeekin, 2014](#); [Von Wirth et al., 2019](#)). Such interventions can stimulate a change in consumption practices in several ways ([Geiger, 2009](#); [Shove et al., 2012](#)). First, interventions can change the internal dynamics of practices, for example via the introduction of new industry standards, the adoption of new training methods, or the use of social marketing campaigns ([Shove et al., 2012](#); [Spurling and McMeekin, 2014](#)). Second, interventions can substitute practices by discouraging current unsustainable practices and replacing them with existing or new alternatives, shifting the balance of competition between practices. Third, interventions can change the way in which practice bundles (the wider web of relations between practices) interlock, where the focus of the intervention is not on the targeted practice itself, but on shifting the practices that interlock with it ([Spurling and McMeekin, 2014](#)). [Watson et al. \(2020\)](#) identify change points, moments in everyday routines where different courses of action can be taken (e.g., shared routines such as preparing meals), as particularly interesting points for policy interventions. Such interventions can lead to small fractures (small cracks that start to appear in practices at the micro-scale), that can deepen and lead to fundamental changes in practices, relationships between practices and the wider web of practices ([O'Neill et al., 2019](#)).

2.2. Practices and inter-organizational collaboration

In recent decades, organization and management scholars have increasingly adopted practice theory in their studies ([Schatzki et al., 2001](#); [Nicolini et al., 2003](#); [Feldman and Orlikowski, 2011](#); [Nicolini, 2012](#)). The diversity of approaches to practice theory used in these studies can be distinguished in empirical, theoretical and philosophical approaches ([Feldman and Orlikowski, 2011](#)). Notwithstanding their differences, three core principles of practice theory can be seen; (1) everyday actions are consequential in producing social life, (2) conceptual oppositions as dualisms should be rejected, and (3) there is a relationality of mutual constitutions ([Feldman and Orlikowski, 2011](#)). Operationalizing these principles, [Nicolini \(2012\)](#) highlights that practices are perceived as dynamic and provisional and as activities that require some form of participation that can be concretely observed in organizations as patterns of interaction in the daily activities of employees. These practices include material objects, such as technological apparatuses, tools, charts, diagrams and workplace design as important elements ([Nicolini et al., 2003](#)).

Scholars have adopted practice theories to study inter-organizational relations and collaboration ([Huxham, 2003](#); [Josserand et al., 2004](#); [Van Marrewijk et al., 2014](#)) as practices of collaboration are considered to be a critical factor for generating successful inter-organisational project outcomes ([Clegg et al., 2002](#)). Collaboration in inter-organizational projects and partnerships is needed in which partners combine their differing strengths, vantage points and expertise to craft innovative responses to pressing societal challenges ([Gray and Purdy, 2018](#)). Inter-organizational projects are constituted by multiple practices, embodied between and accomplished by various actors from different organizations who bring along divergent work practices, narratives, norms and values ([Clegg et al., 2002](#)). Some of these practices may be taken for granted, while others create and anchor new constitutive rules ([Swidler, 2001](#)).

The study of practices in the context of collaboration does not only focus on what actors in inter-organizational settings do, but also investigates why and how practices continue to be practiced ([Sminia, 2011](#)), which normative and institutionalizing power they unfold and how they are changed ([Geiger, 2009](#)). Agreements on partnerships are not a guarantee for successful collaboration and therefore

Gray (2008) argues that interventions are needed to improve inter-organizational collaboration. In the same line, Ruijter et al. (2020) show that this improvement is a laborious investment of both time and budget. It has been argued that actors may be able to construct new practices of inter-organizational collaboration, which are experienced as meaningful and useful, through collective negotiation (Bjørkeng et al., 2009; Van Marrewijk et al., 2014). Bjørkeng et al. (2009) see three essential mechanisms for the construction of new practices. First, practitioners construct formal and informal boundaries in which activities are still perceived as legitimate parts of practice. Second, constant negotiation occurs about those competences that practitioners perceive to be adequate and relevant. In these negotiation processes power issues and conflict may dominate (Van Marrewijk et al., 2014). Third, physical materials are intertwined in the practices and included as essential elements of a practice (Bjørkeng et al., 2009).

2.3. Reflective interventions

The concept of reflection has been adopted in practice literature (Nicolini et al., 2003; Schatzki, 2005), which often refers to reflective practice, an activity intended to explore other ways of seeing than those presenting themselves as the most evident explanation (Yanow and Tsoukas, 2009). Reflection is 'a careful examination and bringing together of ideas to create new insights through ongoing cycles of expression and re-evaluation' (Marshall, 2019: 411). Routine practice is characterized by absorbed coping, which means that practitioners are absorbed in their tasks (Yanow and Tsoukas, 2009) often without questioning the underlying norms of good practice thus reproducing and institutionalizing norms (Geiger, 2009). However, practitioners can shift to a more reflective focus on practices when there is a disturbance, interruption or surprise, including malfunctions, temporary breakdown and total breakdowns (Yanow and Tsoukas, 2009). Practitioners thus have the capacity to reflect on their practices and to articulate those reflections (Yanow and Tsoukas, 2009; Van Marrewijk et al., 2014). Reflective practice involves both reflection on practices, a temporally-spatially separated activity (periodically stepping back), and reflection in practice, which refers to reflection in the midst of action (Yanow and Tsoukas, 2009). Through reflection, practitioners can rethink the tacit understandings and taken-for-granted assumptions that have grown up around the repetitive experiences of a practice and make sense of situations (Schön, 1983).

Within practice theory there has been a focus on individual reflection and the reflective practitioner (Vince and Reynolds, 2009). However, multiple authors have emphasized the importance of collective reflection to engage in experience generated collectively in project teams, internal groups and organizational subsystems (Reynolds and Vince, 2017). In this view, reflection is best understood as a socially situated, relational, political and collective process that can capture the personal and political complexities of organizational life (Reynolds and Vince, 2017; Vince and Reynolds, 2009). Collective and critical reflection increases the extent to which participants question assumptions that inform day to day action (and inaction) because it encourages engagement with others caught up in the distinctive political processes that shape 'the way we do things here' (Vince and Reynolds, 2009). Collective reflection is thus best understood as a dialogical and relational activity designed to 'unsettle conventional practices', instead of being a cognitive activity that gives order to situations (Cunliffe and Easterby-Smith, 2017).

Within the literature on collective reflection there is less emphasis on reflection as the task of individuals, and therefore more focus on the purposeful creation of collective processes for reflection (Reynolds and Vince, 2017). This has led researchers to focus on how reflection can be put to work in practice and which interventions can be used to promote collective reflection (Nicolini et al., 2003). Different types of reflective interventions have been proposed including reflective dialogues (Van Marrewijk et al., 2014), story-telling (Ruijter et al., 2020), reflective surveys, role plays, and theatre-based learning (Schulz et al., 2015). For example, Pässilä et al. (2012) show that the practices, structures, rules, strategies and self-understandings of organisations can be questioned through reflection by creating spaces for generative learning via theatre-based learning. These interventions can be organised by practitioners, consultants and researchers (through action research methodologies) with and for other practitioners (Reynolds and Vince, 2017).

3. Method

Our paper uses a case study approach (Yin, 2013) with action research elements (Susman and Evered, 1978) to investigate how reflective interventions can stimulate a change in practices of inter-organizational collaboration to transform critical points of intersection into points of opportunity. Action research is future-oriented and has been previously adopted in combination with other research methods in the sustainability transitions literature (e.g., Frantzeskaki et al., 2014).

3.1. Case selection

To gain insights from diverse types of reflective interventions, three cases of construction projects in the Netherlands were selected. First, we selected 'the Circular Viaduct' to gain insights in the adoption of reflective interventions during the course of a singular construction project. In this project, in which a prototype for a small circular viaduct for construction traffic was developed, weekly reflective sessions were organized from the start (May 2019) to its end (November 2021). Second, we selected 'Accelerating Together' to investigate the process and outcomes of reflection across multiple construction projects. This program (running from April 2019 to early 2023) initiated by a circular innovation platform and the Dutch Ministry of Infrastructure aimed to accelerate the transition to circular construction. Reflective interventions were organized in eight different circular construction projects, to enable actors of these projects to evaluate on their progress and afterwards share information, expertise and evaluations across projects. Finally, we selected 'the Hubs Project' (running from September 2020 to late 2024), in which several hubs for waste collection were renewed, commissioned by the local municipality. The researchers joined this project in October 2021, when challenges regarding the circular ambitions

were experienced, with the aim to explore the potential for reflective interventions in the project team. In this way, in-depth insights on the organization of reflective interventions could be generated (more information on the cases can be found [Appendix A](#)).

