Shaping the transition towards sustainable living

An iteration on the implementation of the sustainable strategy within development projects in the dense urban environment.

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Abstract

This research investigates the implementation of corporate sustainability strategies at Heijmans Real Estate, a leading Dutch developer navigating the pressures of a national housing shortage, stringent environmental legislation, and a shrinking workforce. Despite high-level strategic ambitions, the research identifies a persistent gap where financial targets and traditional routines frequently reduce sustainability to a secondary priority at the project level.

To diagnose this friction, a qualitative, practice-based methodology was employed, encompassing eight preliminary interviews, observation of meetings, and a multi-case study analysis of three urban development projects. Through document analysis and semi-structured interviews with project developers, the research deconstructed decision-making processes using the theoretical lenses of the Cynefin framework, Organisational Ambidexterity, and Double-Loop Learning.

The findings reveal that project developers resist sustainability out of professional self-preservation. Faced with the complicated, high-pressure reality of urban development, a lack of psychological safety and financial headroom causes developers to revert to known, cost-driven routines to safeguard margins, a classic manifestation of single-loop learning. Furthermore, systemic silos between the sustainability team and developers result in uncontextualised advice and targets that are experienced as vague, which actively hinder innovation.

To bridge this disconnect, the research applies Kees Dorst's studio model to design a collaborative innovation infrastructure: the Ontwikkelplaats. Developed through iterative ideation and tailored to the pragmatic, results-driven culture of the regional office, this intervention embeds a continuous learning rhythm of experimenting, learning, communicating, and growing into daily operations. By formalising financial safety through structurally lowered return-on-investment boundaries, capturing field reality via Veldmemos, and cultivating psychological safety through bi-annual partner sprints and zero-preparation think tanks, the design systematically removes the cognitive and financial barriers to change. Validated by both developers and sustainability advisors, the Ontwikkelplaats proposes to successfully facilitate the transition from an exploitation to an exploration mindset. It shifts the organisation towards collective double-loop learning, ensuring sustainability becomes an integrated element of the developer's professional craftsmanship and enabling the organisation's systemic vitality.

Keywords: sustainability transition, real estate development, dense urban environment, organisational behaviour, organisational change, framework studio model, innovation infrastructure.

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This thesis represents the final milestone in completing my Master's degree in Strategic Product Design. This specialisation aligns far more closely with my interests and passions than the Bachelor's Industrial Design Engineering ever did. In a discipline built entirely upon navigating ambiguity, human behaviour, and messy organisational realities, there were countless moments I caught myself longing for the comforting, black-and-white certainty of a mathematical equation. Yet, learning to find structure and strategy within those grey areas is exactly what has made this process of academic and personal growth so profoundly rewarding. As I reach the end of this journey, I am deeply grateful to everyone who has supported, inspired, and guided me along the way.

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:)

Executive Summary

Despite Heijmans Real Estate's high-level sustainable ambitions, the transition frequently stalls at the project level. This research identifies a critical operational disconnect: when faced with rigid financial KPIs, extreme time scarcity, and abstract sustainability targets, project developers naturally retreat to familiar, cost-driven routines. This is not an act of unwillingness, but a rational act of professional self-preservation (Weick, 1996). Because the current corporate strategy relies heavily on one-way expert advice and generic compliance mandates, it triggers cognitive overload. Consequently, developers lack both the psychological and financial safety required to adopt new, unfamiliar sustainable practices.

To bridge this gap, this research proposes the Ontwikkelplaats: a systemic, continuous methodology designed to transform sustainability from an external compliance burden into an internal operational reflex. Tailored explicitly to the pragmatic, "niet lullen maar poetsen" (actions speak louder than words) culture of the Rotterdam regional office, the framework relies on a low-cognitive-load design. It actively replaces bureaucratic administration with raw, action-oriented collaboration, fundamentally shifting the organisation from a risk-averse exploitation mindset to an innovative exploration mindset.

The framework is introduced as an 18-month phased integration into existing workflows, encompassing four core mechanics:

1. **Innovation budget:** To successfully break habitual friction (the trusted routines), management must formally lower the return-on-investment (ROI) boundaries for a capped number of experimental projects per region. By legitimising this practice, Heijmans removes the individual risk for innovation, making sustainable risk-taking a formally protected baseline.
2. **Veldmemos:** To prevent repeated errors nationally, knowledge must flow. Heavy evaluation reports are replaced by three-minute, unedited video Veldmemos recorded locally.
3. **Partner sprints:** Biannual sprint sessions apply an 80/20 rule. Heijmans presents an 80% completed sustainable design, and external partners (e.g. suppliers, architects) are invited to solve the final 20% friction, unlocking mutual commercial growth.
4. **Think tanks:** To facilitate double-loop learning (Argyris, 1982), low preparation quarterly sessions are held. Curated Veldmemos are used as conversation catalysts, giving developers the agency to challenge broken corporate routines and misaligned KPIs without the burden of administrative preparation.

For this intervention to succeed, the role of the sustainability team will fundamentally shift from solely external advisors to integrated facilitators. They take proactive ownership of the knowledge capture (recording Veldmemos) and curation (facilitating sprints and think tanks), ensuring the administrative burden is removed from the developers. Crucially, as the Ontwikkelplaats scales, this introduces a capacity risk for the sustainability advisors. To guarantee long-term operational viability, the framework dictates that once steady-state operation is achieved, the administrative lifting of the Veldmemos (filming, tagging, platform management) should be outsourced to a specialised content agency or dedicated working students. This allows the internal sustainability advisors to elevate their focus strictly to strategic oversight and high-stakes facilitation. Lastly, the successful rollout of the Ontwikkelplaats requires immediate top-down alignment. Before behavioural change can occur at the project level, management must establish a unified corporate narrative defining what sustainability means for Heijmans. Furthermore, all internal advice must transition to become holistic, commercially integrated, and fully costed. By resolving these foundational prerequisites and committing to the continuous rhythm of the Ontwikkelplaats, Heijmans will systematically transform the friction of the sustainability transition into an engine for long-term organisational vitality.

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1. Introduction

1.1 Context and Background

The Dutch construction and real estate sector is currently navigating a period of profound transition. Organisations are facing intense and simultaneous pressures: a severe national housing shortage—estimated at approximately 400.000 homes in 2025 as can be seen in Figure 1 (Ministerie van Binnenlandse Zaken en Koninkrijksrelaties, 2026)—must be addressed alongside increasingly stringent environmental regulations (e.g. Corporate Sustainability Reporting Directive (CSRD) (Rijksdienst voor Ondernemend Nederland (RVO), (n.d.))), shifting health standards (e.g. GRP Gebouw (Ministerie van Binnenlandse Zaken en Koninkrijksrelaties, 2010), and a persistent shortage of skilled personnel (e.g. highest vacancy rate of 75 open vacancies per 1000 jobs (CBS, 2026)). Furthermore, the construction industry is responsible for a massive environmental footprint, traditionally consuming a vast share of global raw materials and generating significant greenhouse gas emissions (Charef et al., 2022; Gibbs & O'Neill, 2015b). To ensure long-term vitality, construction firms must adapt to these compounding challenges.

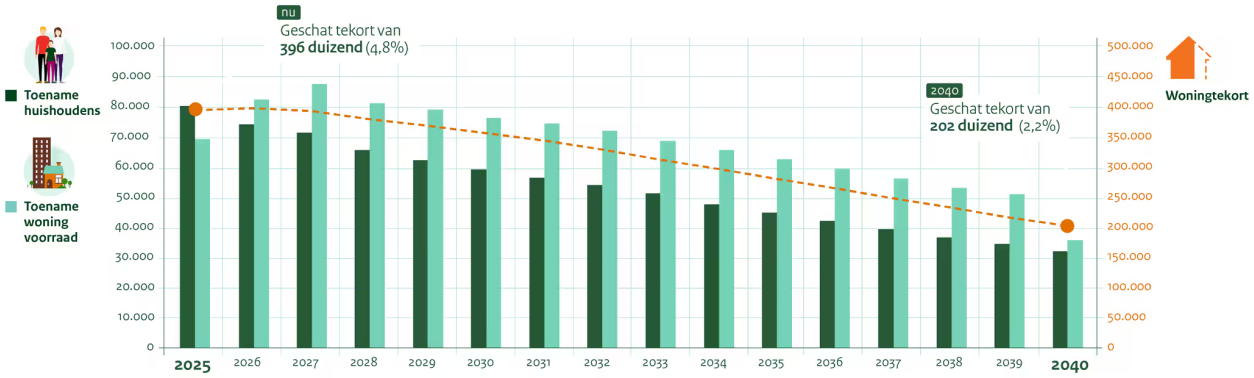


Figure 1: Expected Housing Shortage 2025-2040 (Ministerie van Binnenlandse Zaken en Koninkrijksrelaties, 2026)

However, dealing with a sustainability transition is exceptionally difficult. A transition is not a simple, linear corporate change, it represents a fundamental, long-term shift in socio-technical systems, requiring established incumbent organisations to radically alter their core practices, cultures, and structures (Kungl, 2025; Silva & Stocker, 2018b). Historically, the construction industry has attempted to solve sustainability requirements through purely technological solutions, severely neglecting the underlying social dynamics (Gibbs & O'Neill, 2015a). More recent literature explicitly argues that the primary barriers inhibiting the transition to sustainability in construction are no longer technical, but inherently social and behavioural (Martek et al., 2019). Deeply embedded routines and traditional practices actively slow down the transition, creating a complex environment where standard management mandates fail to take root (Eikelenboom & Marrewijk, 2023).

As society and market demands evolve, the challenges organisations face have shifted from being merely "complicated" to truly "complex", "open", "dynamic", and "networked" (Dorst, 2015). In a complex system, traditional linear problem-solving—where a known cause leads to a predictable outcome—is obsolete because the variables are inextricably linked and in constant flux (Snowden & Boone, 2007). To effectively manage this complexity and break out of entrained, routine thinking, organisations must move towards a more "designerly" approach, allowing new cause-and-effect patterns to emerge (Dorst, 2019; Snowden & Boone, 2007). To effectively tackle these complex, networked problems, design is increasingly recognised as a viable way forward (Tromp & Hekkert, 2016). A core practice within this design-driven approach is reframing, or frame creation: the ability to generate new, actionable perspectives through design abduction as seen in Figure 2 (Dorst, 2011). This involves proposing new interpretations of the broader problem context and testing reflective interventions until a systemic, sustainable fit emerges between the organisation's strategy and the developers' daily reality (Dorst, 2015; Eikelenboom & Marrewijk, 2023; Houkes et al., 2002)



Figure 2: Abductive Reasoning (Dorst, 2011)

Within this specific sustainability transition, the role of the project developer is paramount in the construction and real estate sector. Research indicates that the "front-end" of construction projects—the initial feasibility and design phase—acts as a critical window where sustainability transitions are either successfully driven or ultimately abandoned (Rokio et al., 2026b). Developers form the primary executing workforce in this phase, they are directly responsible for the design, material selection, and strategic planning of new housing developments. Simply put, if project developers do not integrate sustainable practices into their daily routines at the front-end, the buildings of the future will not be sustainable, and the overarching corporate strategy will fail to materialise at the project level. Ultimately, developers must design for the client, creating resilient, liveable environments that satisfy evolving human needs and ensure that occupants can live well in the future (Bedi et al., 2023).

Engaging with the sustainable transition is therefore no longer merely a regulatory requirement, it has become a fundamental strategic advantage. Embracing a circular economy—intentionally designing projects to eliminate waste, recycle materials, and keep finite resources in the loop—secures financial backing and significantly increases market appeal (Charef et al., 2022). Most importantly, empowering the project developer to integrate sustainability ensures that the organisation is actively designing for the future, creating resilient projects that prioritise the long-term well-being and health of the end-user while safeguarding the vitality of the firm.

1.2 Organisational Context: Heijmans Real Estate

Recognising this imperative, Heijmans has formulated an ambitious sustainability strategy to lead within the sector. This research is conducted in collaboration with Heijmans Real Estate, part of the third-largest construction firm in the Netherlands. To scope this study, the focus is within the Southwest region, specifically operating from the Rotterdam office. This was chosen because of previously explained pressures being most prominent here. The national government has set an ambitious target to realise 900.000 new homes before the end of the decade (Rijksoverheid, 2023), and the province of Zuid-Holland faces the steepest challenge, tasked with realising the largest share of 247.896 homes, as can be seen in Figure 3.

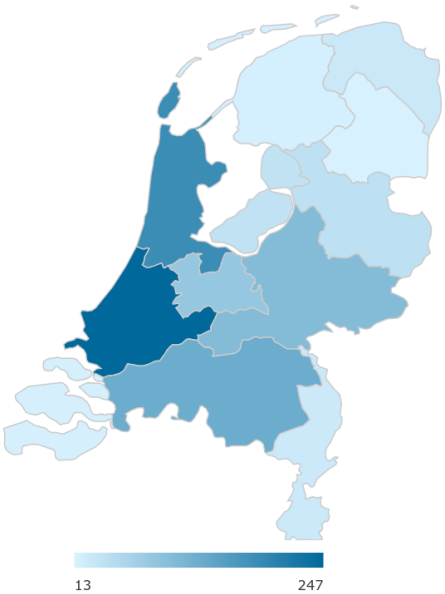


Figure 3: Distribution of Homes to Build 2023-2030 (Rijksoverheid, 2023)

Heijmans positions itself as a proactive leader in sustainable construction, driven by the core philosophy of shaping healthy living environments (Heijmans, (n.d.)). Their overarching ethos is to "give more than they take," deliberately moving away from traditional, resource-depleting construction methods. The objective is to leave every area development in a better, more sustainable state than it was found. This ambition is anchored in the corporate strategy which rests on five foundational pillars: well-being, sustainability, connection, feasibility, and team. Focusing specifically on the sustainability pillar, Heijmans has established timelines to ensure measurable progress:

- By 2027: Operational methods will no longer have any adverse effects on water quality or quantity.
- By 2030: Achieve 100% zero-emission operations for direct emissions (Scope 1 and 2 of the GHG Protocol) (Ranganathan et al., 2003).
  - Indirect supply-chain emissions (Scope 3) will be reduced by 50% compared to 2019 levels.
  - Attain a positive CO2 balance by actively storing and avoiding carbon.
  - Ensure all area developments achieve a top-tier A label from NL Greenlabel (NL Greenlabel, (n.d.)).
- By 2040: Attain complete net-zero status across the entire value chain, operating as a fully climate-neutral organisation.

To realise these ambitions, Heijmans focuses on three primary environmental themes:
Climate: The objective is to eliminate greenhouse gas emissions and transition to a 100% circular building model. Interventions include transitioning to electric and zero-emission machinery, using bio-based fuels, and prioritising timber-frame construction. During the design phase, suppliers are selected based on Life Cycle Assessments (LCA) (Quist, 2024). Buildings are designed to be demountable, incorporating material passports, while waste is repurposed using the 10R model (Malooly & Daphne, 2023).

Water: Treated as a guiding principle, water management focuses on safety, balance, and quality. Heijmans integrates rigorous ecology, water, and soil scans (EWB-scans) into their planning. Practical applications include rainwater harvesting, replacing valuable drinking water with surface water during construction, and deploying mobile purification systems to adhere to the European Water Framework Directive (EUR-Lex, 2021).

Biodiversity: The strategy aims to actively restore natural habitats. Flora and fauna are prioritised alongside human habitation by diversifying species and using nature as a raw material. Tools such as the BioBuddy (Figure 4, (de Vaan, 2025)) are utilised to measure biodiversity performance and increase ecological knowledge.



Figure 4: BioBuddy (de Vaan, 2025)

To embed this strategy internally, Heijmans initiated multiple knowledge-sharing interventions to inspire and teach, including project showcases (to receive budget for experimenting), learning-and-development opportunities, and lunch lectures, all bundled extensively on an online interface.

1.3 Project Development Process

To understand where sustainable impact can be made, it is essential to map the project development process. The Real Estate department is primarily responsible for the design of housing projects. Once construction commences, the project is internally transferred to the Construction department. According to standard governmental frameworks (Reiswijzer Gebiedsontwikkeling, 2019), a project development follows several distinct phases, as seen in Figure 5. It begins with the initiation phase, where a response to a municipal tender is created. If successful, the project enters the feasibility phase. This phase is heavily led by the project developer and encompasses multiple design stages, from the initial sketch to the final technical design. Once the design is finalised, the realisation phase begins, executed by the contractors, followed ultimately by the exploitation and management phase.



Figure 5: Area Development as an Iterative Process (Reiswijzer Gebiedsontwikkeling, 2019).

The focus of this research is firmly situated within the first design cycles of the feasibility phase. It is during this crucial window that sustainable ambitions must be anchored to guarantee positive impact, as resulted from the preliminary interviews and is grounded by literature (Rokio et al., 2026a). The core design team consists of the project developer, an in-house constructor, and an external architect. They are supported by various, mostly external advisors, including urban planners and sustainability consultants. While Heijmans possesses a dedicated team of sustainability advisors and specialists (such as ecologists) in-house, they are predominantly located at the head office in Rosmalen, offering advice on alternative materials and guiding the general sustainable transition.

1.4 Implementation Gap: Strategic Framing

The catalyst for this research lies in the current operational reality at Heijmans Real Estate. To map this specific organisational context and define the core problem, eight preliminary interviews were conducted with key stakeholders across different departments (for a detailled overview of all research participants, see Table 1 in Chapter 3). These initial discussions revealed that despite the formalisation of a comprehensive sustainability strategy and its implementation through initial knowledge-sharing events, there remains a significant gap between the projected corporate targets and the actual project outcomes, visualised in Figure 6. As explicitly highlighted during these interviews, the current sustainable strategy is seen as a mandatory extra for project developers, and it is not guiding the initial design phases as a core foundation. This discrepancy stems from the organisation operating in a highly exploitation-oriented environment. This fundamental disconnect between the daily act of running the business and the strategic goal of changing it is a clear demonstration of the tension between exploitation and exploration, as described by March (1991). Project developers are overwhelmingly focused on daily execution, managing project margins, meeting immediate deadlines, and satisfying stakeholders. Their primary mandate is maintaining operational output, leaving little capacity to focus on systemic transitions.

Conversely, the responsibility for driving the sustainability transition has largely been compartmentalised within the dedicated sustainability team. Because developers lack the time—and generally do not perceive systemic innovation as part of their core, daily responsibilities—the interviewees confirmed that the transition is frequently experienced as a top-down mandate. The sustainability team effectively works alongside the project developers rather than being fully integrated into their daily workflows. Consequently, standard development processes remain largely traditional, and the sustainable shift is perceived as an external requirement rather than an intrinsic priority.

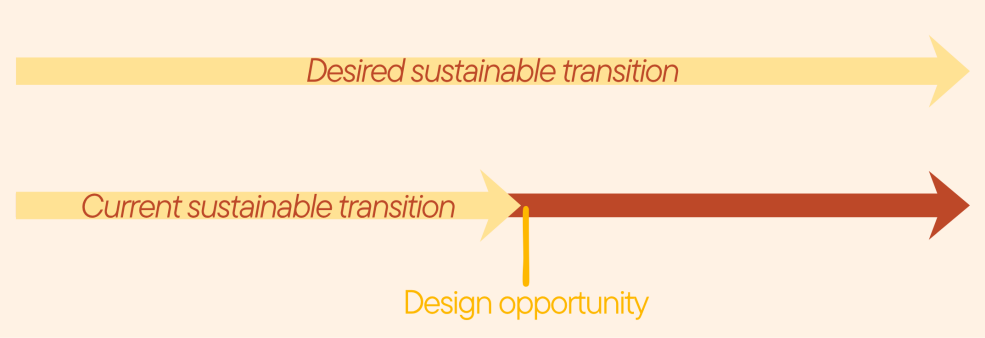


Figure 6: Implementation Gap

1.5 Project Aim and Assignment

The current implementation of the sustainability strategy at Heijmans Real Estate is falling short of its intended goals. The aim of this graduation project is to (1) investigate the root causes of this misalignment and to (2) design a human-centred intervention to improve this. The intervention must be tailored to the user: the project developer, to facilitate, empower, and enable them to seamlessly integrate sustainable practices into their daily workflows.