3.2. Data collection

Data for the three cases was collected through in-depth semi-structured interviews, the observation of team meetings, the observation and organization of reflective sessions and document research (see [Tables 1-3](#)). Before starting the data collection process, informed consent from the participants, outlining the goals and data management procedures of the study and ensuring individual anonymity, was obtained. Ensuring anonymity was important as the circular ambitions and their realisation was sensitive information to the participants. It was thus helpful in enabling the participants to talk more freely during the interviews and reflective sessions, and enabled them to be open about potential mistakes ([Ryen, 2004](#)). The researchers had an effect on the participants during the reflective sessions, for example by providing insights from the literature and guiding the reflective sessions based on their prior insights. Therefore, data was not only obtained, but also generated through collaboration between the researchers and practitioners ([Susman and Evered, 1978](#)).

In-depth semi-structured interviews were conducted with individuals participating in the three cases. The interviews lasted between 30 and 70 min, were held in Dutch, and were recorded and transcribed. Interviewees were asked about the project and its goals, the collaboration between different actors in the project, the type of reflective interventions adopted in the project, the opportunities and challenges of these reflective interventions, the follow-up of the reflective interventions and the project outcomes. The interviews were conducted between October 2021 and March 2022. Due to the pandemic, all interviews were conducted through video calls. Video call interviewing offers advantages, such as cost and time savings ([Sedgwick and Spiers, 2009](#)), but also leads to challenges including technical issues, limited access to body language, and a loss of intimacy ([Seitz, 2016](#)). We aimed to address these challenges by slowing down and clarifying talk, being open to repeating answers and questions, and paying close attention to facial expressions ([Seitz, 2016](#)).

Data was also obtained through observations and participation in the three cases, providing the researchers with direct experiential and observational access to the participants world of meaning. This provided for a more in-depth understanding of the everyday organizational life and practices of collaboration of the participants ([Van Marrewijk et al., 2016](#)). In general, the observations involved between 60 and 120 min per meeting where the researcher took extensive notes.

Furthermore, data was generated through collaboration between the researchers and practitioners ([Susman and Evered, 1978](#)). This involved several action research elements, were the researchers worked as co-creators and co-learners with the practitioners ([Rapoport, 1970](#)). For the ‘Circular Viaduct’ and ‘Accelerating Together’ cases we participated in 9 reflective group sessions. These sessions were held by a consultant of the ‘Accelerating Together’ program and two PhD students of the research team, each centred around a different circular construction project. The sessions lasted on average 134 min, with a minimum of 107 min and a maximum of 188 min. Participants were asked to reflect on their circular construction projects in terms of materials, energy, water, social and management aspects. The two PhD students actively engaged in these sessions, stimulating the participants to reflect on their collaboration. For the ‘Hubs Project’, the action research cycle steps ([Susman and Evered, 1978](#)) were followed, enabling the researchers to get insights in the project, team and challenges they were experiencing (diagnosing step). In this process, the researchers identified the prioritization of ambitions by the project actors and the type of relationship they wanted to have. In consultation with the team, the researchers designed a reflective session (action planning step) which was organized in April 2022 (action taking step). The discussions in this session were recorded and transcribed. After the session, the first author remained involved in the project, doing additional interviews and observations of team meetings to evaluate the effects of the session and follow-up actions (evaluating step).

Lastly, archival data was collected for all cases, including documents on the projects, follow-up projects, and internal/external communications such as e-mails.

Table 1
Data sources case 1; Circular viaduct.

	Number + specifications	Length	Timing
In-depth interviews	1. Senior consultant concrete company 2. Project manager client 3. Project manager contractor 4. Program & project manager client 5. Project manager client	40 to 60 min per interview	October 2021
Reflective sessions	1. Involving: senior consultant concrete company, contract manager client, project manager contractor, moderator external consultancy company, 2 PhD researchers.	166 min	August 2021
Documents	1. Document specifying the project learnings 2. Final project reports (2 items) 3. Reports on follow up project from the client (2 items) 4. Strategy report client	219 pages in total	–

Table 2
Data sources case 2; Accelerating Together.

	Number + specifications	Length	Timing
In-depth interviews	6. Co-founder circular network organization 7. Co-founder circular consultancy company 8. Consultant A sustainable consultancy company 9. Consultant B sustainable consultancy company	40 to 70 min per interview	November 2021
Reflective sessions	2. Project A; circular construction project; involving a client, contractor, consultant and two PhD researchers 3. Project B; circular renovation project: involving three members of the contractor, a client, a consultant and two PhD researchers 4. Project C; circular construction project: involving three members of the client, a consultant and two PhD researchers 5. Project D; circular construction project: involving a real estate developer, a consultant and two PhD researchers 6. Project E; circular demolishing and construction project: involving two members of the client, a contractor, a consultant and two PhD researchers 7. Project F; circular infrastructure project: involving three members of the client, a contractor, a consultant and two PhD researchers 8. Project G; circular urban development project: involving three members of a real estate developer, a consultant and two PhD researchers 9. Project H; circular renovation project: involving a contractor, a consultant and two PhD researchers	107 to 188 min per group interview	December 2020 – August 2021
Documents	5. Interview preparation forms for all 8 projects 6. Public/news items on the program (4 items) 7. Reports and presentations on the first outcomes of the program (4 reports and 2 presentations) 8. Internal communications (e-mails)	187 pages in total	–

Table 3
Data sources case 3; Hubs Project.

	Number + specifications	Length	Timing
In-depth interviews	10. Project manager client 1 11. Project manager client 2 12. Project manager client 3 13. Sustainability advisor client 14. Director real estate client 15. Director facilities client 16. Sustainability advisor engineer 17. Project manager engineer	30 to 70 min per interview	December 2021 – March 2022
Observations	1. By-weekly project meetings (14x) 2. Sustainability meeting, general 3. Sustainability meetings, per project (2x) 4. Meetings on the tender procedures (2x) 5. Project meeting with the users	60 - 120 min per meeting	October 2021 – May 2022
Reflective sessions	10. Involving: project managers client (2); assistant project managers client (2); sustainability advisor client; project manager facilities client; sustainability advisor engineer; project manager engineer; first author; PhD student	120 min	April 2022
Documents	9. Project plan (2 items) 10. Tender engineer (4 items) 11. Outcomes sustainability meetings (3 items)	84 pages	–

3.3. Data analysis

To analyse the data of the three cases, interpretative sensemaking was followed as a kind of ‘dwelling in one’s data’ (Yanow and Schwartz-Shea, 2006). This type of interpretative analysis is designed to strengthen claims made about actors’ interpretations of events. This was done through the use of a multi-step approach. First, all materials were carefully read, in order for the researchers to become familiar with the specifics of the circular construction projects and the reflective interventions that were adopted in these projects. Second, a first analysis of the data was conducted using Atlas.ti 9 to identify the main concepts. In this analysis we focused on coding the practices of collaboration that were adopted in the construction projects. We identified critical points of intersection by evaluating which of these practices slowed down the transition to circular construction according to the participants and were simultaneously locked in by the conventional construction regime (meaning they were hard to change and reinforced by the policies, technologies, culture etc. in the Dutch construction sector). Additionally, we explored how these practices needed to be changed according to the participants in order to enable circular construction. In a third step, the researchers asked through which processes the

reflective interventions could assist in changing the practices and transforming critical points of intersection into points of opportunity. We focussed on identifying interpretations, considerations, decisions and behaviours of the participants during the reflective sessions as well as their accounts on the effects of the interventions (from the interviews) and our observations after the intervention took place in the 'Hubs Project'. During this process, there was a continuous movement back and forth between the documents, questioning categorizations and adding new data to the categories under construction. In a fourth step, the results were discussed with the research team and consortium members of the research program. The fifth step was building a framework, which involved the revalidation of the concepts and the addition and re-integration of new categories. A final reading and evaluation focused the results (see data structure in [Appendix B](#)).

4. Results

4.1. Context: the Dutch construction sector & circular construction

In this section we will firstly present important information about the context of the construction sector and circular construction in the Netherlands, building on our findings and the findings of previous studies in this sector. In our study we found that the culture of the Dutch construction sector is not really helpful in achieving a fully circular construction economy. The reputation of this sector was seriously damaged by a parliamentary enquiry in 2002 disclosing illegal practices of collusion, fraud and price fixing (Priemus, 2004; Sminia, 2011; Van Marrewijk et al., 2014). These practices breached competition rules, reducing incentives for innovation, and had an enormous impact on trust and future collaboration between public sector clients and contractors (Sminia, 2011; Van Marrewijk et al., 2014). Consequently, the culture in the construction sector has often been described as 'toxic' (Clegg et al., 2023), which is a culture of conflictual collaboration between public clients and contractors, in an unequal hierarchical relationship with mutual negative stereotyping, low institutional trust, and rooted in fear for opportunistic behaviour (Van Marrewijk et al., 2014). Collaboration is organised through short term project-based working, which hinders long-term learning and change (Cicmil et al., 2006). Frequently, change programs have been executed to improve this laborious collaboration and to develop institutional trust between public clients and contractors (e.g., Ruijter et al., 2020; Van Marrewijk et al., 2014). However, institutional processes, mutual distrust, opportunistic behaviour, dysfunctional routines and laborious collaboration remained persistent and continued, resulting in comprehensive, detailed, and juridical contracts (Cicmil et al., 2006; Ruijter et al., 2020). Therefore, Sminia (2011) suggests that this institutional continuity in the Dutch construction sector is related to social mechanisms of repairing and/or concealing contradiction between clients and contractors so that change is not initiated.