1.6 Research Questions

To achieve this aim, the following primary research question has been formulated:

How can a human-centred design intervention tailored to the project developers improve the implementation of the corporate sustainability strategy to contribute to a vital organisation?

This main question will be answered by exploring three supporting sub-questions, following the logic of the design process, which will be explained in subchapter 1.7:

1. *(Discover/Define phase): What barriers and behavioural mechanisms currently cause project developers to revert to traditional processes and resist strategic changes?*
2. *(Develop phase): Which design principles and frameworks can be utilised to disrupt the found cause (their routines) and foster organisational learning within a project-based firm?*
3. *(Deliver phase): How can these insights be translated into a validated strategic design intervention and an actionable implementation roadmap for Heijmans Real Estate?*

1.7 Project Approach and Reading Guide

This research is structured around the Double Diamond design methodology (Design Council, (n.d.)). As illustrated in Figure 7, this framework divides the research into two distinct halves: finding the right problem and designing the right solution. This report is chronologically organised to guide the reader through these phases. Before entering the first diamond, Chapter 2 establishes the theoretical framework, and Chapter 3 formally outlines the qualitative, practice-based methodology used to execute the research.

The first diamond focuses on uncovering the right problem. The Discover phase (Chapter 4) dives into the messy, operational reality of the project developers. Through qualitative field research, this chapter maps the daily working environment at Heijmans, exposing the siloed dynamics and defensive routines that occur in practice. With the operational symptoms uncovered, the research shifts to synthesis in the Define phase. Chapter 5 dives back into the literature to academically diagnose these behavioural findings, culminating in the formal definition of the core organisational challenge. Chapter 6 then translates this root problem into a clear design goal and a strict set of empirical design criteria.

The second diamond centres on the design of the right solution. The Develop phase in Chapter 7 begins with divergent exploration to prevent relying on the entrenched biases of the construction sector. By examining cross-industry analogies and engaging in participatory ideation with external designers, this chapter explores new systemic approaches to breaking habitual friction. The last phase—Deliver—details the iterative refinement and final presentation of the intervention: the Ontwikkelplaats. Chapter 8 explains the mechanics of the design, demonstrating how it was validated to ensure psychological safety and operational feasibility. Chapter 9 then translates this theoretical design into an actionable, 18-month strategic roadmap for the organisation.
Finally, moving beyond the design phases, Chapters 10 and 11 conclude the report with a theoretical discussion of the findings, a reflection on the project's limitations, and the overarching conclusion to the research inquiry.

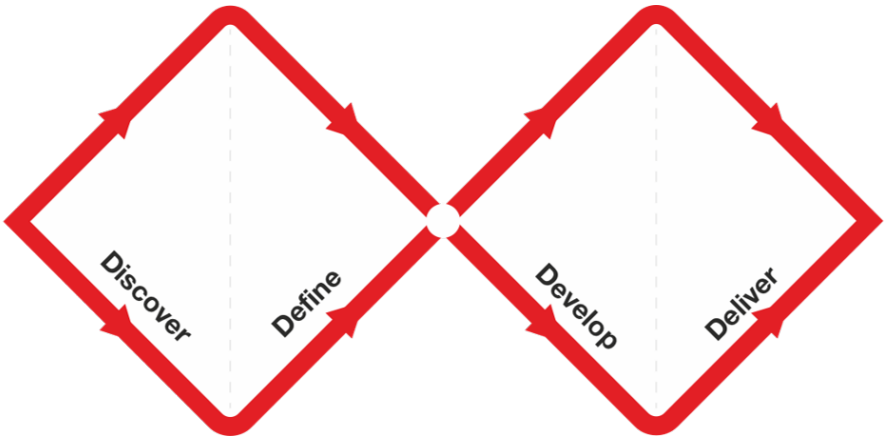


Figure 7: The Double Diamond (Design Council, (n.d.))

2. Theoretical Framework

This chapter explores the academic literature surrounding the implementation of sustainable strategies, particularly within the construction industry. Because construction companies fundamentally operate as project-based firms (PBFs), this chapter investigates the structural challenges inherent to this organisational model, and examines the complex, dynamic nature of modern area development. By combining organisational science, complexity theory, and behavioural psychology, this framework identifies the root causes of implementation failure and establishes the theoretical foundation for the subsequent research and even for the design intervention.

2.1 Implementation of Sustainable Corporate Strategies

Addressing the challenges of climate change and resource depletion requires a profound societal transition towards sustainability, a process which represents a fundamental, multi-dimensional shift towards a renewed society in harmony with its natural surroundings (Silva & Stocker, 2018a). Within the architecture, engineering, and construction sector, implementing a sustainable strategy requires integrating economic, social, and environmental dimensions into corporate operations. However, literature indicates that these organisations frequently suffer from a "skewed development" bias, where they focus heavily on the external delivery of green-certified projects while severely neglecting the integration of sustainability within their own internal operations, corporate governance, and social stakeholder engagement (Lu & Zhang, 2016).

Implementing true sustainable strategies requires establishing new roles and practices that often transcend established professional boundaries (Raynard et al., 2025a). Members of the organisation tasked with driving these sustainability initiatives must engage in inter-occupational collaboration to embed new criteria (such as environmental, social, and governance factors) into conventional business analyses. This implementation process frequently encounters resistance, as new sustainable knowledge must compete for legitimacy against traditional, highly structured frameworks and established technical workflows (Raynard et al., 2025a).

To fully understand the depth of this resistance, one must define what is actually being targeted for change. A professional practice is not merely a sequence of administrative tasks; it consists of the routine behaviours, deeply held values, implicit rules, and specific tools that professionals use to navigate their daily reality (Dorst, 2018; Shove et al., 2012). The foundation of this practice is 'practice knowledge,' which encompasses both the operational actions a developer takes ('know-how') and the underlying conceptual assumptions justifying those actions ('know-why') (Kim, 1993)). Consequently, designing an intervention to change this practice requires fundamentally challenging these deeply embedded assumptions—a cognitive shift that forms the core of double-loop learning. However, the organisational environment in which a practice is situated heavily dictates its capacity to engage in this type of learning. For project developers, this environment is overwhelmingly defined by the structure of the Project-Based Firm.

2.2 Sustainable Strategy in Project-Based Firms (PBFs)

Implementing sustainable strategies is particularly challenging for project-based firms (PBFs). PBFs are defined as organisations in which projects form the primary mechanism for coordinating business functions, value creation, and innovation (Blindenbach-Driessen & van den Ende, 2010). A central barrier to sustainability in this context is the "PBF dilemma," which highlights the inherent tension between the short-term, results-driven focus of temporary projects and the long-term, mission-driven perspective necessary for the permanent organisation (Hermano & Martín-Cruz, 2020).

Because PBFs are structured around temporary ventures, any sustainable knowledge or innovative practice gained during a project is at a high risk of being lost once the project concludes and the team dissolves. Consequently, PBFs often struggle to transfer learning across the firm, forcing them to "reinvent the wheel" on subsequent developments (Hermano & Martín-Cruz, 2020). Furthermore, PBFs traditionally rely on rigorous, contractually defined milestones and efficient execution routines to manage their operations. In the context of organisational learning, this strict adherence to established routines heavily favours the "exploitation" of old, known certainties over the "exploration" of new, sustainable possibilities (March, 1991). As a result, while

PBFs are highly efficient at executing standard developments, their deeply embedded routines actively inhibit the flexibility required to adopt radical sustainable innovations (Blindenbach-Driessen & van den Ende, 2010).

2.3 Complicated vs. Complex Context of a Development

When analysed through the lens of the Cynefin framework from Figure 8 (Snowden & Boone, 2007), it becomes evident that traditional project development often treats challenges as belonging to either the 'simple' or 'complicated' domains. In a complicated context, cause-and-effect relationships are discoverable, and challenges can be resolved by relying on expert analysis and established "best practices" (Snowden & Boone, 2007). However, as societal and environmental demands evolve, sustainability transitions no longer fit this linear model, instead, they represent a truly "complex", "open", "dynamic", and "networked" context (Dorst, 2015). In a complex system, variables are inextricably linked, multiple stakeholders possess conflicting values, and the environment is in constant unpredictability. In these unordered contexts, standard linear problem-solving fails because solutions cannot simply be imposed top-down. Rather, the path forward must be allowed to dynamically emerge through experimentation and frame innovation. In design theory, a frame acts as a novel standpoint or conceptual lens that fundamentally alters how a complex problem is understood, allowing entirely new, actionable pathways to become visible (Dorst, 2015).

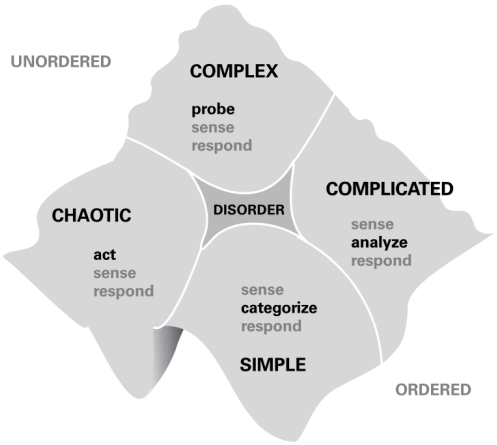


Figure 8: Cynefin Framework (Snowden and Boone, 2007)

2.4 Habitual Friction and Organisational Learning

When confronted with open, complex, dynamic, and networked problem situations, organisations naturally fear a loss of control and tend to seize up, reacting defensively by retreating into static, conventional problem-solving rules (Dorst, 2015). This reflex causes professionals to apply rigid planning methodologies to fluid problems. This psychological phenomenon is vividly captured by Weick (1996) through the metaphor of wildland firefighters who perish because they refuse to "drop their tools" when fleeing an escalating fire. In the face of severe ambiguity and threat, professionals experience habitual friction, they cling to their familiar, heavy tools—in the developer's case, their traditional, linear problem-solving methodologies and financial KPIs—rather than unlearning and adapting to the new reality.

This individual reluctance to drop traditional tools creates a structural blockage for the entire firm because of how organisational learning fundamentally works. As Kim (1993) emphasises, organisations do not learn independently, they ultimately learn only through the mental models of their individual members. The process of organisational learning requires individual learning (changes in individual beliefs and routines) to be codified and transferred into the organisation's shared memory and structures. Consequently, if individual developers experience cognitive overload and habitual friction, they naturally fall back on defensive, single-loop learning routines (Argyris, 1982). In single-loop learning, professionals merely adjust their immediate actions to solve a problem—such as reverting to traditional, cost-driven suppliers—without ever questioning the underlying systemic assumptions of their practice. Because of this, top-down, rationalist strategies actively clash with the bottom-up, emergent learning required to successfully implement sustainability on the ground, ultimately failing because they fail to alter the individual mental models of the developers executing the work. To internalise new sustainable practices, the permanent organisation must shift towards double-loop learning, a process that fundamentally challenges these governing variables. In this context, frame innovation (Dorst, 2015) can be understood as a design-driven manifestation of double-loop learning. By establishing a radically new working principle—a process that inherently requires questioning underlying assumptions—developers are forced to break their defensive routines, fundamentally rethinking the problem space and fostering the radical innovation necessary to implement sustainability.

2.5 Conclusion and Theoretical Lens

The literature clearly outlines the structural and psychological barriers to strategy implementation. project-based firms structurally isolate developers in an exploitation-driven environment, leaving little capacity for exploration (Blindenbach-Driessen & van den Ende, 2010; March, 1991). Furthermore, as the demands of sustainability transform area development into a highly complex, unpredictable task (Snowden & Boone, 2007), professionals frequently experience cognitive overload. Rather than adapting through generative collaboration, they exhibit habitual friction, refusing to drop their traditional tools and falling back on familiar, single-loop learning routines (Argyris, 1982; Weick, 1996).

While the academic field of change management understands why individuals resist change, there is a distinct lack of research exploring how human-centred design can be utilised to actively bypass this resistance within the decentralised context of the construction industry. Existing solutions heavily favour top-down management directives, which fail to alter the individual mental models of the developers (Kim, 1993).

This theoretical framework provides the foundation for the Discover and Define phases of this thesis. Armed with the concepts of habitual friction, double-loop learning, and generative collaboration, the empirical research will now turn inward. The following chapters will investigate the daily operations at Heijmans Real Estate to determine exactly how and where these theoretical barriers manifest in practice, ultimately informing the design of a human-centred intervention to overcome them. Firstly by explaining the methodology used.

3. Methodology

3.1 Research Design

To investigate the gap between the corporate sustainability strategy and its practical implementation, and therefore the decision-making processes, organisational behaviours, and values of project developers working within dense urban environments, this study utilises an exploratory, qualitative research design. Specifically, the research adopts a practice-based approach (Kuijer, 2014). In the context of this study, a practice-based approach does not refer to research through design, but rather to the analytical framing of the project developer's daily work as a professional practice (Dorst, 2015).

Rather than evaluating the formal, documented processes of the organisation, this approach investigates the messy, operational reality of the developers. As established in Section 2.1, a professional practice is deeply rooted in both operational routines and underlying conceptual assumptions (Kim, 1993; Shove et al., 2012). Because these deeply held values, implicit rules, and specific tools that professionals use to navigate their daily tasks cannot be measured through simple quantitative metrics, this research design necessarily employs a qualitative, design-led approach. This methodology is specifically structured to uncover the 'know-why' driving the developers' daily actions, allowing for a deep understanding of the behavioural friction occurring at Heijmans Real Estate. Because the central problem of this thesis revolves around human behaviour and habitual friction within a complex environment, this practice-based lens is essential. A purely quantitative approach or a formal process evaluation would be insufficient to capture the underlying why and how of the developers' actual decision-making.

3.2 Data Collection

To comprehensively understand the organisational context and the underlying barriers to implementation, data was collected through a qualitative approach. Relying on multiple data sources allowed for cross-verification, ensuring that the findings were empirically grounded across different facets of the organisation. Each method was deliberately selected to contribute to a specific layer of insight to the research inquiry.

As introduced in Section 1.4, the research began with an initial phase comprising eight preliminary interviews with key stakeholders across various departments (see Table 1). The primary contribution of these interviews was to map the organisational context and define the practical problem space. They provided crucial insights into the daily, practical challenges faced by the different teams, exposing the siloed working dynamics between the sustainability team and the project developers. These insights directly informed the literature review and framed the core research inquiry.

Participant	Job description	Duration (minutes)
1	Sustainability manager	90
2	Sustainability manager	90
3	Sustainability manager	60
4	Sustainability manager	45
5	Real Estate manager	45
6	Regional manager	45
7	Sustainability team member	60
8	Thesis Intern	60

Table 1: Preliminary Interviews

To supplement the interviews with contextual behavioural data, three internal events were observed (Table 2). This contributed to an ethnographic understanding of how sustainability ambitions are currently communicated top-down within the organisation, and how developers naturally respond to, and engage with, these knowledge-sharing initiatives in an informal setting.

Activity	Description	Duration (minutes)
1	Monthly deep dive with the sustainability team	120
2	Lunch lecture about urban housing products	60
3	Lunch lecture about developing for social wellbeing	60

Table 2: Observations

A comparative multiple-case study design (Yin, 2017) was selected to explore the spectrum of decision-making and routine behaviours across different project developments. To ensure internal validity, all selected projects are situated within area developments in and around Rotterdam, meaning the developers faced similar urban constraints (e.g. integrating existing property, complex spatial planning requirements). This ensures that any differences in how the sustainability strategy was implemented stem primarily from internal decision-making dynamics and project structures, rather than differing external municipal pressures. Document analyses (including tenders, phase documents, and sustainability calculations) were performed for each case to establish a factual baseline of the choices made during the design phase (Table 3). To fully capture the behavioural nuances and habitual friction, the three selected cases were deliberately chosen to represent different decision-making environments:

- Case 1: traditional way
  - *Context*: A traditional, custom-built development.
  - *Methodological contribution*: This case represents the entrenched, business-as-usual professional practice. It serves as the primary baseline for observing standard developer routines, allowing the research to map exactly how sustainability is currently navigated when developers operate within their most trusted and familiar workflows.
- Case 2: friction point
  - *Context*: A traditional build where a highly structured, alternative development concept was seriously investigated but ultimately rejected.
  - *Methodological contribution*: This serves as a critical behavioural case study. It represents a scenario where developers attempted to deviate from standard practice but ultimately reverted to known methods. Analysing this case is vital for uncovering the specific defensive routines (Argyris, 1982) and cognitive barriers that cause developers to resist systemic changes and fall back onto traditional problem-solving.
- Case 3: systemic constraint
  - *Context*: A project executed using a predefined, industrialised housing concept.
  - *Methodological contribution*: This case places the developer within a rigid, predetermined operational framework. Although it is a ground-level development, its inclusion allows the research to analyse how decision-making routines and cognitive loads shift when traditional design complexities are removed. It highlights whether structural constraints enable better sustainability integration or simply create different forms of behavioural resistance.

Case	Description document	Number of documents
1	Tender document, interim presentations, elaborations of plan sections	15
2	Phase documents, tender document, sustainability calculation	5

Case	Description document	Number of documents
3	Phase documents, interim presentations	9

Table 3: Document Analyses

To understand not just what decisions were recorded in the documents, but how and why they were made, semi-structured interviews were conducted with five key project developers directly involved in the selected cases (Table 4). The contribution of these in-depth interviews was to uncover the underlying assumptions, defensive routines, and 'know-why' driving the developers' daily actions. To effectively capture these behavioural nuances, the interview topics were structured around three core themes: the developers' daily decision-making routines under project constraints, their practical approach to integrating corporate sustainability targets, and their experiences with inter-departmental knowledge sharing (the translated interview guide is provided in Appendix A). The interviewees were chosen based on their active involvement throughout the design phases of the selected projects, with one participant offering a valuable comparative perspective having had experience across two cases. All interviews were recorded and transcribed verbatim to ensure data accuracy, following the explicit permission of the participants (the Informed Consent form is available in Appendix B). Because the primary language of the organisation is Dutch, all interviews were conducted in Dutch. Consequently, any direct quotes extracted from the interviews for this report were translated from Dutch to English by the researcher, ensuring the original contextual meaning and professional nuance were preserved.

Participant	Job description	Case	Duration (minutes)
1	Project developer	2	66
2	Project developer	1, 2	55
3	Project developer	1	49
4	Project developer	2	53
5	Project developer	3	59

Table 4: Semi-Structured Interviews

3.3 Data Analysis

The initial data collected to define the problem context (the eight preliminary interviews and the three internal observations) was not subjected to formal transcript coding. Instead, field notes and meeting summaries from these events were synthesised through open, qualitative evaluation. This preliminary analysis was used exclusively to map the organisational environment, verify the siloed working dynamics, and establish the core organisational challenge.

To diagnose the underlying friction occurring during the implementation of the sustainability strategy, the core analysis focused on the primary data gathered from the three selected cases. The primary unit of analysis was the individual project developer. However, rather than analysing their behaviour purely through a psychological lens, their daily work was evaluated through a practice-based analytical lens, as mentioned at the start of this chapter. By focusing on the developer's professional practice, the research acknowledged that their decisions are heavily shaped by their environment and routines. This case-based analysis was conducted in two distinct methodological steps (Yin, 2017):

1. Within-case analysis

First, a within-case analysis was conducted for each of the three development projects. The formal project documents (e.g. tenders, phase documents) were reviewed to extract objective technical parameters, establishing a factual baseline of the decisions made. Following this, the

interview transcripts were analysed using thematic analysis (the complete coding framework can be found in Appendix C). Rather than evaluating the technical outcomes of the buildings, this step focused on diagnosing the specific decision-making outcomes and behavioural frictions unique to each environment. This involved analysing whether the trusted routines in the traditional baseline (Case 1) limited sustainable exploration, why alternative concepts were ultimately rejected at the friction point (Case 2), and how predefined frameworks shifted cognitive loads and routines (Case 3).

2. Cross-case thematic synthesis

Once the specific outcomes and frictions of each case were established, a cross-case thematic synthesis was performed. This step compared the coded semi-structured interview findings across all three cases to identify the universal cognitive barriers and routine frictions that persist regardless of the specific project type. By synthesising the findings across all three environments, the overarching current professional practice of the developers was mapped (Figure 9). Following Dorst (2018), this general practice was deconstructed into four observable elements:

- **Values**: What drives the decision (e.g. sustainable impact vs. financial margin)?
- **Principles**: What are the unwritten rules of the firm (e.g. "The budget is leading")?
- **Methods**: How are decisions validated (e.g. gut feeling vs. parametric data)?
- **Actions**: What specific operations are performed (e.g. using sustainable learnings vs. the trusted method)?

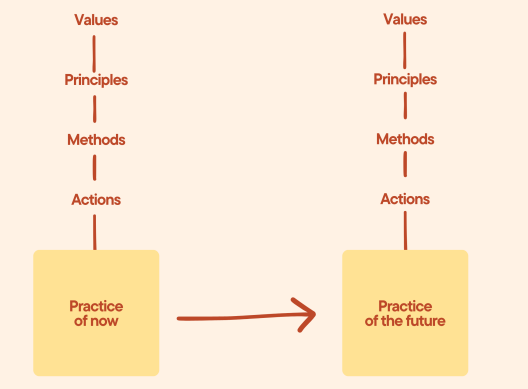


Figure 9: Current and Future Practice

Theoretical frameworks were then used to academically contextualise this mapped practice. The Cynefin framework (Snowden & Boone, 2007) was applied to explain the contextual mismatch between complicated tools and the complexity of the sustainability transition, while Weick's (1996) allegory of dropping tools was used to explain the behavioural resistance to abandoning traditional workflows. Furthermore, the cross-case analysis explored the epistemological challenge of inter-occupational collaboration (Raynard et al., 2025a). It systematically investigated why the conceptual leap from single-loop to double-loop learning (Argyris, 1982) fails to occur, preventing the sustainability team's knowledge from altering the mental models of the developers (Kim, 1993).

3.4 Design and Validation

Following the Double Diamond methodology, the research shifts from problem-finding to problem-solving. To translate the empirical insights into a viable strategy implementation framework, a multi-tiered ideation and validation process was structured using methods outlined in the Delft Design Guide (van Boeijen et al., 2020). The ideation phase was structured in two distinct stages, as can be seen in Table 5.

First, to break away from the internal biases of the construction sector, a phase of divergent exploration was conducted. This included a systematic analysis of cross-industry analogies (examining behavioural change mechanisms in sports, finance, and product design) (van Boeijen et al., 2020) and a qualitative expert interview. The interview was conducted with a professional who had experienced a top-down workflow transition, providing critical, real-world insights into cognitive overload and habitual friction outside of Heijmans (the raw output of this initial ideation is documented in Appendix D). Following this contextual exploration, participatory ideation sessions were facilitated with fellow design students to introduce an outsider perspective and prevent researcher bias. The complete mapping, "How to…" prompts, and outputs of these sessions are provided in Appendix E. As detailed in Table 5, the process moved from using broad "How to…" questions (van Boeijen et al., 2020) to using these for targeted, convergent problem-solving. The output of these sessions was categorised using a Morphological Chart (van Boeijen et al., 2020) to generate cohesive structural concepts. To objectively select the final direction, the researcher conducted a Weighted Criteria Evaluation (van Boeijen et al., 2020). While the

evaluation was executed individually by the researcher, subjective bias was mitigated by strictly anchoring the scores to the empirical design criteria established in Chapter 6.

Activity	Description	Participants	Duration (minutes)
Individual Ideation	Initial ideation about possible solutions	N/A	N/A
Cross-Industry Analogies	Systematic analysis of behavioural change mechanisms (including sports, finance, and product design sectors)	N/A	N/A
Expert Interview	Qualitative interview regarding top-down workflow transitions and habitual friction	1 Professional	30
Group Brainstorm 1	Ideation on the studio pillars (experiment, learn, communicate & grow) using “How to…” prompts and physical whiteboard mapping.	2 Design students	60
Group Brainstorm 2	Ideation focusing on targeted Heijmans barriers, mostly about learning, using specific “How to…” problem statements and post-it notes.	3 Design students	90

Table 5: Ideation Sessions

The resulting design concept—aimed at supporting developers in navigating trade-offs and breaking habitual friction—was subsequently refined through a series of iterative validation sessions. As outlined in Table 6, these feedback sessions actively engaged both the sustainability team and project developers to ensure the proposed intervention aligned with their pragmatic, commercial reality. The primary methodological objective of these sessions was to evaluate the initial design mechanics against real-world constraints, specifically testing for operational feasibility, cognitive load, and psychological safety. The qualitative feedback gathered during these activities was used to systematically iterate the design, triggering several critical strategic pivots that culminated in the final framework.

Activity	Participants	Amount of participants	Duration (minutes)
1	Sustainability team	10	45
2	Developers	5	45
3	Sustainability manager	1	30

Table 6: Feedback Sessions

Finally, to support the extensive qualitative synthesis and iterative design processes outlined above, various Artificial Intelligence (AI) tools were utilised throughout the research. Specifically, large language models were employed to assist with text restructuring and ideation, while the AI-powered platform Lovable was used to prototype digital interfaces during the Develop and Deliver phase. A comprehensive, transparent declaration of these tools, their specific applications, and the ethical boundaries maintained during their use is provided in Appendix F.

4. Analysis of the Results

This chapter presents the empirical findings gathered from the internal analysis, including semi-structured interviews, document analyses, and observations at Heijmans Real Estate. Following the two-step methodology outlined in Chapter 3, the analysis is structured to first map the specific decision-making outcomes of the selected projects (Within-Case Analysis), before synthesising the universal organisational barriers (Cross-Case Thematic Synthesis).
The objective is to map the daily operational reality of the project developers and diagnose exactly how and why the implementation of the corporate sustainability strategy is stagnating. By analysing the standard development process, the prioritisation of project constraints, and the internal dynamics of knowledge transfer, this chapter directly answers the first sub-question of this research. It transitions the theoretical concepts (e.g. habitual friction and organisational silos) into practical, observable business challenges, laying the groundwork for the redefined design goal.

4.1 Within-Case Analysis

Before identifying the overarching behavioural themes across Heijmans, it is essential to establish the specific operational realities and decision-making outcomes within the three selected project environments. Rather than evaluating the physical buildings, this section diagnoses how developers navigated sustainability within their specific project constraints.

4.1.1 Case 1: traditional way

This case represented the standard, custom-built development process within a complex urban environment. The outcome of this project demonstrated that when developers operate within their most trusted, traditional routines, the cognitive space required for sustainable exploration is severely limited. Because the developer had to dedicate immense resources to mitigating spatial and financial risks, sustainability was reduced to a compliance exercise. The project successfully met the bare minimum legal sustainability requirements (e.g. BENG regulations), but the established routine did not allow for proactive, double-loop learning or the exploration of alternative sustainable interventions.

4.1.2 Case 2: friction point

This case involved a traditional build where an alternative, standardised development concept was seriously investigated but ultimately rejected. This environment served as a critical friction point. The outcome revealed that the developer attempted to deviate from standard practice to improve efficiency and potentially integrate better sustainable baselines. However, because the alternative concept lacked integrated financial and technical validation (e.g. exact investment costs or fire safety guarantees), the developer experienced acute cognitive overload. Unable to confidently defend the alternative concept against strict project margins, the developer predictably retreated to single-loop learning, abandoning the concept and falling back onto traditional custom-building routines to protect the business case.

4.1.3 Case 3: systemic constraint

This case placed the developer within the rigid framework of a predefined, industrialised housing concept. The outcome here demonstrated that standardisation successfully bypassed certain defensive routines; because the baseline sustainability metrics were pre-engineered into the product, the developer did not have to negotiate or sacrifice them during the feasibility phase. However, this systemic constraint created different behavioural frictions. While the technical sustainability was secured, the developer struggled to adapt the rigid framework to the complex, hyper-local spatial requirements of the urban environment, highlighting a tension between standardised sustainable solutions and custom urban integration.

4.2 Cross-Case Analysis

Once the specific outcomes of each project were established, a cross-case analysis revealed that regardless of the development method used, developers exhibit universal defensive routines caused by structural organisational barriers.

4.2.1 Developers' Context

To understand why sustainable impact is falling behind across all cases, one must first understand the primary role, intrinsic values, and operational constraints of the project developer. Developers at Heijmans function as generalists, they manage a highly complicated network of stakeholders and constraints to ensure a project's feasibility. As one developer illustrated: *"My design team consists of a building physics advisor, an installer, an architectural draughtsman, an architect, a structural engineer, a contractor, and myself […] There is already so much you have to comply with."* (Participant 4).

The interview data reveals that the daily reality of a developer is overwhelmingly exploitation-oriented. Their primary mandate is risk management and ensuring the financial feasibility of an area development. A developer's project performance is reviewed and managed by directors almost exclusively on traditional financial metrics, rather than on holistic sustainability outcomes. One participant summarised this mandate: "*The main objective is to guarantee what we promised in our permit, in our tender, and to the buyers […] within time and budget"* (Participant 3). Consequently, developers operate under immense cognitive and temporal pressure. Their standard routine is designed to navigate these strict commercial boundaries safely, leaving very little room for the exploration required to innovate or adopt radically new sustainable practices.

The interview data also reveals that the developers' professional identity is not exclusively tied to financial metrics. Their intrinsic professional motivation is to create durable, high-quality, and aesthetically pleasing living environments. As one participant explained after being asked why they wanted to become a developer:

> "*To make beautiful, strong plans where you can generate a return as a company, but where future residents and neighbours can live comfortably. That it has architectural quality, an added value for the future […] That is the fun part."* (Participant 3)

In practice, developers often align the concept of sustainability with long-term spatial quality and durability, noting that "*the most sustainable thing you can do is build buildings that don't stand for 50 or 75 years, but for two or three hundred years"* (Participant 4).
However, this intrinsic motivation operates within a highly complicated and constrained environment. Developers must navigate conflicting interests from municipalities, urban planners, and strict aesthetics committees, all while managing these tight financial margins. The operational reality of a developer is heavily focused on mitigating these risks to ensure the project remains viable, focusing on the exploitation. As one developer noted regarding a complicated site: "*Two years ago, we could just as well have thrown it in the bin […] We really had to fix a lot to get it to a healthy business case."* (Participant 2).

4.2.2 Prioritising Sustainability

Within this high-pressure environment, the data indicates a structural issue regarding how sustainability is prioritised during the critical design or feasibility phase. A recurring finding across the interviews is that while the corporate sustainability strategy is highly ambitious, these goals rarely translate into clear, non-negotiable targets at the inception of a specific project. Beyond mandatory legal requirements, hard sustainability specifications are often absent. Because sustainability is not structurally anchored as a hard requirement, it is treated as an optional extra. It is integrated only when developers feel they have the budget and time for it, with participants noting that sustainability is frequently *"sought too much in the margins"* (Participant 1). When developers are faced with complicated urban constraints or sudden budget deficits, sustainability is often the first element to be downgraded, as "*optimising just means cutting costs"* (Participant 4). The supremacy of the financial routine is heavily reinforced by management. When developers send out their phase documents for management to check, the sustainable ambitions are ignored, because the focus is on other Key Performance Indicators (KPIs). This tension between strategic ambition and operational reality causes significant frustration:

> "*They just say: "Approved, but please look at the construction costs again […] a margin of at least 8% must be possible." So, they simply impose an extra financial target. And I read*

nothing about the solar panels [...] What is more important: that I make an 8% margin, or that I achieve the BENG 2=0 standard?" (Participant 1)

While Participant 1 articulated this top-down friction explicitly, the data indicates that this dynamic operates implicitly across the wider project development team. Other interviewees did not directly critique management's review processes, but their reported behaviour reflects the exact same hierarchy: financial metrics are treated as non-negotiable baselines, while sustainable targets remain flexible. Because this direct critique originated from a single explicit quote, relying on it in isolation posed a methodological risk. Therefore, this specific finding was actively verified with the broader developer group. When presented with this dynamic and asked if they recognised themselves in the situation, the other developers confirmed the underlying truth: the necessity to protect the financial margin consistently overrides sustainable exploration.

Because developers are heavily reliant on traditional, custom-built development to navigate complicated urban sites, they are granted significant design freedom. However, this freedom also introduces a significant risk. While traditional methods offer the opportunity to select new sustainable options, they simultaneously increase the likelihood of non-sustainable outcomes: "*And when building traditionally, of course, you have the opportunity at that moment to choose what is most sustainable […] But within that, there is a greater risk that choices are also made that are not sustainable"* (Participant 4). This constant temptation to revert to familiar, unsustainable choices persists when developers are faced with strict legislation or budget pressures.

Developers actively recognise the commercial appeal of sustainable design, noting that "*if you look with your commercial glasses on, the sustainability stories are exactly what sells"* (Participant 2). However, because sustainability is not structurally anchored as a hard requirement, its implementation is frequently contingent on the project's financial buffer. When a project faces budget deficits, sustainability is often the first element to be downgraded. This decision is driven by the necessity to maintain the overall viability of the project rather than an opposition to sustainability:

> *"If you have a healthy profit... you can choose to generate a bit less turnover to invest in sustainability. But the moment your business case is on the edge, you are not going to implement those things, because then the project might not be realised at all. And you want it to be built, because we are dealing with a housing shortage."* (Participant 4)

4.2.3 Disconnect in Sustainable Advice

Heijmans possesses a wealth of internal sustainability expertise. However, the analysis shows a disconnect in how this knowledge is activated and transferred to the developers. Because project-specific sustainability targets are perceived as vague, developers do not inherently know what information is necessary. Knowledge transfer is not a proactive push from the organisation into the project, rather, developers must proactively pull this support. Consequently, experts are often brought in far too late in the process. When developers do seek advice from the sustainability team, the collaboration often stalls. Developers reported that the advice provided is highly focused on environmental impact but severely lacks integration with the commercial reality of the project.

A developer's core responsibility is to make informed decisions based on comprehensive project data: *"Our work is actually decision-making. Continuously making decisions. And if you do not have the right information to make a decision, you do not make the decision."* (Participant 4).

Because the sustainable advice frequently lacks cost calculations or procurement checks, it does not provide the complete information required within the developer's financial framework. This creates an additional administrative burden, the developer must independently calculate the financial risks of the sustainable alternative. Under the pressure of a tight business case, this lack of integrated data frequently leads to the rejection of the sustainable option:

> *"The sustainability advisor comes with an overview, but there are no investment costs included. [...] Furthermore, does it meet fire safety regulations? They could not answer that immediately. If they add a new product, it has to be checked against our quality standards.*

Ideally, you want the sustainability department to sit down with the quality and procurement departments and say: we have these alternatives that meet our standards, and this is the difference in investment." (Participant 1)

4.3 Current Professional Practice

Following the practice-based analytical lens of Kuijer (2014) introduced in Chapter 3, the empirical findings regarding the developer's daily reality can be explicitly deconstructed into four structural elements (Dorst, 2018). Mapping these elements exposes the cognitive and operational barriers preventing the integration of the sustainability strategy (Figure 10):

- **Values** (what drives the decision?): The intrinsic value driving the developers is the desire to build the city of the future, creating durable, aesthetically pleasing, and high-quality living environments that contribute to society, while also achieving commercial success. However, a severe systemic conflict exists: because management evaluates their performance almost exclusively on traditional financial KPIs, their intrinsic drive to create sustainable impact is structurally forced into a secondary position when budgets tighten.
- **Principles** (the unwritten rules?): The prevailing unwritten rules within the practice are shaped by ambiguity and risk. Firstly, because there are too many conflicting opinions on what sustainability actually entails for Heijmans (e.g circularity vs. energy efficiency), the principle dictates that hard, regulated targets (in the form of KPIs like BENG) take precedence over ambiguous, abstract goals. Secondly, because the system does not provide a safe space or financial buffer for failure, the overarching principle is that experimentation is inherently risky. Therefore, the budget and timeline are leading.
- **Methods** (how are decisions validated?): Decisions are validated through established financial calculation routines and proven traditional construction frameworks. This creates a disjointed workflow with the sustainability team. When the sustainability team proposes an alternative, their method of validation is predominantly environmental. Because this advice frequently lacks commercial integration and fails to account for competing project constraints (e.g aesthetics, acoustics, or fire safety), it cannot be seamlessly validated through the developer's established methods.
- **Actions** (specific operations performed?): Due to the lack of time, space, and financial resources to experiment safely, developers are forced to engage in defensive operations. They pull sustainable expertise into the project too late. When faced with conflicting sustainability advice, complicated urban constraints, or budgetary pressure, their primary action is to exhibit habitual friction: they actively reject new sustainable learning, avoid partnering with unknown suppliers or testing new materials, and instead fall back on trusted, traditional building routines to protect the project.

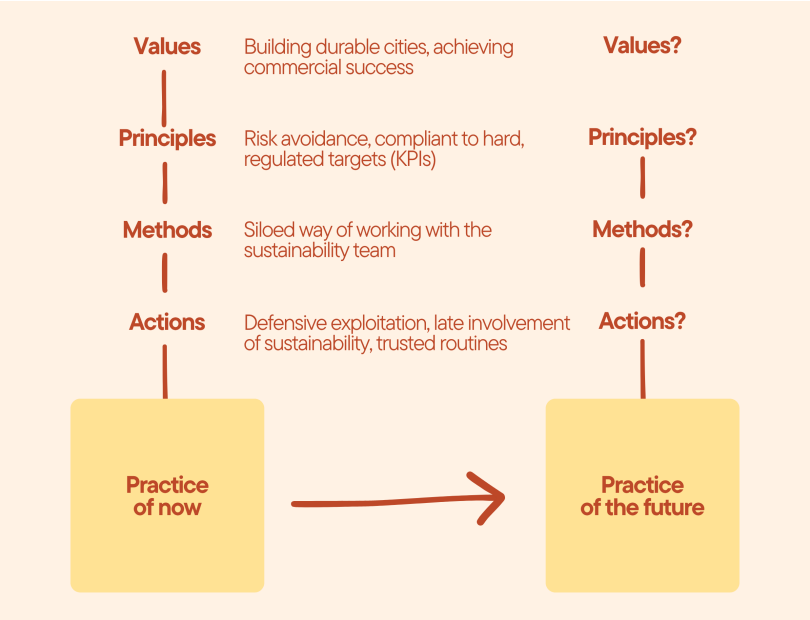


Figure 10: Current Practice

4.5 Summary of Empirical Findings

Table 7 provides a synthesised overview of the primary operational and structural challenges observed during the internal analysis, anchored by representative statements from the interviewed project developers.