Table 4

Change in practices of inter-organizational collaboration needed according to project actors including the informal and formal regime rules that reinforce the hindering practices and their practice elements; a) meanings, b) competences & c) materials.

Practice	Reinforcing regime rules	Hindering practice elements	Changed practice elements	Illustrating quote
Contracting	- long-standing relationships and role divisions between clients and contractors - deeply rooted distrust between clients and contractors	a) predictability, inflexibility b) setting up detailed contracts, adhering to contract specifications c) comprehensive, detailed, juridical contracts	a) flexibility b) adjusting (contracts) to the circumstances, coordinating changes c) flexible contracts (building team/rapid circular contracting)	'A circular innovation is characterized by insecurity, which actors should be able to respond to during the project. A tight contract based on distrust could impede this' (document #2)
Monitoring	- dominant focus on costs in project and individual evaluations - deeply rooted distrust between clients and contractors	a) punctuality, distrust b) keeping track of the budget & planning, sticking to deadlines c) hard control mechanisms (e.g., detailed contracts), fines	a) trust-based relationships, cooperation b) finding solutions together, adjusting to the circumstances c) soft control mechanisms (e.g., evaluation forms)	'If we are going to be very strict with time and money, then we won't be able to do this in a circular way. We need that extra room to allow ourselves and other parties to start to think differently' (interviewee #13)
Communicating	- strict role divisions between clients and contractors - high level of specialization of construction sector actors	a) strong hierarchies, fragmentation b) adhering to existing structures and role divisions, task focus c) emails, telephones, separated work spaces	a) equal relationships, integration b) thinking along with others, sharing knowledge c) new communication channels, shared work spaces	'As a subcontractor you normally never really talk with the client. Well in this project we had to do it very differently, we sat at the same table with the client and contractor, and made decisions together as equals' (reflective session #3)
Project-based working	- (project-based) structure of the organizations - strong focus on costs and competition in the sector	a) project-as-end, short-term focus b) delivering a project, establishing short-term relationships c) separated offices with own logo's, located near construction work	a) project-as-part-of, long-term focus b) collecting, sharing and developing knowledge, establishing long-term relationships c) integrated programs, knowledge sharing structures	'We have to continuously push ourselves to think about how to collect and share our insights. People are used to build, realise and after that is it done. However, for the transition to circular construction we also need to share our insights' (document #1)

In order to realize the ambition to become circular in 2050, the Dutch government set four strategic goals for the construction sector: 1) using (mostly) renewable resources, 2) optimising material usage during the entire lifecycle of buildings, 3) reducing CO₂ emissions as much as possible during the construction and lifespan of buildings, and 4) being an innovative sector that proactively reacts to changes in society (RVO, 2022). We identified several key characteristics distinguishing circular construction from conventional construction. First, its focus on quality, durability and ecological efficiency (Ghaffar et al., 2020; Leising et al., 2018), which is different from the focus on costs and economic efficiency in conventional construction (Van Bueren and Broekmans, 2013). Second, the use of new experimental technologies, such as modular building techniques and online resource sharing platforms, to minimize resource use (Leising et al., 2018), contrasting to the focus on well-developed, tested and proven technologies to minimize liability concerns in conventional construction (Van Bueren and Broekmans, 2013). Third, the adoption of collaborative relationships and business models (Ghaffar et al., 2020), unlike the focus on competitive and legalistic relationships in conventional construction (Priemus, 2004). Fourth, a culture characterised by risk-taking, a long-term orientation (life-cycle of a building) and intrinsic motivation for sustainability (Leising et al., 2018), different from the short-term orientation, risk aversion and extrinsic sustainability motivation in conventional construction (Priemus, 2004).

4.2. Practices of inter-organizational collaboration hindering circular construction

Project actors highlighted that circular construction projects would not succeed when traditional practices of collaboration between client-contractor-subcontractor would be adopted; *'if we would do it traditionally, we knew we would not succeed'* (interviewee #3). We identified four practices of inter-organizational collaboration that could hinder the transition to circular construction according to the project actors and were difficult to change due to their reinforcement by formal and informal rules in the construction regime (Table 4). Changing these practices was perceived to be essential for the success of circular construction projects; *'I think that it is essential that we realize that the transition to a circular economy can only happen by adopting new ways of collaborating'* (interviewee #11). We therefore also identified how these practices needed to be changed according to project actors in order to create points of opportunity (Table 4). While these practices are not completely new to actors in the construction sector, they are rarely adopted in construction projects; *'this way of collaboration is really something that is not in everyone's head yet, most projects are still adopting traditional relationships and traditional ways of working together'* (interviewee #1).

First, project actors emphasized that conventional contracting practices relied on contracts offering limited flexibility during the execution of projects; *'the tendency to fix every detail, such as time, money and size, early on in the project, reduces flexibility and therefore also the possibilities for circular innovation'* (document #7). These contracts were comprehensive, detailed, and full of juridical jargon, and not meant for daily consultations, but remain stored in filing cabinets and computers until conflicts arose. Project actors argued that new contracting practices would be needed for circular construction, using for example new types of contracts, such as *'construction team contracts'* or *'rapid circular contracts'*, which offer more flexibility during the project. This was needed according to project actors because circular construction is still an ambiguous area, where different interpretations of circularity exist and several uncertainties arise, such as uncertainties about the lifetimes of reused materials: *'can we use these materials for 50 or 100 years, or do they have a shorter lifespan? That is something we can only figure out during the project, after testing'* (interviewee #5). It is therefore difficult to set specific guidelines upfront as circular opportunities often materialize over time; *'we cannot specify everything regarding circularity in the contract upfront, we need a flexible and iterative process'* (interviewee #2). This materialization requires more flexibility in the collaboration between client and contractor to adequately respond to changing circumstances; *'flexibility helps to more consciously deal with unexpected events, which enables parties to choose the circular route'* (document #6). However, it was difficult to implement these new practices as conventional contracting practices were reinforced by the long-standing relationships and role divisions between clients and contractors in the construction sector, which has also been established in previous research (Sminia, 2011). Furthermore, due to the deeply rooted distrust between clients and contractors following the malpractices in 2002 (Priemus, 2004), practitioners were reluctant to switch to more flexible contracting practices; *'I am not sure if I dare to do it, they [contractor] might not be professional enough, the chances of it going wrong are too high'* (observation #4).

Second, the respondents argued that construction projects would benefit from a change in monitoring practices. Clients in the construction sector often show a high level of controlling behaviour, closely monitoring the progress of the project in terms of time, budget and scope. The client's monitoring system consists of a computer-based planning program and up-to-date information on the financial budget with green and red colours indicating the progress of the project. This strict monitoring is problematic according to project actors due to the higher level of ambiguity and uncertainty in circular over 'other' projects, for example about the availability of reused materials: *'in circular projects we have to deal with the unexpected, in our case the availability of donor steel, which took much longer to acquire than we anticipated upon'* (interviewee #2). Frequently, such unexpected circumstances cause higher costs or time delays. Consequently, (sub)contractors often choose to abandon circular innovations all together as they may be fined for exceeding the predetermined budget and/or planning, but not for failing to achieve the circular ambitions. Strict monitoring practices could also lead actors to not be open about mistakes or disappointing results, for example when the circular ambitions that were specified at the beginning of a project could not be achieved; *'they did not tell me in time that the old building could not be reused, I think they did not dare to'* (interviewee #16). The respondents argued that more soft control mechanisms would be needed to enable circular construction, based on trust between clients and (sub)contractors. This would also enable actors to identify solutions together in case of unexpected delays; *'my traditional reaction [to the sub-contractor] would be: look out, if you do not make it in time, there will be a fine. In this project I did the exact*

opposite, I let go of control and said to him, we can find a solution together. That is something you only do when you trust each other' (interviewee #3). This can assist practitioners in dealing with the ambiguities and unexpected drawbacks involved in circular construction, enabling them to adjust and learn. However, it was difficult for practitioners to switch to new monitoring practices due to the deeply rooted distrust between clients and (sub)contractors in the sector (e.g., Ruijter et al., 2020; Van Marrewijk et al., 2014). Furthermore, conventional monitoring practices were reinforced by the dominant focus on costs in the construction sector (Cicmil et al., 2006), which, for example, also caused project actors to be evaluated in their own organizations on their ability to keep the project within their budget; *'It does not matter for them [directors] if the project is circular or not, we are not evaluated on that, all that matters is that we can achieve it within the available time and budget'* (interviewee #12).