Theme	Observed Challenge	Example quote
1. Developers' Context	1.1 Developers possess a strong intrinsic desire to build durable, high-quality environments, but must sacrifice this to fix struggling, complex business cases.	*"The most sustainable thing you can do is build buildings that don't stand for 50 or 75 years, but for two or three hundred years."* (Participant 4) *"Two years ago, we could have thrown [this project] in the bin... We really had to fix a lot to get it to a healthy business case."* (Participant 2)
	1.2 Developers suffer from cognitive overload trying to harmonise conflicting legislation, municipal demands, and technical advisors.	*"My design team consists of a building physics advisor, an installer, an architectural draughtsman, an architect, a structural engineer, a contractor, and myself... There is already so much you have to comply with."* (Participant 4)
2. Prioritising Sustainability	2.1 Because strategic goals are not anchored as hard project requirements, sustainability is treated as an optional, high-risk extra.	*"It has to do with the fact that sustainability is still sought too much in the margins. Perhaps out of fear, because we simply do not know what it will do to the costs."* (Participant 1)
	2.2 When project constraints tighten, management structurally enforces traditional financial KPIs over sustainable ambitions.	*"They simply impose an extra financial target. [...] What is more important: that I make an 8% margin, or that I achieve the BENG 2=0 standard?"* (Participant 1)
3. Disconnect in Sustainable Advice	3.1 Sustainability experts are pulled into the project too late, rather than their knowledge being a proactive, integrated push.	*"Our work is actually decision-making. Continuously making decisions. And if you do not have the right information to make a decision, you do not make the decision."* (Participant 4)
	3.2 The provided sustainability advice lacks vital commercial variables (e.g cost calculations, fire safety, procurement checks), making it unusable for the developer.	*"He comes with an overview, but there are no investment costs included. [...] If they add a new product, it has to be checked against our quality standards."* (Participant 1)
4. Risk Aversion & Habitual Friction	4.1 The lack of a financial buffer for safe experimentation forces developers to reject unknown variables to protect the immediate project viability.	*"The moment your business case is on the edge, you are not going to implement those things, because then the project might not be realised at all."* (Participant 4)
	4.2 The freedom to custom-build allows for sustainable choices, but under pressure, it significantly increases the likelihood of reverting to unsustainable routines.	*"And traditionally, of course, you have the opportunity at that moment to choose what is most sustainable... But within that, there is a greater risk that choices are also made that are not sustainable."* (Participant 4)

Table 7: Empirical Findings

4.6 Conclusion

The internal analysis illustrates that the stagnation of the sustainability strategy is not a result of individual unwillingness. Rather, it stems from a profound structural misalignment between the output of the sustainability team and the operational context of the developers. Fundamentally, the current implementation of the strategy is not user-centred.

Developers genuinely value creating durable, high-quality urban environments. However, when navigating complicated projects, they are subjected to strict financial KPIs, ambiguous sustainability targets, and siloed advice that lacks commercial integration. Because the current organisational structure does not provide the time or financial safety to safely experiment, developers experience cognitive overload when attempting to integrate abstract sustainable knowledge. The reality is that the current system simply does not allow sustainability to be prioritised.

In response to this systemic pressure and uncertainty, developers exhibit habitual friction. To ensure the project remains viable and passes financial reviews, they predictably revert to traditional, financially proven routines. This reliance on familiar methods protects the immediate project but blocks the double-loop learning necessary for a sustainable transition.

Therefore, a successful intervention must target this habitual friction objectively. It must bridge the procedural silo between the sustainability team and the developer, translating abstract environmental goals into practical, commercially viable choices early in the process, thereby aligning the strategy with both the developer's intrinsic values and their (financial) operational reality.

5. Literature Research

5.1 Contextualising the Empirical Findings

The internal analysis in Chapter 4 concluded that the stagnation of the sustainability strategy is not caused by individual unwillingness, but rather by severe structural misalignments. The data revealed a distinct disconnect between sustainability advice and commercial reality, forcing developers into cognitive overload and causing them to retreat into trusted, traditional routines to protect their projects. While the previous chapter mapped exactly what these cognitive and operational barriers are, this chapter investigates the deeper psychological and structural reasons why they persist. To rigorously contextualise and explain these empirical findings, this chapter systematically applies a series of theoretical frameworks. First, the observed disconnect between the sustainability team and the developers is explored through the epistemological challenge of inter-occupational collaboration (Raynard et al., 2025). Second, the cognitive overload developers experience when navigating strict urban constraints versus new sustainable demands is explained using the Cynefin framework (Snowden & Boone, 2007), which highlights the structural mismatch between complicated traditional tools and the inherent complexity of the sustainability transition. Faced with this complexity, Weick's (1996) allegory of dropping tools is then used to theoretically explain the behavioural resistance and habitual friction of developers refusing to abandon their trusted financial workflows. Finally, the chapter investigates why the conceptual leap from single-loop to double-loop learning (Argyris, 1982) fails to occur, preventing new sustainable knowledge from fundamentally altering the mental models of the developers (Kim, 1993). By contrasting these systemic barriers with Human-Centred Design (HCD) practices from other industries, this chapter ultimately defines the specific research gap this thesis aims to bridge.

5.2 Inter-Occupational Collaboration

The disconnect observed between the sustainability team and project developers is not merely a communication failure, it is a fundamental clash of knowledge paradigms. Raynard et al. (2025) define this as the epistemological challenge of inter-occupational collaboration. Different professions validate knowledge through entirely different lenses. The sustainability team operates within an environmental epistemology, where valid knowledge consists of ecological data, carbon reduction metrics, and long-term climate resilience. Conversely, the project developer operates within a commercial epistemology, validating knowledge through financial feasibility, immediate risk mitigation, and strict project timelines. When sustainability advice crosses this occupational boundary without commercial integration (e.g. lacking cost calculations), it does not meet the developer's criteria for valid, usable knowledge. Consequently, developers struggle with sensemaking, they cannot reconcile these new, ambiguous environmental demands within their established professional identity as financial risk managers, leading to the rejection of the advice (Lehtimäki et al., 2023; Raynard et al., 2025b). According to Weick (1995), individuals do not passively receive information, they actively engage in sensemaking: interpreting complicated or ambiguous situations based on their established identities and past experiences. Consequently, rather than viewing sustainability as a core responsibility, developers perceive it as an ambiguous, peripheral task that does not align with their ethos, leading to misaligned goals and poor integration.

5.3 Navigating Complexity

This epistemological clash is exacerbated by the highly dynamic environment in which Project-Based Firms (PBFs) operate. Snowden and Boone's (2007) Cynefin Framework, as explained in Chapter 2.3, categorises decision-making contexts into distinct domains:

- Simple: cause-and-effect is self-evident, the domain of best practice.
- Complicated: cause-and-effect requires analysis, the realm of known unknowns, the domain of experts.
- Complex: cause-and-effect is only clear in retrospect, the realm of unknown unknowns, the domain of emergence.
- Chaotic: no clear relationships exist, the realm of unknowables, the domain of rapid response.

Traditionally, construction projects are managed in the simple or complicated domain, where expert developers use established, predictable tools to find solutions. However, the sustainability

transition is dynamic, open and networked, in a complex context. The integration of novel, untested sustainable materials is an example of complexity being pushed into in a simple or complicated development process. A strategic mismatch occurs when developers attempt to use simple or complicated traditional tools to solve the highly complex, emergent challenges of the sustainability transition.

5.4 Professional Identity

Faced with this overwhelming complexity and the threat to their financial KPIs, organisational actors often resist adopting new strategies. Weick (1996) vividly illustrates this behavioural resistance through the allegory of wildland firefighters who refused to drop their heavy tools to outrun an exploding fire, ultimately resulting in their deaths. Weick identifies critical reasons for this refusal, four of which translate directly to the cognitive barriers observed within developers:

- Identity: Tools define the professional. As highlighted by Dainty et al. (2007), employees often resist standardisation and new workflows because it threatens their professional identity as unique problem solvers or craftsmen. For a developer, dropping their traditional, highly customised financial design methods creates an existential professional crisis.
- Control: Tools represent a cause-effect link to survival. Keeping the trusted tool feels safer than relying on an unfamiliar (sustainable) strategy.
- Justification: Without clear, non-negotiable reasons (such as a strict project briefing of explicit sustainable ambitions) to change, professionals persist with the known method.
- Consequences: People are doubtful if the new tool will actually make a difference. If the positive effects of the change are not evident, and do not feel psychologically plausible within the immediate project budget, a lack of change will remain.

They cling to their familiar tools—traditional routines—to avoid the perceived risks of the sustainable transition (Dorst, 2015; Weick, 1996). These factors result in biased selection criteria, where traditional methods are favoured simply because they align with the dominant organisational logic, even if a sustainable solution would be highly viable.

5.5 Cognitive Overload and Habitual Friction

The significant cognitive barriers are primarily driven by the structural environment of PBFs and a dominant management focus on financial KPIs. Within project-based environments, developers have high autonomy but are evaluated based on their ability to deliver projects strictly within budget and on schedule (Blindenbach-Driessen & van den Ende, 2010).
Exploring new sustainable alternatives introduces uncertainties regarding results and potential disruptions to established value chains, creating immense perceived budgetary risks (Abdulai et al., 2026; Oluleye et al., 2022). Faced with these cognitive barriers and the threat to their financial KPIs, developers experience massive cognitive overload. To cope, they exhibit habitual friction. This protects immediate project delivery but actively blocks the double-loop learning required for a long-term sustainability transition (Argyris, 1982; Kim, 1993).

Beyond cognitive identity, this resistance is deeply rooted in daily habitual behaviour. Research into the psychology of habits reveals that an attitude-behaviour gap often exists: high strategic awareness of sustainability does not automatically translate into eco-friendly behaviours due to the extreme difficulty of changing ingrained routines (Mazar et al., 2021). To overcome this, organisations must look beyond radical cognitive shifts and implement structural changes that alter the friction of daily tasks. The current organisational infrastructure actively creates friction for sustainable choices while making traditional choices effortless. Making sustainable choices low-threshold by reducing the friction for desired behaviours, while simultaneously adding friction to traditional, unsustainable practices, is essential for embedding new habits and overcoming the defensive retreat into old routines.

5.6 Organisational Learning

As foundational strategy literature establishes, a profound gap frequently exists between a board's intended strategy and the realised strategy that actually emerges in practice (Mintzberg & Waters, 1985). Because strategic directives are reinterpreted by the individuals executing them, new corporate strategies are rarely adopted exactly as top management initially expects. The dynamics of implementation frequently challenge the assumptions held by the board. To

understand how an organisation can adapt to this reality, the mechanisms of organisational learning must be examined.

Learning within organisations happens on two levels. Operational learning involves acquiring the know-how to complete procedural tasks, while conceptual learning involves the know-why: the ability to articulate a conceptual understanding of an experience and rethink underlying criteria (Kim, 1993). Argyris (1982) aligns this with single-loop and double-loop learning. In single-loop learning, organisations detect errors (e.g. high costs) and correct them within existing norms. However, single-loop learning is insufficient for the complex transition towards sustainability. This shift requires double-loop learning, which surfaces and challenges the deep-rooted assumptions, norms, and shared mental models of the organisation. Decision-making regarding new sustainable practices does not make sense to developers without this conceptual learning. This failure to bridge the gap between strategic intent and operational reality is further conceptualised by the Game Changers model (Dorst & Watson, 2023). This model highlights a structural blockage: design interventions and project-based learning happen bottom-up, while organisational strategy is formulated top-down. Because the two processes operate on different logics, bottom-up project innovations rarely achieve strategic impact unless the organisation actively engages in a learning dialogue to shift the wider context. The shared mental models of the organisation must be updated, otherwise, individuals will constantly revert to old, disconnected routines, rendering the organisation incapacitated in both learning and action.

5.7 Current Solutions in the AEC Sector

The academic world recognises how difficult it is to implement corporate strategies in PBFs. However, the Architecture, Engineering, and Construction (AEC) sector suffers from a severe blind spot regarding human behaviour. As Lu and Zhang (2016) explicitly state, the industry treats sustainability as a technical project requirement rather than an internal organisational transformation, severely neglecting the social dimensions of the employees executing the work. When AEC literature does address the human element of strategy implementation, it predominantly views behaviour through the lens of corporate politics and social power. Studies show that reaching consensus on sustainable innovations frequently relies on project managers using (aggressive) influence strategies to coerce stakeholders into compliance (Badi et al., 2020). Furthermore, when the real estate sector attempts to alter employee habits to meet ESG targets, it relies heavily on top-down digital nudging (Ijasan et al., 2026). These classic management approaches fail because they attempt to fix a deeply psychological problem with top-down coercion, failing to alter the underlying mental models of the developers (Kim, 1993).

5.8 the Missing Link: a Design-Led Approach to Strategy

While the change management literature understands why individuals resist change, overcoming entrenched habitual friction requires an approach that goes beyond traditional top-down mandates. In other highly complex sectors—such as healthcare, where professionals face similar cognitive overload when adopting new protocols—literature proves that taking a user-centric, design-led approach to implementation is highly effective at bypassing resistance. Rather than attempting to force compliance, these approaches focus on aligning the new processes with the actual operational reality of the employees and their professional identities.

This aligns with the principles of Strategic and Behavioural Design, which shift the focus from merely designing what the strategy is, to designing how employees can realistically integrate it into their daily workflows. A core component of this is adopting a participatory ethos. As highlighted in Human Resource Design (HRD) literature, actively co-designing processes with the users fosters genuine organisational learning, builds empathy, and aligns business objectives with human needs (Rossi, 2021; Silva & Marques, 2020). By treating strategy implementation as a collaborative design problem, organisations can act as strategic translators—converting abstract corporate goals into tangible frameworks that fit within the developer's commercial epistemology. Ultimately, this participatory approach neutralises defensive power dynamics and organically overcomes habitual friction by ensuring that new practices make sense to the people executing them.

5.9 Conclusion and the Research Gap

Extensive literature highlights the structural difficulties of implementing corporate strategies within decentralised PBFs (Blindenbach-Driessen & van den Ende, 2010). Within the construction and

real estate sectors specifically, the implementation of sustainable strategies is heavily skewed towards technical project outcomes, severely neglecting the social and behavioural dimensions of the employees executing the work (Lu & Zhang, 2016). When employee behaviour is addressed, existing research predominantly focuses on top-down mechanisms, such as political influence strategies (Badi et al., 2020) or digital nudging (Ijasan et al., 2026).

Consequently, as visualised in Figure 11, a distinct intersection gap emerges: while the AEC literature acknowledges that project developers frequently experience habitual friction and retreat into trusted routines under pressure, there is a severe lack of research exploring how this resistance can be overcome without relying on top-down coercion. Specifically, the literature fails to address how a user-centric, design-led approach can be applied internally within a PBF to lower the cognitive threshold of sustainable decision-making. There is a need to understand how design interventions can act as a bridge between abstract corporate strategy and the daily, operational reality of the project developer, organically altering their routines to facilitate sustainable, double-loop learning.

This thesis addresses this gap by investigating how a human-centred, design-led approach can organically overcome habitual friction and facilitate the implementation of sustainable strategies in a project based firm.

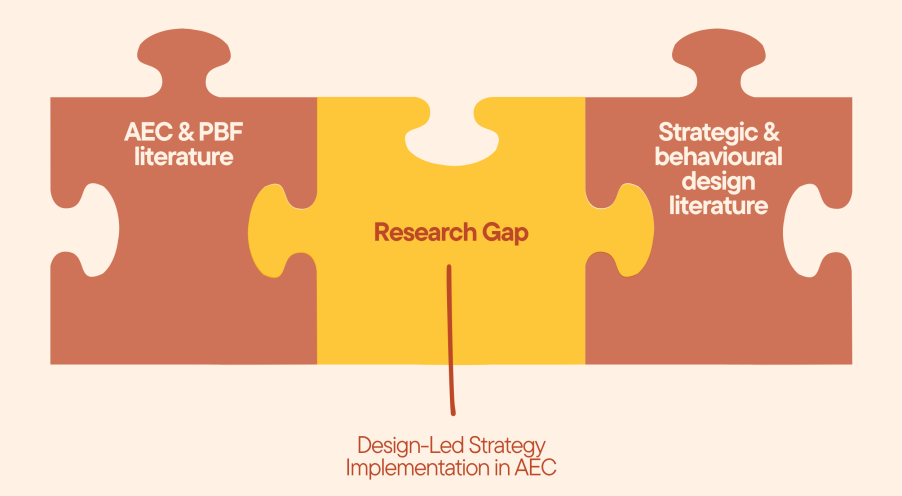


Figure 11: Research Gap

6. Reframed Problem

Following the empirical internal analysis (Chapter 4) and the psychological literature review (Chapter 5), it is evident that the stagnation of the sustainability strategy is rooted in deep systemic and behavioural frictions. As concluded in the previous chapter, overcoming this habitual friction cannot be achieved through traditional, top-down management mandates. Instead, it requires a human-centred, design-led approach. This chapter marks the transition from analysing these psychological barriers to actively defining the design intervention. The synthesis of the preceding chapters directly answers the first sub-question of this research: *What barriers and behavioural mechanisms currently cause project developers to revert to traditional processes and resist strategic changes?*

The empirical findings demonstrated that the stagnation is caused by a structural misalignment between the output of the sustainability team and the operational context of the developers. The literature review confirmed that when developers face these barriers, they experience massive cognitive overload and retreat into defensive routines. By applying a strategic design lens to this problem, the developer is no longer viewed as a non-compliant employee, but as the end-user of the corporate strategy. Currently, the strategic implementation process actively hinders this user, locking them into defensive routines and blocking the double-loop learning required for a sustainable transition. In essence, the current system fails to facilitate the vitality needed within the development process.

To resolve this, the starting problem must be reframed. We must shift from treating strategy as a top-down management issue to treating it as a user-centric design challenge, focusing on how to redesign the implementation of the sustainability strategy to support the developer rather than coercing them.

6.1 Friction Areas

To transition from analysis to design, the Discover phase can be summarised into three specific reasons for the habitual friction identified. Rather than viewing these separately, they serve as the total foundational context that the new design must resolve:

1. The lack of clarity regarding project-specific sustainability targets, combined with management's strict focus on financial performance, causes developers to view sustainability as an additional administrative burden. Because the corporate strategy remains abstract, developers cannot make sense of it within their operational reality. To maintain control and manage risks in highly complicated urban projects, they defensively revert to familiar, financially predictable routines.
2. The late involvement and procedural detachment of the sustainability team create disjointed workflows. Currently, the sustainability team acts as an external advisor rather than an integrated project partner. Their advice is frequently purely environmental, failing to account for changing project costs, logistical constraints, or competing regulations. Because the advice lacks commercial viability, it becomes unfeasible for the developer to implement, again, predictably resulting in a retreat to trusted routines.
3. There is a severe lack of time, space, and financial resources to experiment safely. Testing sustainable materials or partnering with unknown suppliers is inherently risky. Because any delay or failure during an experiment is deducted directly from the developer's individual project margin, internal financial structures penalise innovation. Consequently, developers are forced to rely on traditional working methods, leaving no room for the organisation to learn and adapt.

6.2 Systemic Disconnect

As visualised by these three friction areas, the core problem is a systemic (relational) disconnect between three crucial nodes: the strategy, the developers, and the sustainability team (see Figure 12 on the next page). Summarising, the strategy is perceived as a mandatory afterthought, the sustainability team lacks the structural mandate to integrate early or intervene, and the developers are left to navigate the resulting complexity alone.

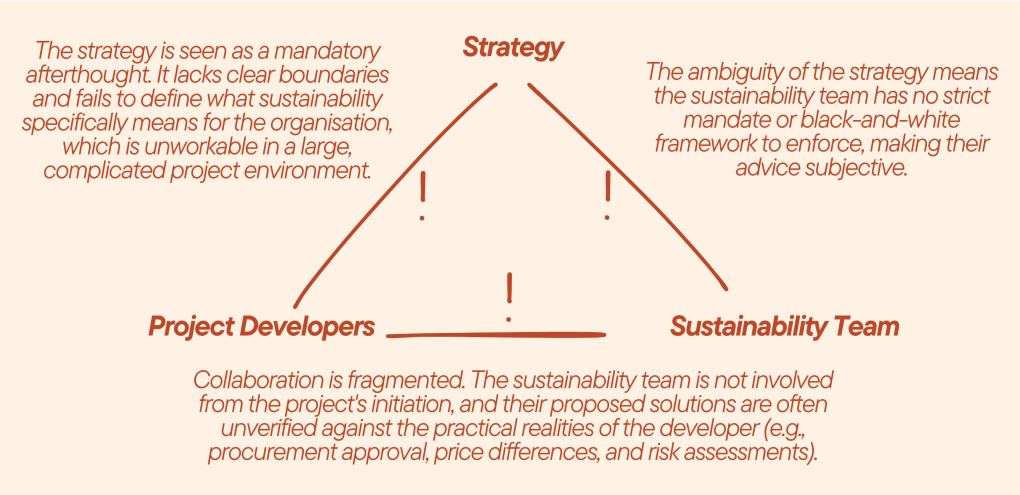


Figure 12: Systemic Disconnect

6.3 Design Goal

The synthesis of this systemic disconnect exposes the core of the challenge: the current system hinders the developer from adopting new practices. The starting problem can be reframed from a failure to meet corporate targets to a failure of user-centric organisational alignment. This leads to one clear, consolidated design goal that marks the end of the Discover phase and sets the boundaries for the ideation phase:

To design an adaptive, user-centric conceptual framework that empowers project developers to safely step out of their trusted operational routines, facilitating continuous, iterative collaboration between the developers and internal sustainability expertise to create sustainable value and foster long-term organisational vitality.