Third, the respondents emphasized that communication practices in construction projects should be changed to enable circular construction. Most conventional construction projects follow strict patterns of communication between clients and (sub)contractors based on hierarchical relationships to prevent practices of collusion and fraud; *'we [clients] often tell the market what to do, let them solve it'* (interviewee #13). Communication takes place by means of mobile telephones, emails, sometimes app groups, and more recently by on-line meetings. Face-to-face meetings are held in (temporary) project housing or at client's offices and work spaces are separated to prevent practices of collusions. Furthermore, there is often limited communication amongst project actors as tasks are separated following clear role divisions. Project actors argued that more, and open communication would be needed in circular construction projects as these projects involve new dilemmas that actors need to collaboratively unravel and make appropriate decisions about; *'a lot of new dilemmas arise during circular projects, about which no one has formulated answers yet. For example, is function more important than lifetime?'* (document #1). Furthermore, project actors emphasized that there is a need for more integration amongst actors early on in the project as demolition, design and construction, need to be combined; *'the activities are no longer separated, you really have to sit down with all the parties; the architect, builder, but also the suppliers'* (interviewee #12). For example, actors demolishing a building need to be closely involved in the design of the new building as they can identify potential materials for reuse. Due to the embeddedness of current role divisions in the construction sector (Sminia, 2011) it was difficult for practitioners to switch to these new communication practices; *'if you ask them, you literally hear from people, for instance in utilities, no first you have to develop it [the construction project] and only when you are done with that we can get involved'* (interviewee #10). Furthermore, conventional communication practices, especially those related to the separation of activities, were hard to change due to the high level of specialisation in the sector; *'most parties don't have a lot of education, they were able to grow because they were good in one specific task. They are afraid to deviate from that'* (interviewee #8).

Fourth, the respondents argued that project-based working practices needed to change. In conventional construction projects, there is often a focus on delivering individual projects; *'I think that we focus too much on projects alone; realising and disassembling buildings'* (interviewee #3). Project-based working is characterized by autonomy, with project offices separated from the mother organisation, with their own logo, located at close distance from the construction work and a clear focus on the delivery of a project. Project actors often view the delivery of a project as an end and the dissemination of insights from projects is therefore limited; *'we lack a structure for sharing valuable lessons in the organization'* (interviewee #13). As the implementation of circular innovations in the construction sector is still at an early stage, learning across projects is of major importance according to project actors; *'there are a lot of projects that still work in the traditional way of construction. There are initiatives that are different, but not at the level that we need for the transition'* (reflective session #6). In order to achieve this, project-based working practices would need to change according to the respondents towards a focus on programs of subsequent projects in which clients and contractors could develop knowledge together: *'we like to work in programs, where there is a series of buildings in subsequent projects in which we are all involved, so we can learn from the work we just did'* (interview #13). However, conventional project-based working practices are kept in place due to the structure of the organizations in the construction sector (Cicmil et al., 2006); *'we are all project-based organizations and our directors evaluate us based on projects, therefore we would need to change our entire structure'* (interview #3). Therefore, even if efforts were undertaken to organize projects in a program, project members would get limited additional time to focus on program activities (such as evaluation sessions) and did not see these as a priority. Furthermore, the strong focus on costs and competition in the construction sector (Cicmil et al., 2006; Ruijter et al., 2020) made practitioners hesitant to switch to programs where multiple projects would be developed in cooperation with the same contractors.

To conclude, the previous section showed that several conventional practices of inter-organizational collaboration, reinforced by the construction regime, could hinder the transition to circular construction, thus leading to critical points of intersection. A change in these practices was needed to enable circular construction, leading to points of opportunity. The next section will present how these practices can be changed through the use of reflective interventions.

4.3. Changing practices of collaboration through reflective interventions

We identified five processes through which the reflective interventions (i.e. interventions that create opportunities for collective reflection organized by practitioners and researchers) adopted in the cases could assist participants in changing their practices of collaboration, including: 1) prioritising reflection on collaboration, 2) critically evaluating practices of collaboration, 3) creating a breeding ground for new practices of collaboration, 4) implementing and maintaining changes in practices of collaboration, 5) embedding new practices of collaboration in partner organizations (see Table 5).

Table 5
Processes enabling practice change facilitated by reflective interventions.

Process	Key topics	Outcomes	Illustrating quote
1. Prioritising reflection on collaboration	<ul style="list-style-type: none"> - What are practices of collaboration in our project? - What are different perspectives on practices of collaboration in our project? 	<ul style="list-style-type: none"> - Participants become aware of practices of collaboration - Participants are enabled to start a conversation about practices of collaboration 	<p><i>'We needed to bring the whole team together and start talking about the collaboration. With these topics you notice that it helps to have a reflective tool to be able to start that conversation; how does our collaboration look like exactly?'</i> (reflective session #7)</p>
2. Critically evaluating practices of collaboration	<ul style="list-style-type: none"> - How are practices of collaboration influencing circular innovations in our project? - Which practices are hindering circular innovations? 	<ul style="list-style-type: none"> - Making practices of collaboration open to discussion - Enabling participants to critically evaluate practices of collaboration 	<p><i>'We reflected on our traditional working relationships in the sessions. And that was not about blaming each other, but it was more like, okay apparently this is the way we do it traditionally. How does this affect our project?'</i> (interviewee #1)</p>
3. Creating a breeding ground for practices of collaboration	<ul style="list-style-type: none"> - Which new/changed practices of collaboration are needed to support circular innovations in our project? - What would happen if we adopt new practices of collaboration? 	<ul style="list-style-type: none"> - Participants are enabled to establish ideas about new/changed practices of collaboration - Participants are enabled to experiment with new practices of collaboration 	<p><i>'Client: what do you need from us?'</i> <i>'Engineer: I miss ownership, we need shared circular ambitions.'</i> <i>'Client: I thought we hired you for that, but apparently you also need us to do so.'</i> <i>'Engineer: Yes, maybe we can develop a shared circular tool to work with in the future.'</i> (reflective session #10)</p>
4. Implementing and maintaining changes in practices of collaboration	<ul style="list-style-type: none"> - How can we adopt new/changed practices of collaboration in our project? - How can we ensure new/changed practices are maintained? 	<ul style="list-style-type: none"> - Participants are enabled to ensure that new/changed practices are adopted and shared by all participants - Participants are enabled to maintain new/changed practices 	<p><i>'There were many moments in the process where we though oh dear, how are we going to deal with this? And things did go wrong. Then there was the tendency to fall back into old behaviour. We had to choose for it, instil it in ourselves, which we could do every time again in our shared sessions.'</i> (reflective session #1)</p>
5. Embedding new practices of collaboration in partner organizations	<ul style="list-style-type: none"> - How can we adopt new practices of collaboration in follow-up projects? - How can new practices of collaboration be transferred to other members of the organization? 	<ul style="list-style-type: none"> - Creating the ability amongst participants to reflect on practices of collaboration in other projects - Creating practices that can be further developed and transferred 	<p><i>'What I notice in the team in which we work on a follow-up project, is that we really refer back to that earlier experience. You also see now in follow-up projects that we continuously challenge ourselves and others about the collaboration and keep each other focused on this.'</i> (interviewee #5)</p>

First, respondents emphasized that the reflective interventions enabled them to prioritise reflection on collaborative practices. According to the respondents, actors in construction projects do often not dedicate time to evaluate their collaboration; *'we are all technical people; we are very focused on the in-depth content and we do not really talk about the collaboration'* (interviewee #3). Priority is therefore given to day-to-day operations, which reinforces traditional practices of collaboration. The respondents emphasized that project actors adopt these practices without questioning them; *'no time is allocated to take a step back and ask questions about the collaboration'* (interviewee #7). We observed that participants became aware of their practices of collaboration during the reflective interventions and that a space was created in which they were allowed to take a step back; *by engaging in the sessions in this program together, we can learn from the process and our collaboration to start a conversation'* (document #6). As collaboration is not an easy topic to talk about for project actors, tools such as statements and anonymous polls were adopted, enabling all actors in different roles and (power)positions to share opinions and concerns. The reflective interventions also enabled the participants to become aware of different perspectives on their practices; *'this is really useful information to discuss for us [client], to know how you [engineer] look at our collaboration'* (reflective session #10). We noticed that participants realized that other project actors may have different experiences regarding the collaboration and began to explicitly question each other about this. However, not all participants were open to be actively involved in the reflective sessions from the start: *'It is not yet the case that all parties are actively cooperating in the reflective sessions. I think that they do often not see the added value'* (interviewee #7). Some of the participants would therefore take only a short amount of time for the sessions, leading to a more question-answer type atmosphere without room for thorough reflection on the collaboration. Reflection became a higher priority amongst project actors when they noticed they were not yet able to achieve their shared circular ambitions: *'At a certain moment you notice that we are not getting there, and then you say to each other, well some things are going well in our collaboration and others not, we really need to talk more about this'* (interviewee #3). Furthermore, project members engaged in the reflective sessions because they believed their circular ambitions could only be achieved via improved collaboration: *'In order to experiment with modular structures, we need the knowledge of all parties, we cannot do it alone, collaboration is key'* (reflective session #1).

Second, the respondents emphasized that they were able to critically think about their practices of collaboration during the reflective sessions, encouraged by the involved consultants and researchers. This allowed them to recognize those practices that could obstruct circular innovations, for example communication practices where clients set the guidelines without sharing responsibilities; *'Consultant: What should have been changed?'* *'Client: I think we should have given the other actors more responsibility for circularity'* (reflective session #4). We noticed that the participants were more open about how their practices were potentially limiting circular innovations and also acknowledged past mistakes; *'Project manager: It is important that we put more focus on that [creating a circular*

mindset) in the future.' Project manager 1: 'Yes, I agree, we did not do that enough' (reflective session #10). Furthermore, critically evaluating their practices enabled the participants to recognize how these practices were enforced by power-relations and distrustful relationships in the sector: 'The type of clientship we adopt, the directiveness and giving little room, is actually closely related to the lack of trust we have in each other in this sector' (reflective session #2). Participants were sometimes hesitant to share this type of information at the start of the reflective sessions, mostly related to their fear of being judged and not wanting to share information that was not fully crystallized yet. According to the respondents, it was therefore important to ensure participants that the reflective sessions were no test or judgement but functioned as a learning platform. The reflective sessions thus made practices of collaboration, which are often treated as 'normal' or 'the way things should be done', open for discussion; 'due to the reflective sessions, you really notice that it is easier to take a step back and ask the critical question to others: is this behaviour useful for the project?' (interviewee #2).

Third, according to the respondents the reflective sessions could serve as a breeding ground for new practices of inter-organizational collaboration. We observed that participants questioned each other and together came up with new ideas, in this case a different project start-up (related to new communication practices), about how their practices could be improved to better facilitate circular innovations;

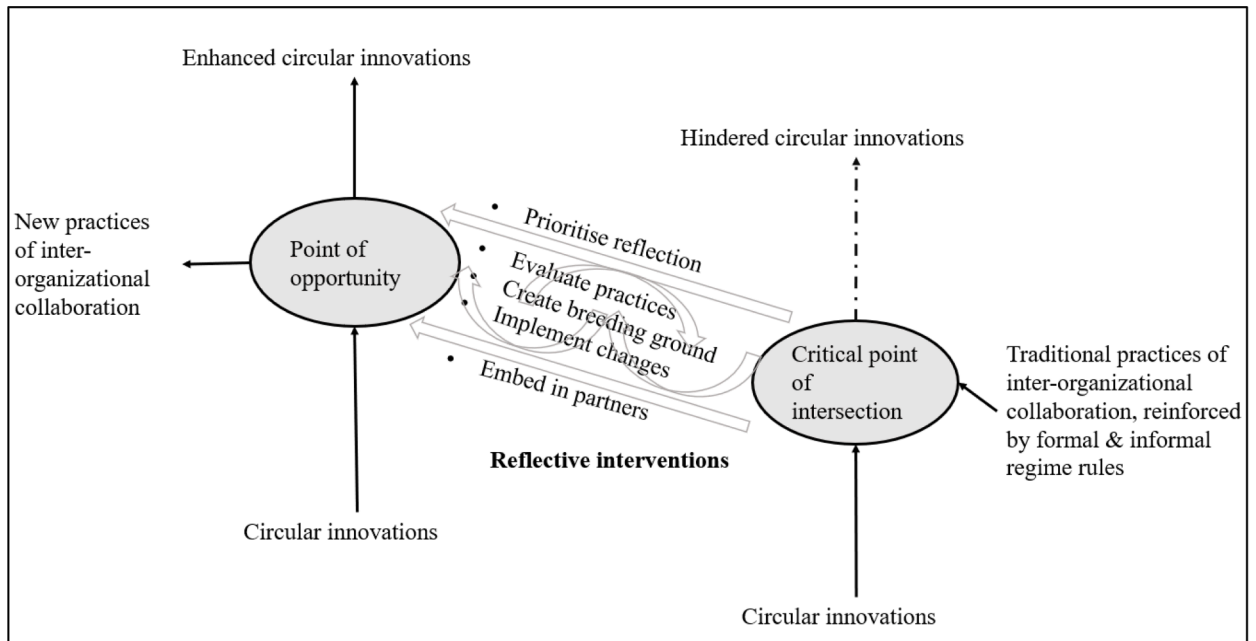
'Client: We are also a learning organization, but in practice you notice that it is difficult to constantly challenge ourselves and talk about things that go wrong.' *'Contractor: Now we talk about it, I am thinking that would be a really cool start of a project. To get together and talk about those things.'*

'Consultant: That is what we also want to try to do, implement a really different start of a project' (reflective session #6).

The reflective interventions facilitated this by enabling participants to learn from the ideas and practices of others. For example, in several of the group interviews of the Accelerating Together program 'outsiders' (participants from other circular construction projects) joined as active listeners to learn and ask critical questions; 'it was very useful to be present during the reflective interview as an outsider, to see what kind of challenges they experience in the collaboration' (document #6). The reflective interventions also enabled participants to experiment with new practices. During the sessions participants collaboratively worked out how new practices could look like, started to implement changes and reflected on the changes made; 'we were able to go a step further and ask; do you have ideas about how we could do it differently? And after that we also aimed to execute the new ideas and updated each other on which steps we took' (interview #1). For example, in the Circular Viaduct the initial reflective sessions led the concrete company and contractor to experiment with new monitoring practices where they would find solutions together (instead for fining) by exchanging more tasks in the engineering phase in order to reduce time pressures. The reflective sessions enabled the development of and continuous reflection on this new practice. In this way 'learning by doing' was stimulated, which was important as most project actors were 'doers' instead of 'thinkers'. However, not all actors were willing to spend time on multiple reflection sessions, mainly because they viewed the circular construction project as a small side-project, for which they could offer advice without the need for structural involvement. These actors were therefore less involved in the new practices of collaboration developed during the sessions: 'The client was not always involved in our sessions and therefore also less involved in our new way of collaborating, that was a pity because we did have a need for their involvement' (interviewee #3).

Fourth, project actors emphasized that the reflective sessions enabled them to implement and maintain changes in their practices of collaboration. According to the respondents, implementing and maintaining changes was difficult as measures taken did not always lead to the desired practices. For example, the actors of one project set the ambition to adopt new contracting practices, working together in a more equal and flexible way through the use of a new 'building team' contract. However, the adoption of this contract did not lead to the desired collaboration during the project; 'the contractor was invited to the table but he did not say a word during the entire process. So, it is not the contract and our initial intentions which per definition lead to a new type of collaboration' (reflective session #9). Participants identified the need to continuously talk about their collaboration during the project in order to implement and maintain new practices of collaboration; 'we need more sessions like this one, involving all of us, it keeps us on point with circularity and our collaboration' (reflective session #10). The reflective interventions also assisted the participants in identifying when their practices deviated from the practices they aimed to adopt in the project, for example in the case of monitoring practices; 'at a certain point the project leader tells me, because I am struggling with the fact that it will cost more and take more time, you know I don't think we should put more pressure on the contractor, that is old behaviour' (interviewee #3). This was especially important when there was a transition of phases in the project, for example from the design phase to the construction phase, or in the case of unexpected events and drawbacks. After participating in several reflective sessions, participants noted that they gained the ability to signal when they deviated from their intended practices without the need for reflective sessions; 'I really got the feeling that because we did these reflective sessions, that we were every time early enough to intervene when someone was falling back into old behaviour' (interviewee #2).

Fifth, project actors emphasised that the new practices had to be embedded in the organization; 'I notice that there is still a difference in the way of working amongst project managers in the organization and how we talk about it here' (reflective session #10). The reflective interventions could assist project actors in embedding new practices of collaboration in their organizations in two ways. First, by becoming aware of their practices of collaboration in their current projects, participants were also enabled to critically think about and change their practices in follow-up projects; 'because we did these reflective sessions in this project and spent time on the collaboration, you also notice that in current projects it is a lot easier to take a step back and think about our collaboration' (interviewee #5). Second, due to the experimentation with practices in projects, facilitated by the reflection sessions, new practices were developed that could be



Illustrative example (circular viaduct)

By incorporating reflective sessions in the first phases of the project it was discovered that not all actors were satisfied with their collaboration and that in particular communication and monitoring practices did not enable the adoption of innovative circular techniques. For example, due to limited communication between the client and constructor, delays were experienced as the contractor’s design team faced difficulties solving dilemma’s related to the adoption of modular elements and strict safety requirements. Via multiple reflective sessions, the team was able to reflect on and implement new ways of collaborating, including soft monitoring mechanisms, more frequent communication, and sharing tasks and responsibilities. Doing so did not only enable the team to address dilemma’s swiftly, but it also allowed them to further develop the modular elements by integrating the knowledge of the client. The design team was for example already familiar with the use of modular elements, however realized, by communicating with the client, that these elements could often not be reused as for each viaduct beams and pillars are unique. By experimenting with increased interaction and shared responsibilities, the team was able to identify several basic principles and design standardized modular elements that could be reused in future viaducts. In this way a point of opportunity was created, where project actors simultaneously developed new practices of collaboration, while also improving their circular innovations.