6.4 Design Vision

To successfully answer the design goal, the intervention must not merely be a new process or checklist; it must facilitate a fundamental transition toward a desired future professional practice. To achieve this, the intervention must systematically alter the four structural elements of the developer's current reality (Kuijer, 2014; Dorst, 2015), shifting them from a state of habitual friction to a state of organisational vitality. This is visualised in Figure 13 on the next page.

- **Values** (what drives the decision?): The developer's intrinsic drive to build the durable city of the future is no longer suppressed by traditional financial KPIs. In the future practice, the system empowers them to view commercial success and sustainable impact as integrated, mutually reinforcing goals rather than competing priorities.
- **Principles** (the unwritten rules?): The prevailing principle shifts from risk avoidance and strict compliance to safe exploration. Because the context of a sustainable transition is constantly changing, the new unwritten rule is that double-loop learning is structurally prioritised. The system provides the psychological and financial safety required to question underlying project assumptions without immediate threat to margins.
- **Methods** (how are decisions validated?): Decisions are no longer validated through disjointed, purely financial routines or isolated environmental advice. Instead, validation occurs through a living, user-centric conceptual framework—a strategic translator that seamlessly merges commercial viability with sustainability expertise from the very inception of a project.
- **Actions** (specific operations performed?): The intervention fundamentally alters how developers act under pressure. Because the new framework is bottom-up and offers less friction, developers no longer engage in defensive, single-loop exploitation. Instead, their primary action shifts to generative collaboration: they proactively step out of their trusted routines to continuously co-create adaptive, sustainable practices alongside internal expertise.

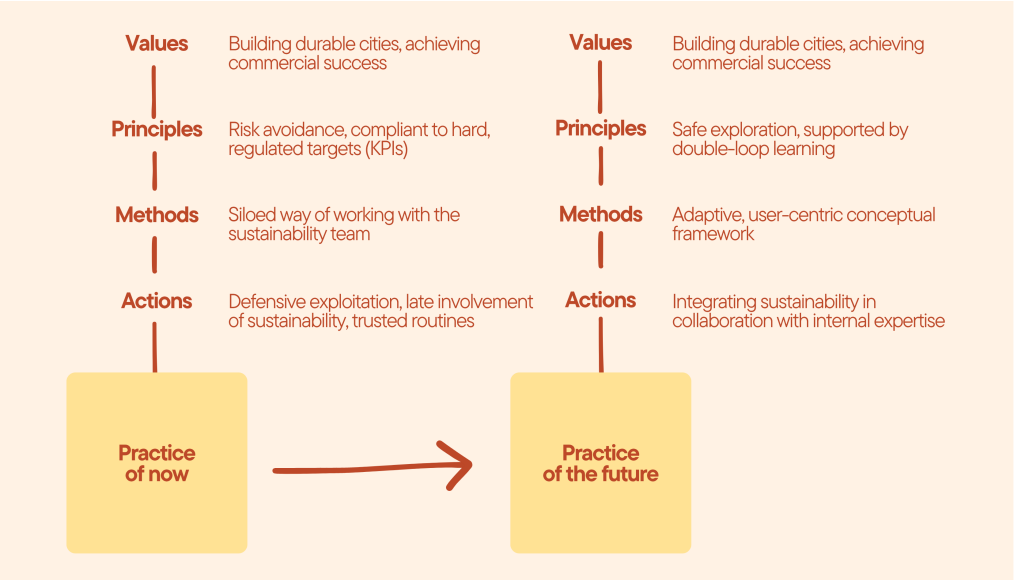


Figure 13: Future Practice

Fostering this specific alignment creates the conditions for organisational vitality to thrive—the energetic capacity of an organisation to continuously learn, adapt, and creatively tackle open-ended challenges. Crucially, this thesis will deliver the first validated iteration of this framework, structurally designed to empower the developers and sustainable disciplines to continuously update their shared Methods and Actions as urban challenges evolve.

Therefore, the design vision driving the creative phase is defined as follows:
The project developers at Heijmans should experience that navigating the sustainability transition fosters organisational vitality. To achieve this, the intervention must act as a frictionless, bottom-up framework that empowers them to safely step out of single-loop routines and continuously co-create adaptive, sustainable practices alongside internal expertise.

6.5 Design Criteria

To ensure the final design intervention successfully embodies the vision of vitality, it must adhere to a specific set of design criteria. These criteria serve as the boundaries for the ideation phase. As visualised in Table 8, every requirement is directly traceable to the empirical friction areas identified in the current practice (Chapter 4) or the psychological barriers synthesised in the theoretical framework (Chapter 5).

Design Criterion	Functional Requirement	Theoretical & Empirical Derivation
1. Provide actionable clarity	To prevent cognitive overload, the intervention must translate abstract corporate sustainability ambitions into concrete, workable parameters at the very inception of a project.	*Empirical*: Project target ambiguity. *Theoretical*: Cognitive overload.
2. Ensure commercial integration	The intervention must empower developers to immediately validate sustainable solutions against financial and practical feasibility checks, aligning with their established risk-management identity.	*Empirical*: Absolute dominance of financial KPIs. *Theoretical*: Professional sensemaking.

Design Criterion	Functional Requirement	Theoretical & Empirical Derivation
3. Facilitate generative collaboration	The intervention must structurally integrate internal sustainability expertise into the development process, replacing the disjointed, external advisor-client dynamic.	*Empirical*: Procedural silos and disjointed workflows.
4. Stimulate early exploration	To prevent developers from defensively locking into traditional routines, the mechanism must proactively engage them early in the feasibility phase to establish sustainable choices as the foundational baseline.	*Theoretical*: Habitual friction and defensive routines.
5. Foster conceptual learning	The intervention must provoke joint reflection between disciplines, elevating discussions from mere material selection to a shared definition of project value.	*Theoretical*: Double-loop learning.
6. Cultivate a safe testing ground	The intervention must explicitly carve out the conceptual space and financial safety necessary for the team to experiment and make calculated mistakes without immediate threat to individual project margins.	*Empirical*: Systemic lack of time, space, and financial resources for safe experimentation.
7. Honour professional identity	The intervention must organically align with the intrinsic values of the developers, embedding seamlessly into Heijmans' operational culture to ensure genuine, enthusiastic adoption rather than forced compliance.	*Empirical*: Mapping of the Current Professional Practice. *Theoretical*: Bottom-up vs. top-down strategy implementation.

Table 8: Design Criteria

6.6 Conclusion

The formulation of the design goal, its guiding vision of vitality, and the seven design criteria mark the definitive conclusion of the Discover and Define phases. By synthesising the within- and cross-case analyses from Chapter 4 with the psychological frameworks from Chapter 5, the overarching diagnosis is clear: the primary barrier to sustainable strategy implementation is not technical incompetence, but deeply entrenched defensive routines aggravated by the rigid structure of a project-based firm. As demonstrated by the reliance on baseline financial routines in Case 1 and the active retreat to traditional methods under pressure in Case 2, the psychological and financial space required for double-loop learning is absent. This establishes theoretical replication; these behavioural barriers—specifically the dominance of single-loop exploitation over generative exploration—are the result of systemic organisational friction, rather than an isolated incident on a difficult project. Therefore, the starting problem is no longer viewed as a top-down compliance issue, but as a strategic design challenge. To bridge this implementation gap, the design intervention cannot merely provide more technical sustainability information or administrative checklists; it must actively disrupt these defensive routines and provide a frictionless, safe framework for collaborative frame innovation.

Guided by the seven established criteria, the research will now transition into the Develop phase. The following chapter will initiate this creative process by systematically exploring external inspiration and cross-industry analogies to ideate potential structures for this vital intervention.

7. Developing

The Discover and Define phases of this research established that the primary barrier to the sustainability transition at Heijmans Real Estate is not a lack of technological capability, but the habitual friction of project developers defaulting to cost-driven routines out of professional self-preservation. Having diagnosed this systemic cycle of single-loop learning and epistemic isolation, the design process now transitions into the Develop phase. This phase is guided by the second sub-question of this research: *Which design principles and frameworks can be utilised to disrupt the found cause (their routines) and foster organisational learning within a project-based firm?* To systematically answer this question, the ideation process followed the principles of the Double Diamond design framework, moving through distinct phases of divergent ideation and convergent selection.

The design process commenced with a broad exploratory phase. This involved internal brainstorming, researching external industry analogies, and conducting an interview analysing a case of failed organisational resistance at a different corporation (fully documented in Appendix D). This initial exploration yielded a crucial insight: traditional, top-down compliance tools inherently trigger defensive routines. This realisation necessitated a strategic pivot. Rather than designing another static intervention, the focus shifted to designing a collaborative learning infrastructure. To anchor this structurally, the research integrated Kees Dorst's studio model (2025) as the primary theoretical framework to draw inspiration from. With this framework established, the ideation again moved into a divergent phase. Two targeted brainstorming sessions were conducted with fellow design peers to generate specific, culturally aligned mechanics that could operationalise the studio model within Heijmans (raw output is provided in Appendix E). To synthesise these fragmented ideas, a Morphological Chart (van Boeijen et al., 2020) was utilised to combine individual solutions into distinct conceptual options. Finally, a Weighted Criteria method (van Boeijen et al., 2020) was applied to objectively evaluate these pathways against the project's design criteria from Chapter 6.5.

This chapter details each of these methodological steps, illustrating how the initial exploration ultimately converged into the final strategic design intervention.

7.1 Exploration

To successfully design an intervention that pulls developers out of their habitual routines, the Develop phase commenced with a broad, divergent exploration. As detailed in the overarching methodology (Chapter 3.4), the objective was to generate a multitude of solutions, drawing inspiration from internal brainstorming, cross-industry analogies, and qualitative insights on organisational resistance.

Initial brainstorming generated a wide array of targeted interventions designed to explicitly alter developer behaviour. As summarised in the ideation visual (see Figure 14), these concepts explored different mechanisms of influence, ranging from compliance to gamification. On the procedural side, ideas focused on rigid workflow mandates, such as a green default toolkit where sustainable materials are pre-selected and require active opt-outs, or mandatory joint sign-offs from a sustainability partner before a project can proceed. Conversely, to leverage financial gamification, concepts explored incentivisation through ring-fenced budgets unlocked via sustainable co-creation, or sustainability bounties offering micro-rewards for testing new metrics. Finally, relational interventions aimed to bridge the disciplinary divide, proposing project swaps or value translation workshops designed to create empathy between the financial and ecological domains.

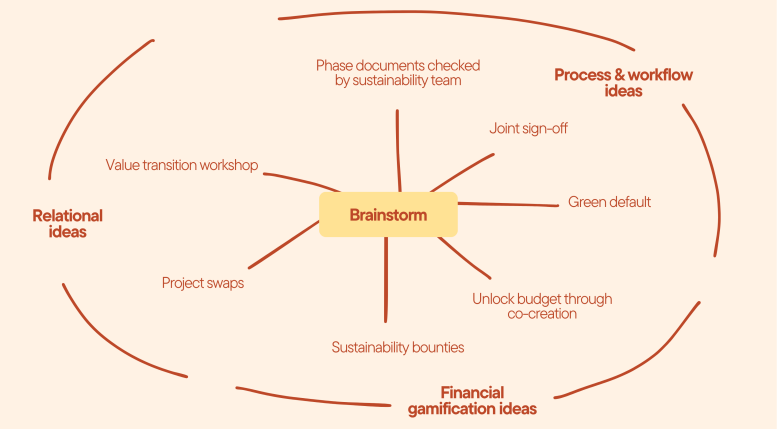


Figure 14: Summary of Individual Ideation

Zooming out from these initial ideas and to understand how systemic routines are broken outside the construction sector, several analogies were analysed (see Figure 15). These revealed that behavioural change fundamentally relies on environmental safety. For instance, the introduction of the Fosbury Flop in high jumping was only possible because soft mats provided athletes with the psychological safety required to abandon their traditional jumping routines. Similarly, overcoming entrenched habits requires deliberate choice architecture. True behavioural change in personal finance is rarely achieved by saving "whatever is left" at the end of the month, but rather by ensuring savings are automatically deducted first, just as a backpacker using a smaller bag must inherently change their packing routine, resulting in packing less. Finally, historical shifts in product design demonstrate that these behavioural nudges only take root through fundamental integration. Features like three-point seatbelts in cars and zero-step thresholds in buildings only succeed when embedded as foundational design criteria, rather than being treated as optional, bolted-on extras like external wheelchair ramps (the alternative to building with no steps).

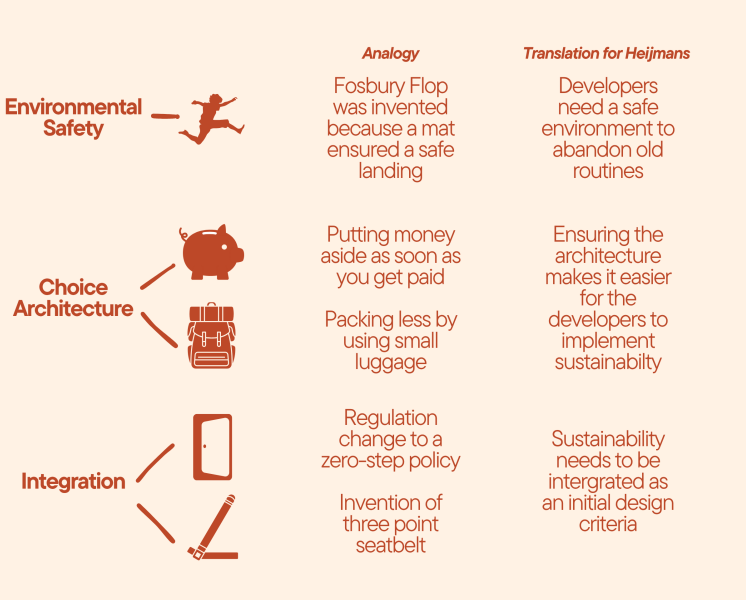


Figure 15: Highlighted Analogies with their Translation for Heijmans

Synthesising the initial brainstorming with these cross-industry analogies establishes clear requirements for breaking habitual friction at Heijmans. The analogies demonstrate that the intervention should proactively carve out a safe environment for experimentation, establish a choice architecture that naturally defaults to sustainable decision-making, and structurally integrate these elements into the developers' existing routines. The individual ideation reveals exactly how these theoretical mechanisms can be operationalised: financial tools (such as ring-fenced budgets) are essential to provide the tangible, risk-free space required for this environmental safety, while relational interventions hold significant potential to structurally integrate the disjointed workflows between developers and the sustainability team. Moving into the next stage of design, these combined avenues require further iteration to translate from abstract inspiration into workable corporate processes.

To ground these concepts in human reality, an interview was conducted with an employee experiencing a major, top-down workflow transition at a news broadcasting organisation, as concluded in Figure 16 on the next page. The organisation attempted to shift their thematic approach. The transition failed to take root because it was not user-centred, the new system was conceptualised by individuals who did not understand the extreme temporal pressure of the actual work. This created a severe misalignment with operational reality: the new interface made it highly difficult for employees to locate vital data quickly. Trying to navigate this counter-intuitive system while facing strict deadlines caused massive cognitive overload and the fear of missing critical news updates. To relieve this mental burden and ensure their immediate survival on the job, employees engaged in active habitual friction. They secretly reverted to their old routines, creating hidden personal folders to bypass the new system entirely. The crucial takeaway from this interview is that overriding the actual operational context of the user inevitably leads to cognitive overload, resulting in frustration, shadow-systems and the rejection of the strategy.

The structural parallels between the news broadcasting transition and the Heijmans sustainability strategy are striking. In both scenarios, the failure is not rooted in the employees' unwillingness to change, but in a severe epistemological clash between the designers of the strategy and the operators on the ground. Just as the reporters faced temporal pressure, project developers face extreme commercial and risk-management pressures.

When a top-down mandate fails to incorporate this operational reality, the psychological result is identical: cognitive overload. To survive this overload, both the journalist and the developer engage in self-preservation. The journalist's creation of shadow folders is the exact behavioural equivalent of the developer retreating to traditional, single-loop (financial) routines.
While this external interview does not provide a direct functional solution, it validates the universality of the problem. It validates the empirical finding of Chapter 4, that if a new strategy does not alleviate operational pressure and lower the cognitive threshold of decision-making, it will inevitably trigger defensive routines. Any proposed intervention that overrides the daily operational reality of the developers will inevitably be rejected in favour of shadow systems, draining the vitality of the transition.

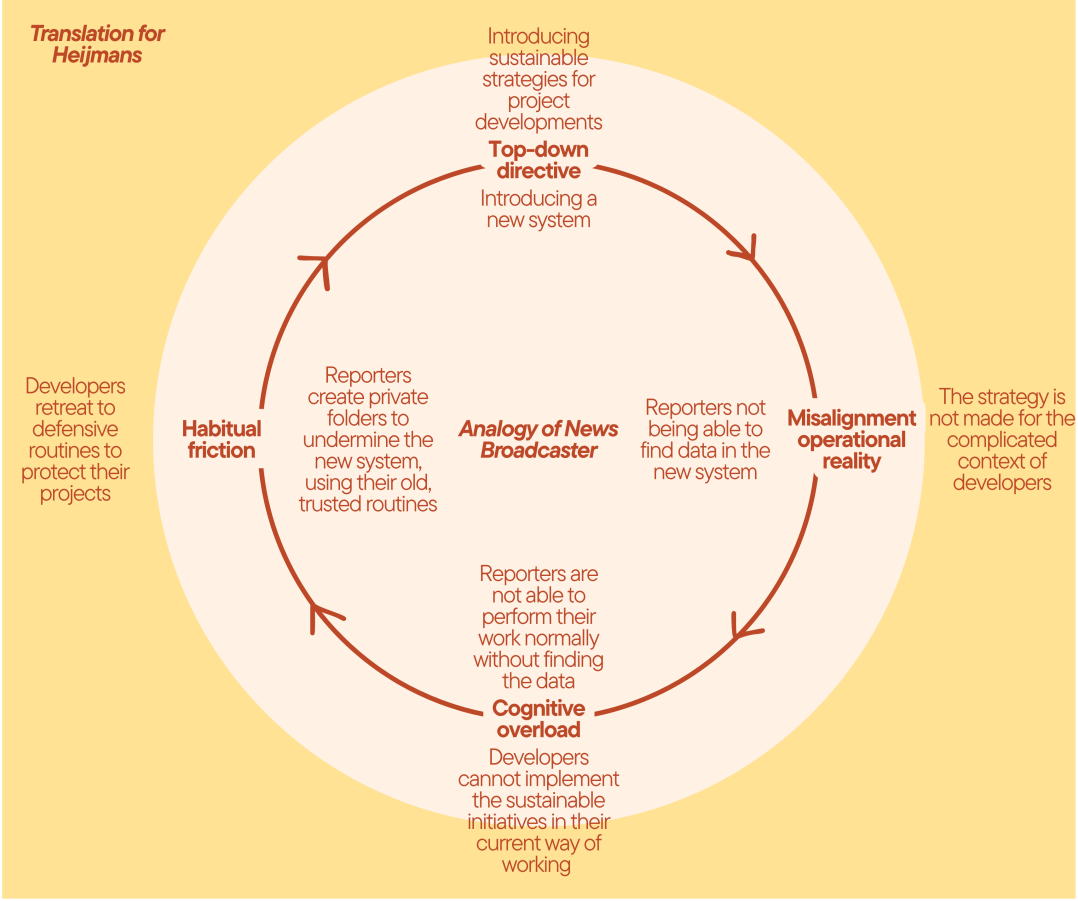


Figure 16: Analogy Interview at News Broadcaster with its translation for Heijmans

7.2 Pivoting

Evaluating the initial brainstorm concepts against the insights from the external analogies and the broadcasting interview triggered a fundamental realisation: implementing a single, static intervention would ultimately fail. As established in Chapter 6, the sustainability transition is not a linear, complicated problem, it is open, complex, networked, and dynamic (Dorst, 2025). Because the endpoint of this transition is uncertain and constantly evolving, attempting to force developers into a new, rigid process is merely another form of top-down coercion. It repeats the exact mistake the organisation is currently making with the overarching sustainability strategy. Designing a top-down intervention to address a top-down implementation issue is self-contradictory. Furthermore, static interventions strip the users of ownership. If developers and sustainability experts are simply handed a new tool or forced into a mandatory workshop, they remain passive executors. This prevents the conceptual, double-loop learning required to alter their shared mental models (Argyris, 1982).
To help achieve true organisational vitality, the solution cannot be an intervention designed for the developers, it must be an infrastructure that equips the developers and the sustainability team to design the solutions themselves. They must be given the safe space to jointly explore, make sense of the complexity, and take ownership of the transition. Consequently, the ideation phase

deliberately pivoted away from designing static behavioural interventions, moving instead towards designing a systemic, collaborative infrastructure.

7.3 Studio Model

To facilitate innovation within an open and complex context, a fundamentally different learning infrastructure within the organisation is required. The studio model, developed by Kees Dorst (2025) based on the working methods of advanced design and architectural firms, provides a framework specifically designed to navigate such transitions.
Rather than imposing rigid, top-down rules, the studio operates as a dynamic learning environment. As Dorst notes, an organisation is traditionally a structure built to formalise activities, but in a networked transition, these boundaries become arbitrary and must be constantly questioned. The studio actively prevents the organisation from falling back into classical patterns by establishing a set rhythm of four core activities:

- **Experiment**: Testing new approaches in a safe, bounded environment.
- **Learn**: Extracting knowledge from both successes and failures.
- **Communicate**: Sharing these insights widely to align the organisation and receive external feedback.
- **Grow**: Mirroring the learnings with deep reflection and critically challenging existing assumptions and mental models.

The primary function of this model is to initiate and inspire new reframing projects, syncing the bottom-up movement of ideas with top-down strategy. Crucially, the studio maintains a healthy tension, it is never truly resolved and never finished. If a routine works perfectly, the studio moves on to challenge the next certainty. Ultimately, this framework satisfies the requirement for double-loop learning. By embedding these four pillars into the daily rhythm, the model actively creates what Dorst (2025, p. 169) describes as the lifeblood of adaptation: "*The studio gives life to change. It is the vitality of the organisation."* This theory provides the perfect foundation for designing Heijmans' new collaborative learning infrastructure for strategy implementation.

7.4 Ideating the Studio Mechanics

While the studio model provides the theoretical framework, it must be carefully translated into the specific culture of Heijmans. As established in the exploratory phase (Chapter 7.1), to successfully break habitual friction, the intervention cannot rely on generic roll-outs. Instead, it must proactively cultivate a financially safe environment for experimentation, establish a choice architecture that lowers the cognitive threshold, and structurally integrate these new learning mechanics into the developers' existing commercial routines. To define how this collaborative framework would function, the ideation process transitioned into the collaborative, participatory sessions, as detailed in Chapter 3.4.

The first collaborative exploration aimed to stretch the solution space across the four core studio pillars: Experimenting, Learning, Communicating, and Growing. As visualised in the thematic cluster map in Figure 17 (next page), the ideas from Brainstorm session 1 ranged from radical disruption to high-engagement formats. Within the realm of experimentation, ideas focused on breaking routines through radical disruption, such as introducing a sustainable instigator (a designated rebel who secretly alters the work environment to force sustainable behaviour) or hosting extreme future-proofing sessions that hypothetically ban traditional materials like concrete or steel. To address learning and bridge the epistemological gap, the session deliberately moved away from traditional corporate lunch lectures towards immersive formats, proposing physical shadowing days, Virtual Reality (VR) environments, and museum exhibitions. For communication, the initial objective was to ensure sustainable insights permeate the internal organisation without feeling like administrative spam. However, to align more with Dorst's studio model, this focus actively shifted towards external communication designed to harvest feedback from the broader operational environment. This led to high-engagement, low-threshold concepts including fake leaking memos, designed to intentionally provoke discussion, sponsored pub quizzes, and organising a pitch event. Finally, to facilitate the growing phase and trigger the missing double-loop learning, ideation focused on making vulnerability safe. Concepts in this area included post-completion project autopsies, delayed automated reflection emails sent six months into the future, and the normalisation of mistakes by sharing professional blunders via lighthearted voice memos.

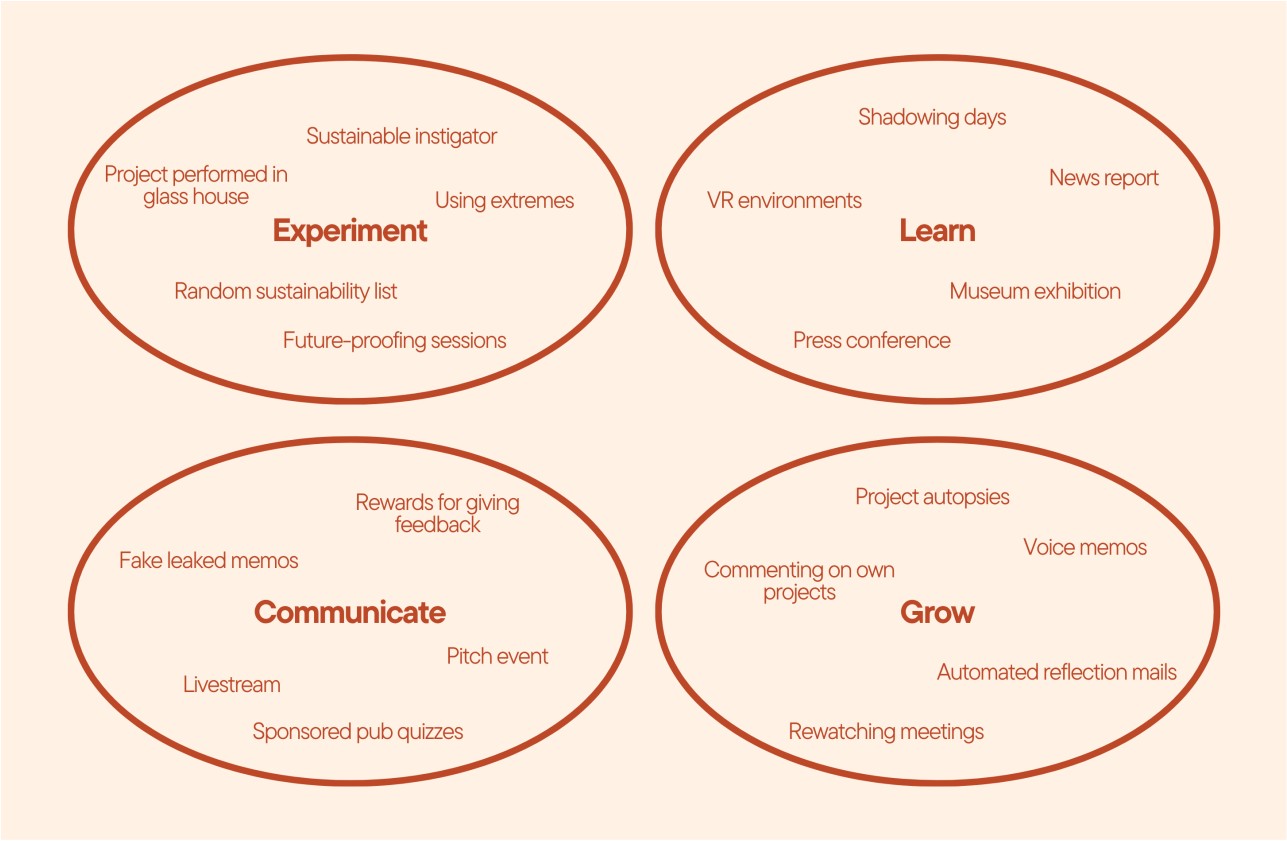


Figure 17: Highlights from Brainstorm 1 about the Studio Mechanics

Evaluating the output of this brainstorm session yielded a critical insight: the generated concepts still focused too heavily on prescribing how developers should experiment or learn, rather than creating the safe environment required to enable them to do so. Consequently, these highly specific ideas were abandoned. The defining takeaway for the subsequent ideation phase is that the design focus must shift from “How to…” to “How to structurally facilitate…”. This reinforces the core premise established in Sections 7.2 and 7.3: Heijmans requires a supportive infrastructural framework, not a standalone behavioural gimmick. Furthermore, it solidified the requirement that the communication pillar must explicitly face outward to actively gather external feedback.

Building directly upon the realisation that developers require structural facilitation rather than behavioural gimmicks, a new group of students was engaged to introduce fresh perspectives for Brainstorm 2. To strictly guide this session, five targeted “How to…” questions were formulated. These questions actively translated the theoretical requirements established in Section 7.1 (relational integration, safe experimentation (environmental safety), choice architecture, structural integration, and operational reality) into Heijmans-specific design challenges.

To address the separated workflows between project developers and the sustainability team, the first two questions asked: “How to learn from fellow developers?” and “How to learn from the sustainability team?”. Concepts aimed at forcing cross-pollination included formal exchanges (swapping offices for a day, or shadowing days), monthly brainstorm sprints, half-yearly internal fairs, museum-style expositions, and integrating sustainability advisors directly into weekly project huddles. The students highlighted that in a high-pressure corporate world, relational interventions only succeed if they require zero to little preparation. The principle of just showing up by simply requiring physical presence (e.g. at an internal fair or huddle), the intervention demands no prior mental space from the developer, thereby actively preventing cognitive overload.
To navigate the extreme time scarcity of the developers, and thus respect their operational reality, the third question asked: “How to seduce employees to share knowledge?”. To bypass heavy administrative burdens, the choice architecture of the ideas leaned towards low-effort, high-reward, default mechanisms. Concepts ranged from physical insights noticeboards, 15-minute weekly wake-up sessions, and streamlined e-learnings, to tying knowledge sharing to existing

workflows, such as triggering an automated evaluation form or a mandatory insight drop into a wider community channel whenever a project reaches a new milestone. Other ideas included creating an exclusive, high-value internal event or replacing written reports with a quick video recorded at a project's conclusion.
To address the psychological barrier of failure and create a safe environment for experimentation, the fourth question asked: "How to reframe failed sustainability ambitions positively to empower sharing?". Ideas focused on destigmatising mistakes, such as celebrating learnings on a wall of fame, an award for risk champion of the month, introducing project bonuses for taking risks, or hosting sessions where sharing a mandatory fail is the required entry ticket. This exploration yielded two major realisations. First, true psychological safety requires structural financial backing. Developers can only engage in safe experimentation if there is a guaranteed financial risk budget explicitly designed to absorb the impact of failed sustainability ambitions, resulting in the concept of a regional risk budget. Second, sharing these failed experiments must be done nationally rather than locally, to prevent other regions from taking the exact same risks (and its financial consequences).
Finally, the fifth question asked: "How to design a system that easily lets developers find answers from an experienced colleague?" To ensure true structural integration, the brainstorm moved away from heavy, text-based databases that demand extra administrative time and trigger cognitive overload. Instead, concepts gravitated towards embedding highly visual, instantly searchable interfaces directly into the developers' existing daily routines. Ideas included an online internal directory with "approach me for…" tags, an attraction park style visual map where active building sites act as clickable attractions for specific insights, and searchable feeds populated entirely by short project videos. By utilising familiar, low-friction formats, knowledge sharing becomes a seamlessly integrated reflex rather than an isolated, bolted-on task.

This brainstorm successfully generated the raw building blocks necessary to construct the enabling framework. It proved that the final solution must actively combine zero-preparation touchpoints (relational), low-effort default mechanisms (choice architecture), guaranteed financial risk budgets (safe environment), and highly visual, searchable interfaces (structural integration)—all while strictly respecting the developers' extreme time scarcity (operational reality). With these distinct functional features defined, the ideation phase concluded. These individual elements are carried directly into the concept creation phase, where they will be systematically combined to generate cohesive concepts.

7.5 Concept Creation and Selection
Following the ideation phase where inspiration was drawn from both the initial individual process and the peer brainstorm sessions, combined and improved ideas were systematically categorised using a Morphological Chart (Table 9). This method allowed for the combination of individual mechanisms (e.g. how to capture knowledge, how to safely experiment, how to communicate) into three distinct organisational concepts. In Appendix G, a more detailled overview per concept is shown.

Core Function			
1. Room for experimenting	**Regional innovation budget**	**Bonus as a reward for sustainable risk**	*Risk champion of the month*
2. Learning	**E-learnings of every project**	*Wall of fame including learnings and insights*	**Visual map with voice memos**
3. External communication for feedback	*Museum exhibition*	**Exclusive event with brainstorm/sprint sessions**	**Sharing insights when celebrating milestones**
4. Growing	*Project autopsy at the end of a project*	**Internal fair**	**Evaluation forms**

Table 9: Overview of the Morphological Chart

Concept A: digital knowledge based

A mostly digital system, visualised in Figure 18, where sustainability is rewarded to guard experimentation, e-learnings are made available by project developers of every project, insights are shared externally when achieving milestones, and evaluation forms are filled in after each project to capture lessons learned.

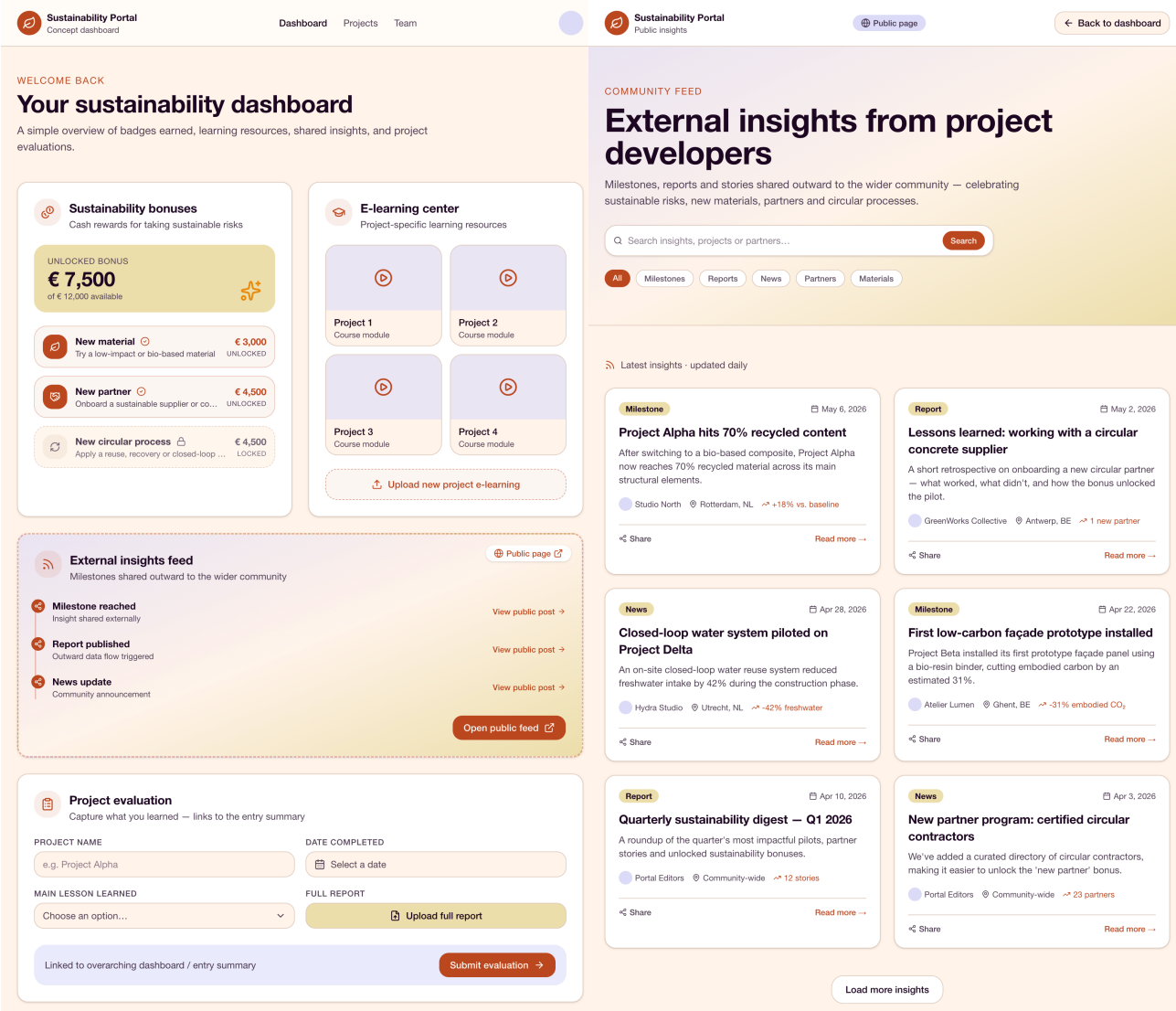


Figure 18: Concept A (Created using Lovable)

Concept B: innovation and experimentation focused
An intervention where taking risks is seen as positive by celebrating the risk takers, learning from their insights on a wall of fame, communicating these through public exhibitions, and learning from each project by performing an autopsy report when finalising. All visualised separated in Figure 19.



Figure 19: Concept B (Generated by Gemini)

Concept C: exclusive innovation framework
A workflow, visually combined in Figure 20, that enables experimentation through regional innovation budgets, insights are collected and visually displayed on a project map, and feedback is gathered through sprint sessions with partners, internally there is space for reflecting and growing at internal fairs.



Figure 20: Concept C (Generated by Gemini)

To objectively determine the most viable direction, these three concepts were evaluated using a Weighted Criteria Matrix, as seen in Table 10. While this evaluation was executed solely by the researcher (as detailed in Chapter 3.4), subjective bias was actively mitigated by strictly scoring the concepts against the empirical Design Criteria established in Chapter 6. This ensured the selection was grounded in the operational reality of the developers.