Fig. 1. Reflective interventions transforming a critical point of intersection into a point of opportunity.

transferred to future projects; ‘people that were involved in the reflective interviews can go back in their own organizations and say, yes this is how we should collaborate in the future’ (interviewee #8). For example, the client organization involved in the Circular Viaduct project initiated an internal track to develop new contracting, monitoring and communication practices, adopted during the project, further; ‘based on our experiences in this project we developed a full track in our organization about a new way of collaborating with market parties’ (interviewee #3). However, respondents emphasized that embedding new practices within the partner organizations was complicated. Project actors often did involve directors in their ideas about new practices of collaboration, however other employees, such as decision makers and internal users, were rarely involved. This could lead to the creation of an in-group of individuals involved in the reflective sessions, whereas other employees in the organization were not onboard with the new practices: ‘We involved some people too late. There was for example a colleague from the production department, but he still held on to the practice that we only start working when there is a traditional contract with the traditional procedures, which caused delays’ (interviewee #1).

We have now highlighted that traditional practices of inter-organizational collaboration, reinforced by informal and formal rules of the construction regime (Table 4), can hinder the transition to circular construction, leading to critical points of intersection (Table 4),

evaluated how they need to be changed (Table 4) and identified the processes through which reflective interventions can assist practitioners in changing these practices, leading to points of opportunity (Table 5). Fig. 1 summarizes these findings, were we zoom in on what happens at the critical points of intersection. Furthermore, we offer an illustrative example showing how, in one of the cases, several practices of collaboration causing critical points of intersection (Table 4) were transformed, via the processes enabled by the reflective interventions (Table 5), creating points of opportunity.

5. Discussion

This paper has presented new insights on how reflective interventions can assist construction project actors in changing their practices of inter-organizational collaboration and transforming critical points of intersection into points of opportunity. In particular, we identified four practices of collaboration in projects, deeply embedded in the conventional construction regime, that hinder the transition to circular construction, including contracting, monitoring, communicating and project-based working. Furthermore, our findings showed that reflective interventions, targeted at these critical points of intersection, enabled the participating project actors to: 1) prioritise reflection on practices of inter-organizational collaboration, 2) critically evaluate these practices, 3) creating a breeding ground for new practices, 4) implement and maintain new practices, and 5) embed new practices in their organizations. These results contribute to three academic debates, which will be discussed below.

5.1. Transforming critical points of intersection by actors through five processes

First, this study contributes to the sustainability transitions literature adopting a practice perspective (e.g., Keller et al., 2022; Seyfang and Gilbert-Squires, 2019; Watson et al., 2020), by showing how reflective interventions assist in transforming critical points of intersection into points of opportunity through five processes, thus answering the call for more research on how this transformation can be managed (Keller et al., 2022; Seyfang and Gilbert-Squires, 2019). Our study highlighted that practice change is set in motion when project actors prioritise reflection on their practices. Implementing reflective interventions targeted at critical points of intersection enables actors to recognize and make practices that hinder circular innovations and are embedded in the construction regime open for discussion. This is stimulated by creating a space for reflection where the perspectives of different (and also less powerful) actors can be shared. As practices such as contracting and communicating are reinforced by existing hierarchies and distrustful relationships in the construction sector, creating such a space is of crucial importance. This highlights the importance of reflective interventions, which are able to address the political complexities of practices of inter-organizational collaboration, unlike interventions such as information and marketing campaigns focused on in previous transitions studies (Shove et al., 2012; Spurling and McMeekin, 2014).

However, our study also showed that when reflection is a one-off endeavour, practice change will likely not occur as practitioners easily revert back to the convenience of conventional practices, a phenomenon that has been identified in previous sustainability transitions research (Seyfang and Gilbert-Squires, 2019), as well as in project management research (Ruijter et al., 2020). Prioritising reflection at recurring intervals during a project enables project actors to break this cycle, creating the ability to signal and prevent the reversion to conventional practices. Next to prioritising reflection, our study indicated that the reflective interventions also engaged project actors in processes of evaluating on, experimenting with and implementing new practices, which should be seen as an iterative cycle. Reflective interventions can thus create an experimental environment where meanings, competencies and materials can be purposefully reorganised, as proposed by Järvensivu (2017). The reflective interventions created these spaces close to the day-to-day activities of practitioners, instead of organizing them at a distance of their daily activities (as described in Järvensivu, 2017). This enabled the participants to experiment with new practices of collaboration during their projects and share insights on experiences. The learnings of these sessions could therefore be more easily adopted and disseminated, which has been shown to be particularly challenging in the context of sustainability transitions (e.g., Loorbach, 2010). Furthermore, through the iterative cycle of evaluating, experimenting and implementing, reflective interventions allow for multiple forms of practice change (Järvensivu, 2017; Keller et al., 2022). Previous research has mainly focused on the need for actors entrapped in regime dynamics to unlearn obsolete and ineffective practices (Ghosh et al., 2021), making them more willing to adopt niche innovations (Schot and Geels, 2007). Our results indicated that the reflective interventions could also create an experimental mindset amongst these actors, giving them a significant role in the development of new practices. Unlearning obsolete practices and creating new practices can thus occur in tandem. Finally, we found that the reflective interventions enabled actors to embed new practices in partner organizations. In line with previous studies (Borghei and Magnusson, 2018), our study showed that this is a challenging process as project actors have to (re)adjust to the norms and routines of individuals in the partner organizations. Project actors can address this challenge by involving individuals in the partner organizations early on and at recurring intervals, resulting in a collective process of unlearning and learning practices amongst actors in projects and organizations.

Our study also contributes to the sustainability transitions literature by moving beyond the current focus on top-down policy interventions (Gazull et al., 2019; Shove et al., 2012; Spurling and McMeekin, 2014), by focussing on the reflexivity of project actors. With this focus, we address the call for an increased focus on the agency of actors in organizations (Farla et al., 2012; Köhler et al., 2019; Mossberg et al., 2018). Our study showed that project actors can change practices of inter-organizational collaboration, including contracting, monitoring, communication and project-based organizing practices, in their projects and organizations by

engaging in reflective interventions, leading to practices which they experience as useful and meaningful for the transition to circular construction. Through our focus on project actors, we also expand the focus of current sustainability transitions research beyond the practices of consumers (Köhler et al., 2019). More attention should be directed to the practices of professionals in projects and organizations, as these practices do not easily become destabilized and can obstruct the transition. By doing so, we also draw more attention to the wider systems that hold things in place and maintain normality, an area which is often overlooked in sustainability transitions research (Seyfang and Gilbert-Squires, 2019). For example, informal and formal regime rules, such as deeply rooted distrust between actors and the structure of organizations in the sector, which reinforce traditional practices of professionals and obstruct the sustainability transition.

5.2. Adopting a critical perspective on inter-organizational collaboration

Second, the findings of this study contribute to the debate in organization and management studies on social practices and inter-organizational collaboration (Bjørkeng et al., 2009; Feldman and Orlikowski, 2011; Josserand et al., 2007; Nicolini, 2012) with an in-depth understanding of how reflective interventions can assist project actors in critically evaluating their practices and construct new meanings. The identified steps confirmed the work of Bjørkeng et al. (2009), and added two important steps, including the implementation and embedding of new practices in the collaborating organisations. Furthermore, we were able to identify several formal and informal regime rules in the construction sector that influence practices of collaboration. By doing so, our research highlights how practices can also be locked-in by the regime, requiring the need for targeted interventions in order to enable change. The results furthermore show that practitioners may aim to adjust their practices by focussing on materials only, such as formal contracts, which is in line with previous research on contracting in the construction sector (Swärd, 2016). This may not be sufficient, as it does not lead to a change in meanings and consequently conventional practices, especially those that are deeply embedded in regime dynamics (Sminia, 2011), may remain unchanged.

Our study also highlights that reflective interventions are executed in an inter-organisational power context, in which questions of who evaluates, implements or withholds practices have to be addressed. For example, we observed an asymmetric power relation between clients and contractors in the cases studied. In doing so, we contribute to the literature on inter-organizational collaboration taking a critical perspective (Cicmil and Marshall, 2005; Van Marrewijk et al., 2016; Kostis et al., 2022). Critical stream scholars try to avoid simplistic solutions and optimistic discourses on collaboration and partnerships (Kostis et al., 2022). These studies put (asymmetric) power relations central and understand collaboration as an instrument of power to influence organisational interests (Van Marrewijk et al., 2016). Power is here understood as a social relation, produced and reproduced through the everyday practices of project actors (Clegg, 1989). We continue this line of critical research and broaden it to the domain of sustainability transitions. While the practice theory approach of Shove et al. (2012) has traditionally not dealt constructively with issues of inequality and power, more recently it has been emphasized that understanding power within systems of practice is of utmost importance (Shove and Spurling, 2013). Furthermore, early sustainability transitions research has often taken a more functionalistic perspective towards inter-organizational collaboration, seeking practical solutions that can enhance collaboration in order to unlock sustainability transitions (e.g., Loorbach, 2010). By taking a critical perspective, our study shows that inter-organisational collaboration in itself is not sufficient and can even obstruct these transitions. For example, contracting and monitoring practices embedded in distrustful and hierarchic relationships between clients and contractors reduce flexibility and risk taking and therefore limit the adoption of circular innovations. Our study thus highlights the importance of adopting a critical perspective and unpack the ideal of inter-organizational collaboration, enabling researchers and practitioners to address its embeddedness in regime dynamics and create fruitful transition experiments.

5.3. Reflective interventions facilitating learning by doing

Third, the findings of this study are relevant to the literature on reflective interventions, in particular in the construction sector (e.g., Hart et al., 2019; Yanow and Tsoukas, 2009). While multiple studies have shown that a change in practices of inter-organizational collaboration is needed in the construction sector to transition to sustainability in general (Hart et al., 2019; Cicmil and Marshall, 2005; Clegg et al., 2023) and to circularity in particular (Ghaffar et al., 2020), limited knowledge has been developed on how this may be facilitated. Research highlights that changing practices in the construction sector is a difficult and long-term process requiring an intensive commitment from organizations (Ruijter et al., 2020). We contribute to this literature by zooming in on reflective interventions, showing how these interventions can enable actors in construction projects to reflect on their practices close to their day-to-day activities. This is of crucial importance as actors in the construction sector learn by doing, which may reduce the effectiveness of other interventions identified in the transitions literature, such as social marketing and information campaigns (Shove et al., 2012; Spurling and McMeekin, 2014).

Our study also adds to the literature on collective reflection (Reynolds and Vince, 2017) by revealing five processes through which collective reflection assists in changing practices of inter-organizational collaboration. However, we found that the last process, embedding new practices in partner organizations, was especially hard to accomplish. Therefore, practice change was often bounded to the individuals involved, as also highlighted by previous studies (Bjørkeng et al., 2009; Van Marrewijk et al., 2014). Our results

indicated that reflective sessions may have wider implications when they created the ability amongst participants to reflect on their collaboration without the need for dedicated sessions, moving from reflection-on-action towards reflection-in-action. This enabled the participants in our study for example to also signal when they deviated from their intended practices in future projects. In doing so, this study highlights a potential interplay between reflection-on-action and reflection-in-action, where the former may stimulate the latter, enabling wider practice change in organizations (Yanow and Tsoukas, 2009). Furthermore, and in line with earlier suggestions (Reynolds and Vince, 2017) our results indicate that addressing practices through reflective interventions is a complex social process, where actors may refuse to join and/or share perspectives. The involved actors therefore need to be prepared to challenge and be challenged, which can be encouraged by prioritizing reflection on inter-organizational collaboration (e.g., via the organization of weekly reflective session) and enabling the sharing of diverse perspectives (e.g., via anonymous polls). In addition, our study highlights the role researchers can play in this regard. By adopting an action research approach, researchers can assist construction project actors in reflecting on their day-to-day activities as these actors are often not used to reflect on their collaboration and miss the necessary language and skills to do so (Van Marrewijk et al., 2014). These findings are in line with the sustainability transitions literature, which has argued that researchers can play important roles in sustainability transition through the adoption of action research methodologies (Wittmayer and Schöpke, 2014).

5.4. Limitations and future research

While this study offers useful insights, several questions remain, in particular regarding the boundaries of reflection. Our study highlighted for example that the transfer of practices developed during projects to the organization is challenging. Future studies may investigate this process in further detail, for instance by exploring the potential for organization wide reflective interventions. We also identified several other challenges involved in organizing reflective interventions, including the limited time actors are willing to spend on reflection. Another question that remains is how reflective interventions can assist in changing relationships in the wider web of practices in construction projects and the partner organizations. We focused in this research on changes in practices of inter-organizational collaboration, however this may have an impact on relationships with other practices as well (such as those related to governance). Additionally, future research could take long-term approaches to explore the impacts of reflective interventions. Our method focused on uncovering the processes through which reflective interventions could assist in changing practices and transforming critical points of intersection, paying attention to the interpretations, considerations, decisions and behaviours of the participants. Future research is thus needed to systematically analyse how reflective interventions influence the transition to circular construction in the long-term. Furthermore, we looked at critical points of intersection between systems of practices and regimes as proposed by Hargreaves et al. (2013) due to our focus on interventions enabling a change in practices embedded in the regime. However, other points of intersection may exist, for instance between systems of practices and niches, which can be explored in future studies. Finally, future research is needed to explore different cases, contexts and types of reflective interventions to evaluate potential differences. For example, future research could explore the effects of role plays and theatre-based learning, next to reflective dialogues. While our cases were all located in the Netherlands, we argue that our results are relevant to other countries and contexts as well as research highlights the presence of similar conflicts, cultural characteristics and practices of collaboration in the international construction sector (e.g., Clegg et al., 2023). However, future research is needed to confirm this and explore potentially differing characteristics, such as legal systems.

Declaration of Competing Interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests:

Alfons van Marrewijk reports financial support was provided by the ‘Nederlandse Organisatie voor Wetenschappelijk Onderzoek’. The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

The data that has been used is confidential.

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Appendix A: Case Descriptions

Case 1: Circular Viaduct

The first case focusses on an experimental inter-organizational construction project nearby Zwolle in the Netherlands in which a prototype for a small circular viaduct for construction traffic was designed, build, monitored and deconstructed (project duration: May 2019 to November 2021). The project was seen as an experiment, and the aim was to develop, next to a working viaduct, knowledge on the circular construction of viaducts and bridges. The circular ambition was focused on eliminating waste, meaning that it should be possible to remove all elements of the viaduct and reuse them. The initiative for the circular viaduct was taken by a medium-sized contractor (+/- 450 employees) and commissioned by a large public client (+/- 10,000 employees) responsible for infrastructural facilities in the Netherlands. A consortium was formed including the contractor, public client, a cement company and two knowledge institutions. Multiple reflective interventions were included during the project. First, a project start-up was organized in an inspiring green building (of an unrelated party) in which specific attention was given to reflection on the collaboration. During the start-up, all attendees were divided into small groups of 3/4 participants, with the aim that participants got to know each other and explored the different roles and responsibilities. Second, during the construction phase weekly Circular Tuesday meetings were organized in which all actors would come together to discuss the circular ambitions. A reflective element, called the partnership metre, was included at the beginning of these sessions in which all participants were asked to reflect on the collaboration, including questions on safety, communication and risks. The results were shared in the group which facilitated a reflective discussion. Lastly, a reflective session, involving individuals from all organizations, was included at the end of the project to reflect on the project, collaboration and circular ambitions.