Criteria	Weight	Concept A (Digital knowledge based)	Concept B (Innovation & experimentation focused)	Concept C (Exclusive innovation framework)
1. Actionable Clarity	10	7/10: E-learnings and forms offer a clear structure, though heavily text-based.	6/10: A Wall of Fame is inspiring, but the exact insights can remain abstract.	7/10: Voice memos offer fast clarity, though an internal fair can be chaotic.
2. Commercial Integration	20	6/10: A financial bonus is a strong incentive, but it is a retroactive reward rather than active project budget.	5/10: Celebrating risk culturally is strong, but ignores the strict reality of hard financial KPIs.	6/10: Innovation budgets provide money, but keeping it in a separate pot risks isolating it from standard project margins.
3. Generative Collaboration	15	5/10: Sharing at milestones is efficient, but acts as one-way reporting rather than co-creation.	6/10: Museum exhibitions and autopsies bring people together, but mostly for retrospective viewing.	8/10: Sprint sessions with partners force active, concurrent co-creation to solve active hurdles.
4. Early Exploration	10	4/10: Evaluation forms happen post-project, missing the crucial early design phase.	4/10: Project autopsies occur at the very end, failing to influence early choices.	8/10: Sprint sessions organically engage external experts at the crucial early design hurdles.
5. Conceptual Learning	15	5/10: Highly structured, but filling out forms often encourages compliance over deep reflection.	7/10: Deep cultural reflection is fostered through autopsies and celebrating risks.	7/10: Internal fairs provide a dedicated space for strategic reflection and knowledge exchange.
6. Safe Testing Ground	20	7/10: The promise of a bonus provides a tangible financial safety net for taking risks.	7/10: The champion dynamic provides excellent psychological safety and cultural cover.	8/10: Explicit financial budgets formalise a safe space for material testing upfront.
7. Honour Professional Identity	10	5/10: Appeals to the structured nature of engineers, but evaluation forms trigger administrative frustration.	8/10: Beautifully appeals to developer pride, recognition, and the desire to build showcases.	6/10: Voice memos respect time scarcity, but preparing for an internal fair demands high administrative effort.
Total Score	100	585	615	***700***

Table 10: Weighted Criteria

Concept C emerged as the strongest foundational framework. As illustrated by the matrix, while Concept A offered superior structural clarity, it relied heavily on mandatory post-project forms and text-heavy interfaces. This quickly results in cognitive overload, triggering habitual friction and threatening the developers' professional identity. Conversely, Concept B excelled in fostering psychological safety and cultural pride, but ultimately isolated sustainability as a cultural special event rather than integrating it into the strict commercial reality of hard financial KPIs. Because the root causes of habitual friction at Heijmans are deeply tied to financial pressures and early decision-making, Concept C's focus on protected budgets and early exploration made it the most viable baseline.

The initial exclusive innovation framework of Concept C successfully synthesises the theoretical design criteria to create a robust foundation for continuous double-loop learning. By proposing dedicated regional innovation budgets, the framework explicitly carves out a guaranteed safe environment for experimentation (Criterion 6). To respect the developers' extreme time scarcity, knowledge sharing is structurally integrated via visual project maps and voice memos, avoiding the cognitive overload associated with heavy text databases (Criteria 1). Furthermore, the framework mandates relational touchpoints to systematically bridge disciplinary silos: gathering external feedback through dedicated partner sprints stimulates early exploration (Criterion 4), while dedicated time for reflection at internal fairs actively facilitates generative collaboration (Criteria 3 & 5). Ultimately, by combining these mechanisms of financial safety, visual integration, and relational accessibility, this initial design concept provides a comprehensive foundation to organically drive the sustainability transition from the bottom up.

While the Weighted Criteria Matrix confirms Concept C as the objectively strongest baseline, the evaluation also highlighted critical areas requiring refinement. The concept's moderate scores in Commercial Integration (6/10) and Professional Identity (6/10) indicate specific operational vulnerabilities. Primarily, relying on an isolated regional innovation budget risks disconnecting sustainable experiments from standard project margins. Furthermore, while internal fairs provide space for reflection, they inherently demand administrative preparation, which risks triggering the developers' time scarcity. These specific friction points serve as the primary focus for the subsequent refinement, prototyping, and validation of the framework mechanics in the next chapter.

8. Designed Implementation

The Develop phase culminated in a conceptual blueprint: an exclusive innovation framework explicitly designed to break habitual friction and overcome the cycle of single-loop learning. As the design process now transitions from conceptualisation to execution, it enters the Deliver phase. This final phase is directly guided by the third sub-question of this research: *How can these insights be translated into a validated strategic design intervention and an actionable implementation roadmap for Heijmans Real Estate?*

To answer this question, the theoretical mechanisms established in Chapter 7 have been rigorously iterated upon using feedback from both sustainability advisors and project developers. The resulting final design, titled the 'Ontwikkelplaats', is not presented as a static, definitive solution, but rather as the proposed next iteration of Heijmans' sustainability strategy implementation. Because the sustainability transition is inherently volatile and ever-changing, the strategy itself must continuously adapt alongside it. The Ontwikkelplaats acts as the foundational starting point for this ongoing adaptation. By systematically embedding the core activities of experimenting, learning, communicating, and growing, the framework ensures that double-loop learning becomes an automatic organisational reflex. It continuously prompts the critical questions required for vitality: *Are we still doing the right things? Are we doing them for the right reasons? And do our actions still align with the shifting realities of the broader context*?

For this framework to succeed, these theoretical ambitions must be operationalised into a concrete, highly contextualised rollout. The insights gathered regarding cognitive overload, financial fear, and professional identity have been translated into an implementation strategy that explicitly respects the operational reality of the workforce. Rather than forcing a generic, top-down corporate mandate, the intervention is deliberately aligned with the pragmatic, "niet lullen maar poetsen" (actions speak louder than words) mentality specific to the Rotterdam regional office. Finally, to answer the latter half of the research question, the chapter concludes by validating the intervention against both theoretical change-management principles and practical stakeholder feedback. Through a strategic evaluation of its desirability, feasibility, and viability, the framework proves its capacity to successfully overcome operational resistance and foster long-term organisational vitality.

8.1 Prerequisites

Throughout the research phase, it became evident that introducing a new behavioural framework into a insufficient operational ecosystem will ultimately fail. Therefore, before outlining the operational steps of the Ontwikkelplaats, it is critical to highlight two foundational, systemic barriers uncovered during the field research. While resolving these barriers falls outside the direct behavioural scope of the proposed design intervention, they represent high-value strategic insights for Heijmans' management. They must be addressed top-down to establish the baseline trust required for the Ontwikkelplaats to function effectively.

To encourage sustainable choices, advice must simplify decision-making. Currently, when alternative materials are proposed, the advice is often strictly environmental. If an advisor suggests a bio-based material but fails to provide cost indications, procurement status, or acoustic performance, the advice is incomplete. This creates immediate administrative work and risk for the developer, frequently resulting in rejection. Shifting to holistic, fully costed, and certified advice delivers immediate commercial value, significantly increasing the likelihood of implementation.

Secondly, the organisation must establish a unified narrative detailing what sustainability means for Heijmans. From a developer's perspective, receiving advice to use steel pergolas on one project and wooden pergolas on another creates confusion. While both choices are justifiable (wood for low embodied carbon, steel for circular longevity), the strategic reasoning must be transparent. Establishing this baseline narrative is a prerequisite for building trust in the overarching strategy.
Because these two prerequisites require department-wide standardisation and top-down policy alignment rather than the bottom-up behavioural facilitation targeted by the Ontwikkelplaats, their

specific execution is not further elaborated upon within this research. However, management must actively resolve these foundational issues to ensure the subsequent roll-out of the Ontwikkelplaats is not hindered by pre-existing systemic friction.

8.2 Setting Up the Implementation

Building an infrastructure for deep organisational change requires time. According to Dorst (2025), setting up a fully functioning studio environment typically takes approximately three semesters (18 months). The most effective way to initiate this transition is not through radical disruption, but by gradually layering the Ontwikkelplaats methodology into Heijmans' existing operational routines. This chronological rollout is driven by a shift in the sustainability team's role: transitioning from external advisors into active, embedded facilitators of these new studio activities. To guide this 18-month rollout, the core activities are introduced sequentially, as illustrated in Figure 21.

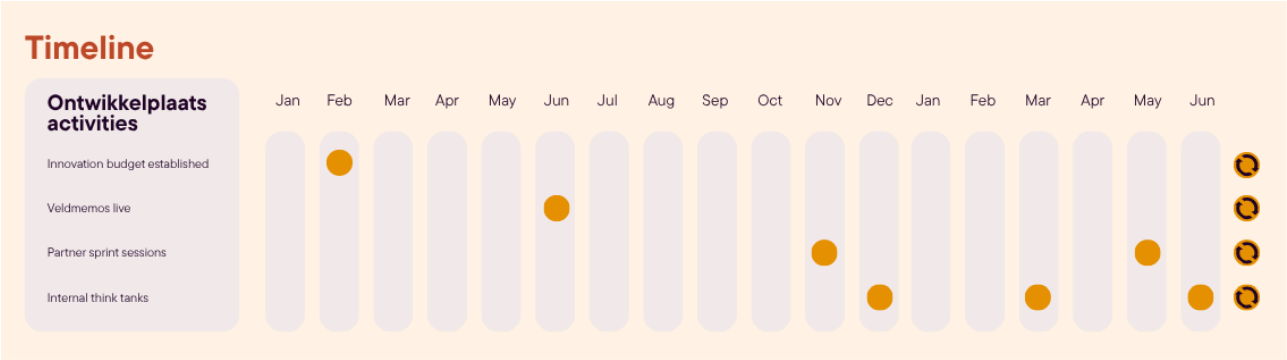


Figure 21: Implementation Timeline

Phase 1: Formalising Financial Space for Experimentation (Innovation Budget)

Before behaviour can change, the systemic boundaries must be adjusted. Experimentation is made possible by formally lowering the required return-on-investment (ROI) boundaries for projects that integrate sustainable innovations. This provides developers with the necessary financial headroom within their own business cases, making it a highly feasible, commercially native adjustment.

To operationalise this phase and the four phases that follow, the Ontwikkelplaats embeds specific guiding questions. It is vital to note that these questions are not academic inquiries requiring an answer within this report. Rather, they are operational prompts that Heijmans must use to continuously challenge ingrained corporate routines. They serve as the structural mechanisms for double-loop learning (Argyris, 1982). While a traditional, single-loop strategy implementation relies on a static checklist of tasks, a volatile transition like sustainability requires a system that constantly questions its own assumptions. By anchoring this initial phase to the following prompts, the organisation begins systematically attacking its financial friction: *How can we translate the ambiguity of a corporate sustainability strategy into concrete financial boundaries for an individual project developer? How can we create space for a developer to test new materials without threatening their individual project margin?* and ultimately, *How can we ensure that sustainability is no longer viewed as a delaying factor, but as the foundation of professional success?*

For this boundary adjustment to function without creating financial instability, the administrative trigger must be strictly governed, yet be highly accessible. Rather than requiring board approval for every individual experiment, which introduces massive procedural friction, the board pre-approves an annual innovation quota. When a developer wishes to experiment with a sustainable innovation (defined as a product, partner, or method that is genuinely new to Heijmans or that specific region), the administrative trigger is a simple initiation conversation with their regional sustainability advisor. This request is designed to be low-threshold, but it demands clear intent. The developer and advisor must jointly answer: *Why are we doing this? What specific friction do we want to learn about? And how will we monitor it?* Crucially, the pitch must highlight the societal return. While the financial ROI may drop, the societal benefits—such as unpriced CO2

reduction or biodiversity gains—rise. By explicitly acknowledging this trade-off, the framework formalises the financial balancing act that motivated developers already attempt to do secretly. If the advisor deems the learning objective valuable, they allocate one of their quota slots to the project. To create scarcity, ensure a natural graduation of knowledge, and maintain financial viability, this quota is capped to the first three projects per region to test a specific new material, partner or method. Once those initial three projects have tested the innovation and shared their findings via Veldmemos (explained in Phase 2), the knowledge is readily accessible locally. The risk is normalised, the method can be safely copied, and it therefore no longer qualifies for financial compensation. Through this mechanism, the sustainability advisor transitions from a compliance checker into a financial enabler.

To illustrate this mechanic, consider a developer aiming to implement structural rammed earth facades (a material largely untested at scale by Heijmans) in a new residential block. The novel material significantly increases the initial capital expenditure, pushing the projected ROI down from the standard corporate baseline of 12% to 10% (note: percentages are illustrative to protect commercial confidentiality). Under traditional financial boundaries, the developer would be forced to abandon the rammed earth as a material to protect their personal performance metrics. However, within the Ontwikkelplaats, the developer pitches this to the sustainability advisor. Recognising the long-term strategic value of learning to build with rammed earth, the team uses one of the slots to formally lower the project's required ROI to 10%. The developer is now financially safe to execute the experiment. The 10% return, combined with the high societal return and the captured learnings, is celebrated as a strategic success rather than punished as a financial deficit. This mechanism, scaling from individual, financially protected regional experiments into a highly governed national innovation network, is visualised in Figure 22.



Figure 22: Regional Innovation Budgets

Phase 2: Initiating Frictionless Knowledge Capture (Veldmemos)

Once experimentation is financially encouraged, every project is reframed as a learning opportunity. To avoid overwhelming the developers, the rollout begins exclusively with passive knowledge capture. During this phase, the regional sustainability advisors actively visit regional offices or construction sites to record three-minute 'Veldmemos', as illustrated by the images in Figure 23 and 24. By taking on this administrative burden themselves, the team introduces a visual, easily searchable interface (via tags and labels) pinned to an interactive project map. This phase directly tackles the cognitive friction of the developer, guided by the following operational guiding questions to ensure continuous reflection on knowledge sharing: *How can we document and share the lessons from an experiment so that the entire organisation learns from them without adding administrative friction?* and *How do we shift our corporate culture so that sharing a failed material test is celebrated as a strategic learning rather than hidden as a personal failure?*



Figure 23: Veldmemos (Generated by Gemini)



Figure 24: Still from a Veldmemo (Generated by Gemini)

To ensure adoption, the Veldmemo system is explicitly designed around the operational reality of the project developer: extreme time scarcity. It is within this mechanic that the framework operationalises the pragmatic “niet lullen maar poetsen” (actions speak louder than words) mentality specific to the Rotterdam regional office. Rather than forcing a generic, top-down corporate mandate that demands heavy, bureaucratic evaluation reports, the intervention creates a bias for action. By replacing heavy written documents (such as evaluation reports) with three-minute video memos, the system prevents cognitive overload for the viewer and eliminates the administrative effort of reporting. Furthermore, the strategic decision to explicitly categorise and share ‘Learnings’ (failed experiments or unexpected hurdles) alongside ‘Successes’ serves a profound cultural purpose. It normalises calculated risks and builds psychological safety. Operationally, it prevents the national repetition of mistakes; if a developer in Rotterdam discovers a critical flaw in a bio-based facade, a developer in Amsterdam instantly has access to that data before making the same procurement error. The digital interface (which can be accessed through https://veldmemos.lovable.app) acts as the central nervous system for this knowledge flow. As illustrated in Figures 25, 26, and 27 on the next pages, the platform is designed for immediate retrieval and cross-regional networking, deliberately stripping away administrative barriers to connect developers directly with the knowledge and peers they need.

By carefully designing this interface to respect the developer’s time and workflow, Heijmans transforms isolated, regional experiments into an easily accessible, highly interactive national database.

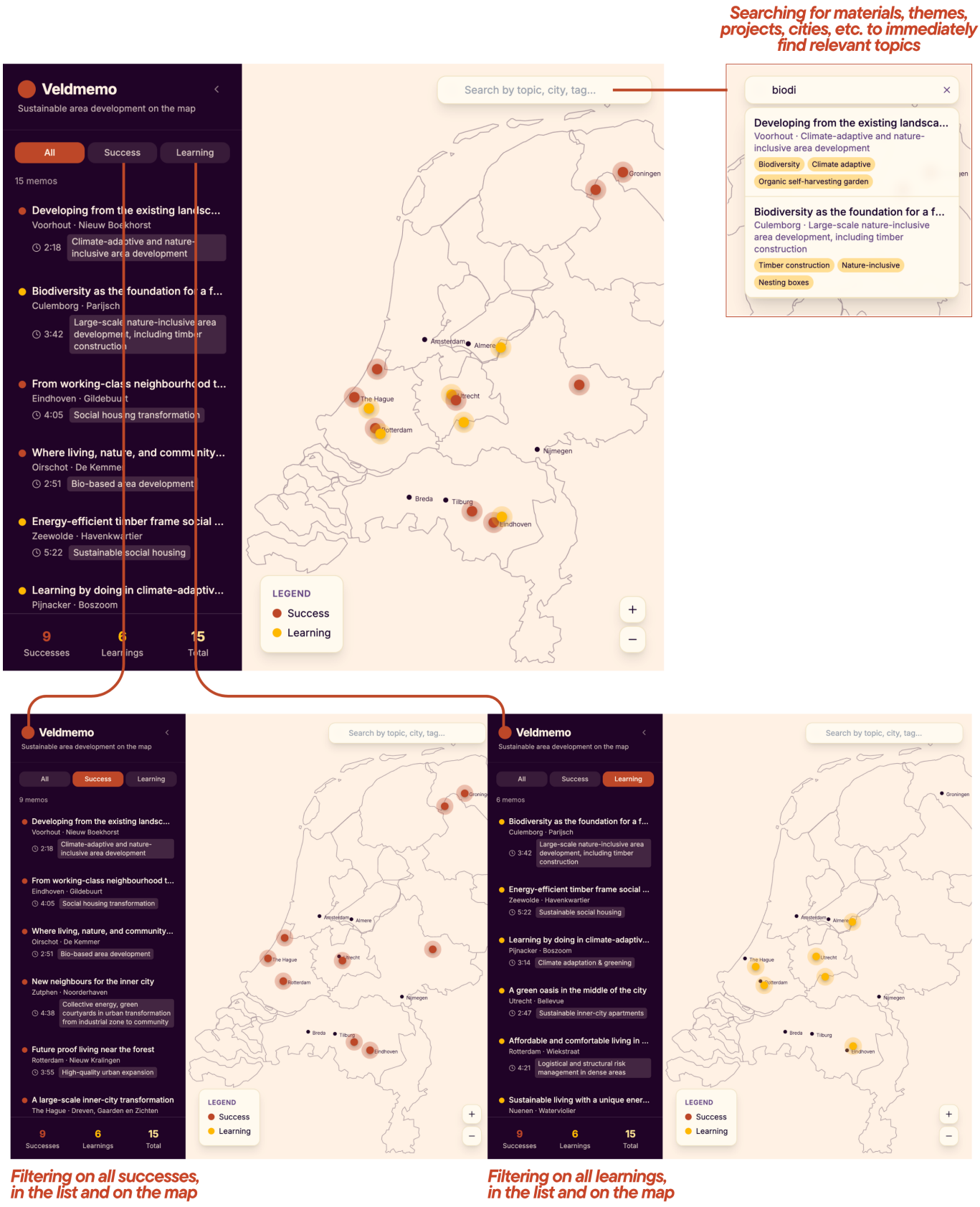


Figure 25: Initial Veldmemo Mechanics (Created using Lovable)



Figure 26: Information of a Learning through a Pop-Up (Created using Lovable)