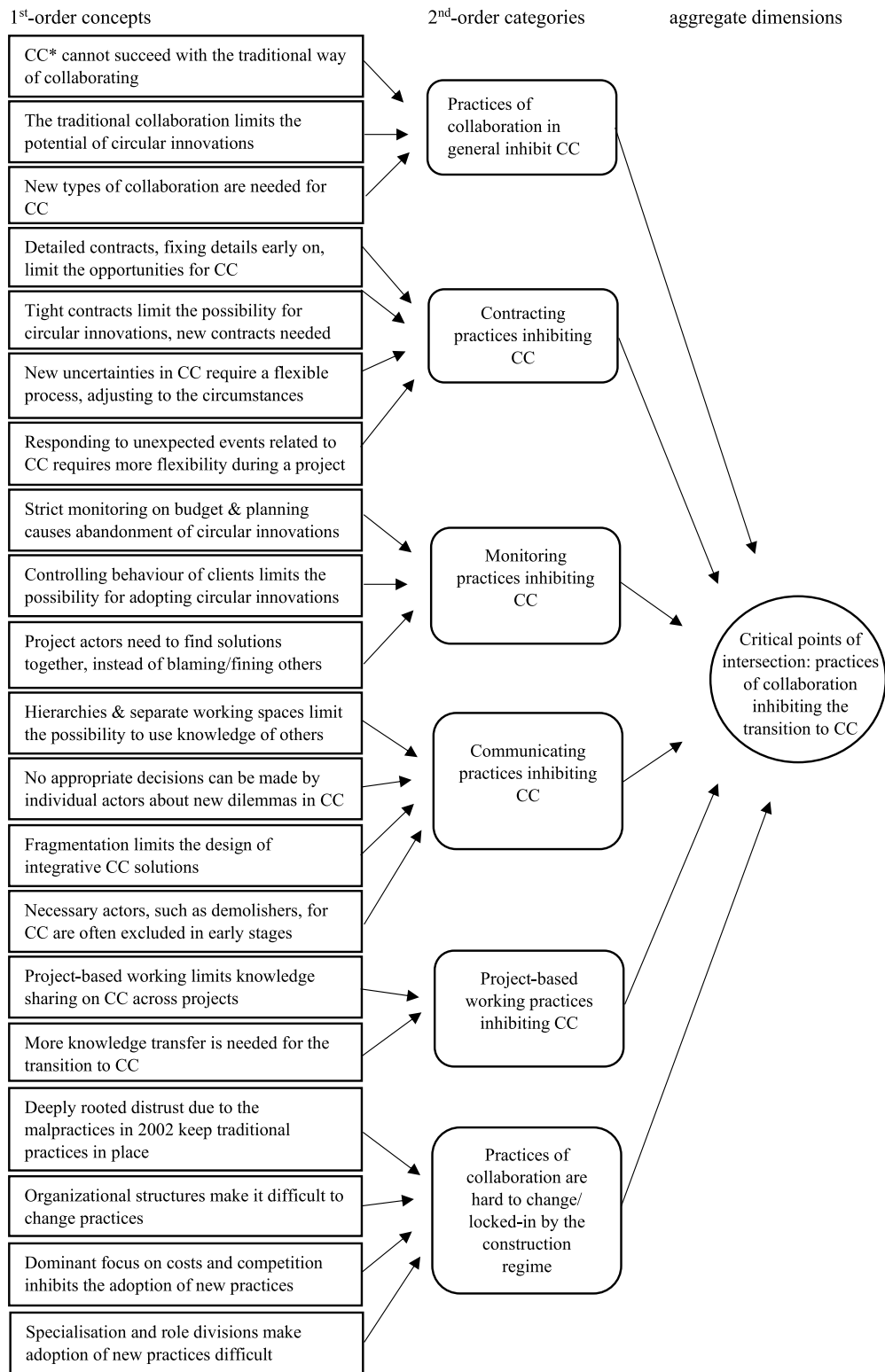
Case 2: Accelerating Together

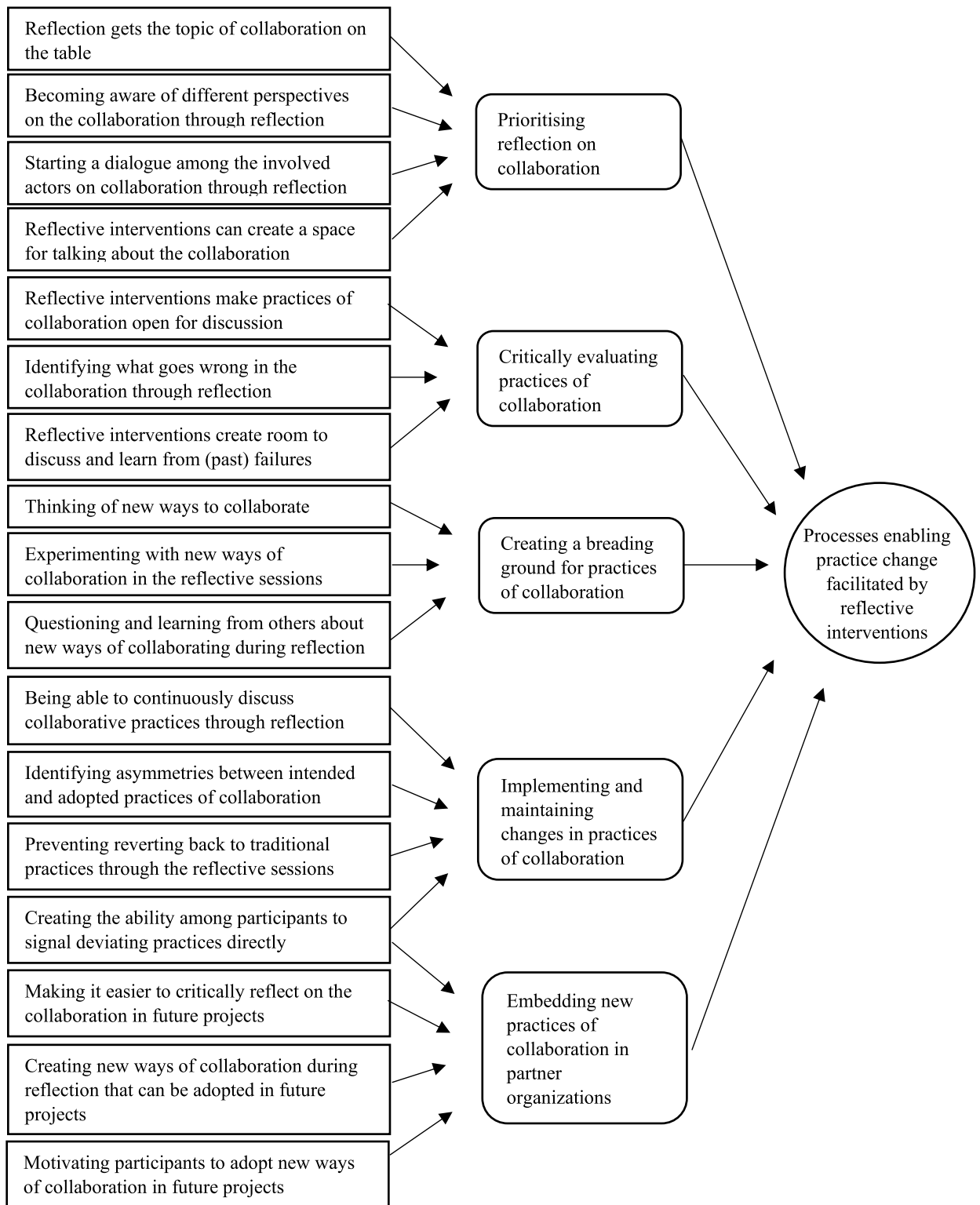
The second case focusses on the Accelerating Together initiative, a Dutch initiative organized by an innovation platform for developing knowledge on the circular economy. This innovation platform was founded in 2017 and had 247 members in 2022 including construction companies, public clients and architects. The Accelerating Together initiative (running from April 2019 until early 2023) was initiated by the innovation platform and the Dutch Ministry with the aim to accelerate the transition to circular construction. In the initiative, reflective sessions were organized across eight different circular construction projects to enable actors in the sector to reflect on how they were doing in terms of circularity in their projects and start a dialogue. All projects reviewed in the Accelerating Together initiative could be labelled as circular construction projects (Leising et al., 2018) and involved inter-organizational collaboration between diverse partner organizations. amongst the projects was for example the construction of four new apartment complexes in Amsterdam commissioned by the local municipality. The project aimed to adopt circular building practices, reusing 98% of the materials from the existing structures. Another project involved the construction of a new residential tower block in Delft commissioned by a project development bureau. In this project the aim was to adopt modular building techniques, wooden structures and minimize CO2 emissions. The Accelerating Together initiative was organized through multiple steps. First, the innovation platform recruited a number of circular construction projects that were being conducted or in their end stages and willing to participate in the program. Second, participants of these projects were asked to fill in a comprehensive evaluation form including questions in terms of materials, energy, water, social, management and collaborative aspects. Third, a reflective session was organized for each project by a consultant and two PhD researchers including individuals from the different organizations involved in the project. In most sessions an outsider from one of the other projects was also involved to learn and ask questions. During these sessions the answers given in the evaluation forms were discussed and more in-depth questions were asked to stimulate the involved individuals to reflect on their project. Fourth, the results of the reflective interventions were analysed by the consultants and involved knowledge institutions, leading to the development of a new norm for circular construction practices, including a toolbox that could be used by practitioners. Intermediate insights were shared with the participants in collective meetings, which also included time for the participants to share their views on the results.

Case 3: Hubs Project

The third case focuses on an inter-organizational construction project, commissioned by a large municipality in the Netherlands (+/- 16,000 employees), in which several hubs for waste collection in the city (the hubs included the offices for workers and parking places for vehicles) were renewed, including renovation, demolishing and construction activities (project duration: September 2020 to late 2024). Multiple circular ambitions were specified in the project including the reuse of materials, the adoption of modular designs and the use of biobased materials. The first author joined the project in October 2021, when the public client and a hired engineer (+/- 1400 employees) were working out the initial designs before putting the tender in the market. In consultation with the team, the researchers designed and organized a reflective session in an open meeting space of the public client. Participants were asked to reflect on their circular ambitions and collaboration. Several tools were used during the session including reflective statements, group discussions and case exercises. Furthermore, participants were stimulated to move across the room and work in small groups during the session. After the session the researchers summarized the insights and shared them with the project team. Furthermore, the first author remained involved in the project, doing additional interviews and observations of team meetings.

Appendix B: Data Structure





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