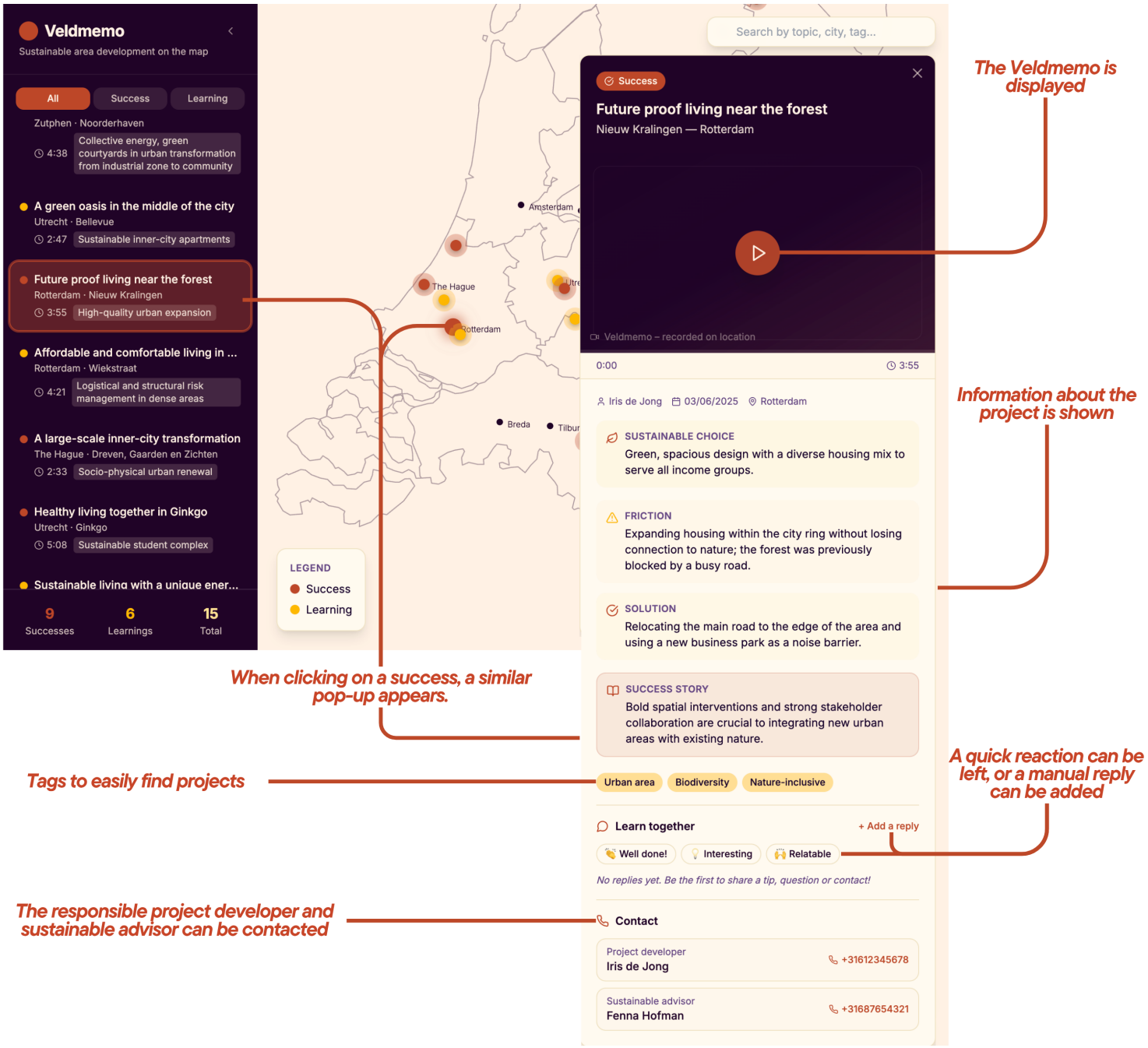


Figure 27: Explained Mechanisms of a Pop-Up (Created using Lovable)

Phase 3: Activating External Feedback (Partner Sprints)
With internal knowledge flowing, the framework expands outward biannually. To communicate the sustainable transition and receive critical field validation, partners are invited to exclusive Sprint Sessions. These sessions operate on a strategic 80/20 rule, acting as a psychological catalyst for collaboration (illustrated in Figure 28). A sustainable experiment is presented as 80% complete, and external partners are explicitly asked to help brainstorm the final 20%. By asking for help on the final hurdle, Heijmans automatically gathers pure, unedited, and highly relevant feedback on the foundational 80% of the project. These biannual milestones systematically address procedural silos by replacing isolated, linear hand-offs with concurrent co-creation. To ensure this co-creation moves beyond a superficial workshop, the session acts as the designated arena to address the phase's specific operational guiding questions: *How can we remove the procedural distance between developers and partners? How can we ensure every proposed sustainable solution is directly linked to a practical feasibility test?* and *How can we design a culture in which making calculated mistakes with unknown materials is seen as valuable data rather than personal failure?*

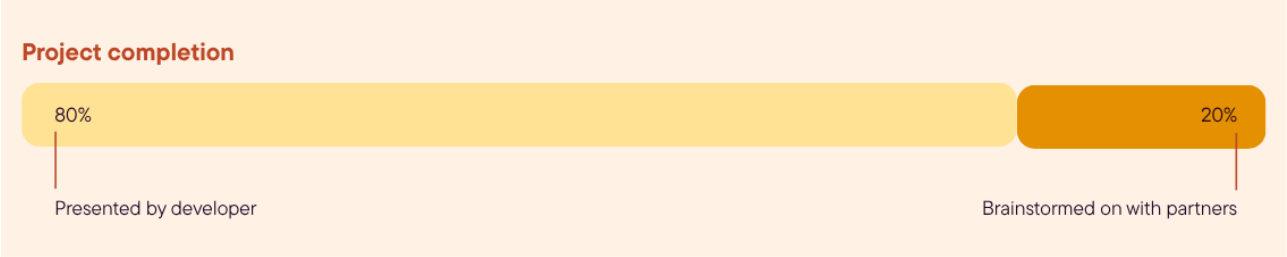


Figure 28: Project Completion for Partner Sprints

To ensure external partners are genuinely motivated to participate, the sprint must offer mutual commercial and strategic value. For external firms, such as acoustic engineers, timber suppliers, or insurers, being invited to an exclusive Heijmans innovation event is not merely an advisory favour, but a strategic business advantage. Firstly, it provides early, preferential access to Heijmans' future procurement pipeline. Secondly, it allows suppliers to directly influence the organisation's design standards, ensuring their own innovative products fit seamlessly into future projects. Therefore transforming a three-hour workshop into highly effective, direct business development.

To demonstrate how this methodology functions in practice, consider a scenario involving a 10-storey Cross-Laminated Timber (CLT) residential tower. Heijmans prepares the 80% baseline (collaboration between developers and the sustainability team): the structural frame is fully designed, the financial viability has been proven using the newly lowered return-on-investment boundaries, and the carbon footprint is calculated. However, they face a critical hurdle. Because timber is significantly lighter than concrete, it performs poorly regarding low-frequency impact noise (e.g. footsteps from the apartment above). To meet the Dutch acoustic building regulations, traditional calculations require pouring a heavy concrete screed over every timber floor. This single requirement threatens to ruin the fully demountable circular ambition of the project while adding massive embodied carbon back into the design.

For co-creation to be genuinely effective, the sprint must be curated to prevent it from devolving into a passive seminar. Drawing from a design sprint methodology (Knapp et al., 2016), the session is capped at a maximum of six to eight participants. This ensures a highly active, balanced dynamic. Internally, Heijmans is represented by just two key stakeholders: the project developer (acting as the problem owner who presents the 80%) and the regional sustainability advisor (acting as the neutral process facilitator). This lean internal presence leaves room for four to five highly specialised external partners, including the external project architect and specific supply-chain experts. Furthermore, to respect the time of these external partners and ensure the session begins with immediate momentum, participants are provided with a visual one-pager sprint brief one week prior. This document strips away heavy administrative reporting, presenting only the visual 80% baseline and the specific 20% acoustic hurdle. This low-effort preparation guarantees that partners arrive cognitively aligned and ready to problem-solve, rather than spending the first hour passively absorbing information. The physical dynamic of this high-energy collaboration is visualised in Figure 29, illustrating how the session moves beyond a traditional meeting into active co-creation.



Figure 29: Illustration of a Sprint Session (Generated by Gemini)

Rather than abandoning the timber frame or accepting the concrete compromise internally, Heijmans uses the acoustic hurdle as the focal point for the partner sprint. They invite an acoustic engineering firm, a bio-based insulation manufacturer, and an architectural firm. The sprint focuses on the final 20%: *"How can we achieve the required acoustic dampening without adding so much structural height that we lose an entire residential storey?"* To ensure this session remains a highly efficient interactive meeting, the event follows a facilitator's agenda, visually represented in the Sprint Journey Map (Figure 30). As the graph illustrates, the schedule is deliberately designed as a fluctuating wave of engagement, providing participants with the necessary space for cognitive digestion and informal networking. By intentionally mapping this psychological

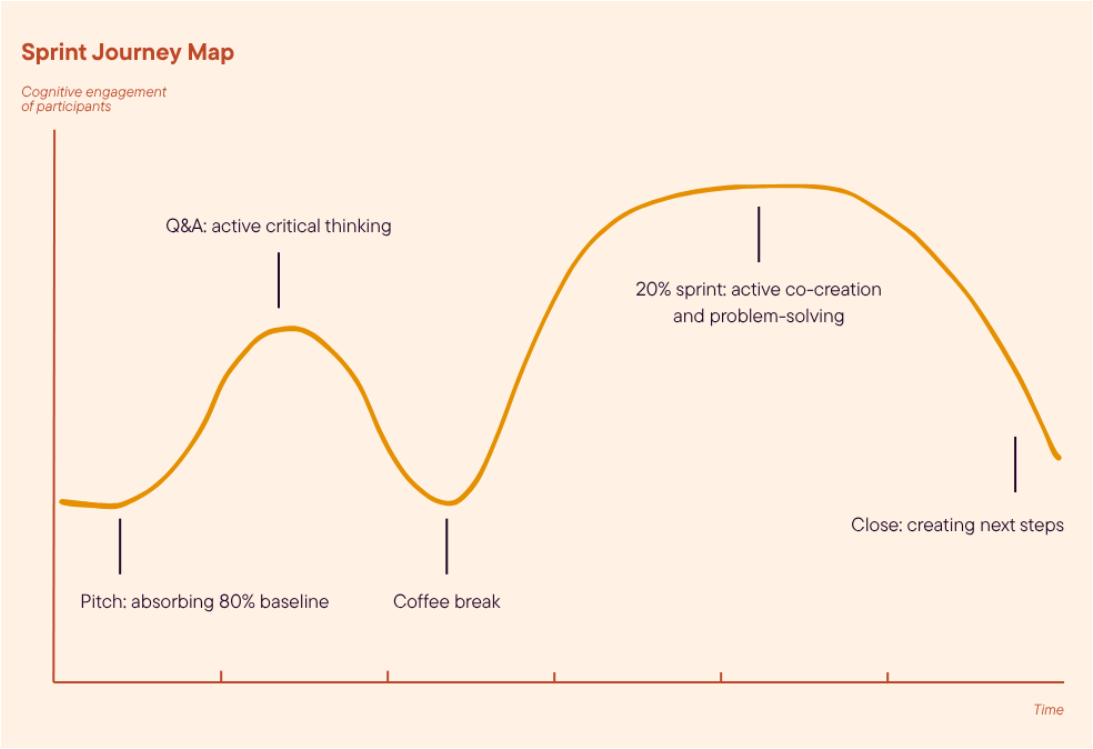


Figure 30: Sprint Journey Map

journey—moving from passive absorption during the baseline pitch, through a cognitive resting

period, and ultimately peaking during active co-creation—the facilitator ensures maximum strategic output. The session progresses as follows:

1. The pitch (±30 mins): Heijmans summarises the 80% design and openly shares the acoustic failure in a presentation.
2. Q&A (±30 mins): A structured Q&A session where partners can interrogate the baseline data and provide immediate, honest feedback on the 80% (e.g. the architect might point out that the current CLT floor spans are slightly too wide, causing a trampoline effect that will make the acoustic problem even worse).
3. Coffee break (±15 mins): A pause allowing participants to digest the critiques, step out of formal corporate roles, and have the opportunity to naturally begin discussing solutions over coffee.
4. The 20% sprint (±90 mins): Guided co-creation focused exclusively on solving the dry-floor acoustic build-up. Because the problem is deeply intertwined with the foundation, this phase naturally generates further iterative feedback on how the initial 80% might need to be adjusted to accommodate the new solution.
5. Close (±15 mins): Defining clear feasibility tests, assigning responsibilities, and establishing the next steps for the proposed solutions.

By structuring the event this way, Heijmans transitions from acting as a traditional, risk-averse client to an open, collaborative partner, actively breaking down the defensive routines of the supply chain while securing high-value, mutual commercial growth.

Phase 4: Facilitating National Reflection (Think Tanks)

The final structural mechanism introduced during the initial 18-month rollout is the quarterly national think tank. Rather than restricting this to the head office, the event rotates quarterly across different regional offices or accessible external venues, keeping the energy dynamic and reinforcing a sense of nationwide equality. This event gathers representatives from all regions to actively challenge underlying assumptions, reflect on internal workflows, and share the learnings captured over the past three months. It is designed to generate the crucial bottom-up knowledge flow required to prevent the strategy from becoming a static, top-down mandate. By reflecting together rather than in isolated departmental bubbles, the think tank provides the structural time and space required to address this phase's operational guiding questions: *How can we ensure that it is practically impossible for developers to automatically fall back on their familiar routines?* and *How can we structure project KPIs so that sustainability performance carries as much weight as financial return?*

Unlike project meetings, the think tank does not focus on solving a specific building's engineering problem. It is the designated arena for double-loop learning: taking a moment to question the system itself. However, securing the active participation of time-scarce project developers requires a compelling incentive, beyond a formal mandate. While attendance is a formalised expectation within the Ontwikkelplaats framework, the true incentive is agency. Developers frequently experience frustration regarding stagnating collaborations, bureaucratic workflows, or misaligned KPIs, but rarely have a platform to change them. The think tank provides direct agency to rewrite the rules of the game. It is a highly valued opportunity to step away from daily delivery pressures, vent operational frustrations constructively, and directly influence Heijmans' corporate strategy. To ensure the session fosters deep reflection rather than getting bogged down in technical details, each quarter focuses on a broad, systemic theme generated from the field data. For example, over a three-month period, the sustainability team might notice a recurring frustration across multiple Veldmemos, partner sprints, or when talking to developers or colleagues informally: *"The new internal carbon-calculation interface takes three weeks to complete per project, delaying our permits."* Instead of accepting this as an assumption, the think tank elevates it to a double-loop question: *"Is our strict internal administration killing our actual sustainable impact?"* and "*Why are we calculating this so rigidly? Are we doing it to genuinely lower our footprint, or just to satisfy a corporate checklist?"* An illustration of the physical scale and collaborative dynamic of this designated reflection arena, bringing developers together from across the country to actively rewrite the rules of the game, is visualised in Figure 31.
To guarantee that participants actively speak up, the environment must be psychologically safe (Edmondson, 1999). If developers are asked to prepare presentations, the event will instantly feel like a corporate performance review. Therefore, the preparation relies on strategic curation by the



Figure 31: Illustration of a Think Tank (Generated by Gemini)

sustainability team. Rather than taking on heavy administrative reporting, they act as thematic synthesisers. They review the quarter's Veldmemos and partner sprint outcomes to identify one recurring, systemic friction point. To introduce this theme, the facilitators simply select one or two raw, unedited Veldmemos from the database that perfectly capture this frustration. This curated Veldmemo serves as the ultimate icebreaker. By opening the event with an authentic video of a peer openly detailing a struggle or operational roadblock, the facilitators instantly dissolve corporate perfectionism. It validates the frustrations of the other attendees, grants the room implicit permission to speak freely, and shifts the energy from defensive reporting to collective problem-solving. The event is also guided by a facilitator's agenda (visually represented in Figure 32) to ensure the conversation moves from venting to strategic synthesis and systemic change. This structure is designed to open with a safe space to analyse the single-loop friction (what is going wrong), before crossing the intersection to systematically pivot towards high-level, double-loop synthesis (why the system causes the friction).

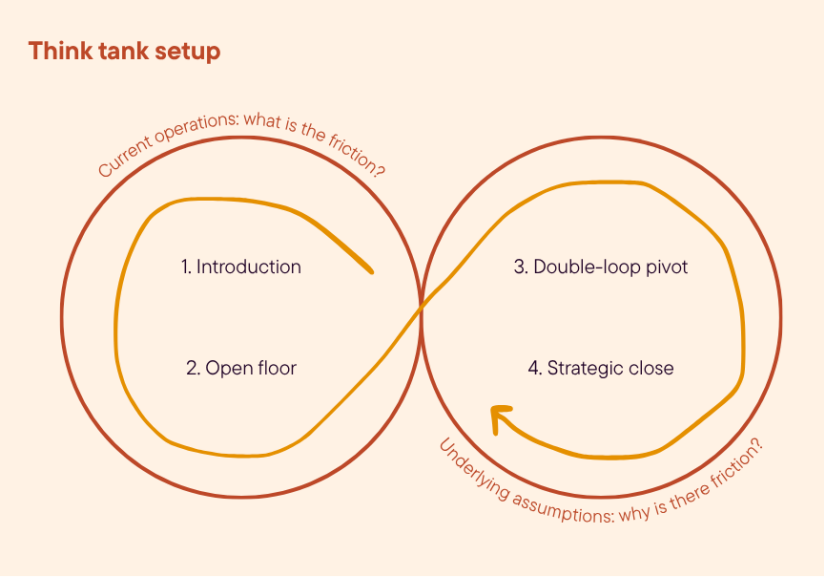


Figure 32: Think Tank Setup

1. Introducing the challenge (±20 mins): The facilitator plays the selected catalyst Veldmemo (e.g. a developer struggling with the carbon-calculation software) to introduce the quarterly theme. No management speak, but raw field reality. The remaining time is used to validate the frustration, explain the principles for anonymised sharing, and explicitly frame the systemic question for the session, ensuring everyone is cognitively aligned before the debate begins.
2. Open floor (±45 mins): A facilitated, open discussion governed by the principle of anonymised knowledge sharing. Participants are explicitly encouraged to speak as individuals rather than corporate representatives. While the strategic insights generated during this session are actively recorded for organisational use, the identity and departmental affiliation of the speaker are never revealed. By decoupling their personal reputation from their feedback, the facilitators create the psychological safety required to openly share opinions on broken workflows, uncooperative departments, or confusing interfaces.
3. Coffee break (±15 mins): A pause allowing participants to step away from the initial venting phase. This informal downtime allows emotions to settle and natural, constructive side-conversations to begin before the group must pivot towards high-level problem-solving.
4. Double-loop pivot (±60 mins): The facilitator steers the room away from venting and complaining, towards challenging the underlying assumptions. Using the administration example, the group might ask: *"Do we actually need to calculate carbon on every single component, or should we just mandate a pre-approved list of bio-based materials and skip the calculation phase entirely?"*
5. Strategic mandate to close (±25 mins): The session concludes by translating these reflections into an actionable strategic mandate. The group drafts an updated guiding question or policy recommendation. To prevent creating a bureaucratic bottleneck, the sustainability team takes ownership of the outcome. They process the raw feedback internally, formulate a concrete action plan, and determine the necessary level of systemic intervention: ranging from a simple workflow adjustment within their own team, to a formal policy proposal for regional directors or the management board.

By structuring the think tank as a continuous, rotating engine for systemic critique, Heijmans ensures that its sustainability strategy is never finished, but rather constantly evolving in direct response to the operational reality of its workforce.

Phase 5: The Infinite Iteration Loop

Crucially, the completion of this 18-month setup is not the finish line; it is the starting point. The Ontwikkelplaats is not a static solution, but a proposed iteration of the current strategy implementation. Because the sustainability transition is inherently volatile, the strategy must continuously evolve alongside it. By systematically executing these core activities (experimenting, learning, communicating, and growing) through interconnected mechanics—funding safe experiments through the innovation budget, capturing field realities via Veldmemos, receiving honest feedback through partner sprints, and challenging corporate assumptions in the quarterly think tanks—Heijmans secures a permanent engine for double-loop learning. The framework guarantees that the organisation will infinitely and automatically continue to challenge its own existence through these final, overarching guiding questions: *Are we still doing the right things? Are we doing them for the right reasons? Why are we executing them in this specific way?* and *Does our strategy still align with the shifting realities of the broader Dutch construction field?* By embedding this reflective cycle into the daily workflow, Heijmans will incrementally build the systemic capacity to not only adapt, but to lead the sustainable transition. To support the regional sustainability advisors in facilitating this continuous evolution, a comprehensive chronological agenda detailing all of the mentioned guiding questions is provided in Appendix H.

8.3 the Future Vision: Organisational Vitality

The ultimate objective of this implementation is a state where the sustainability transition is no longer a disruption, but a managed, integrated reality. The Ontwikkelplaats positions itself exactly at the critical junction where top-down corporate strategy and bottom-up field execution collide. The successful rollout of this framework initiates a fundamental shift in the daily practice and cultural norms within Heijmans. Where developers and advisors previously operated within a transactional, often defensive client-advisor dynamic, they now function as a single, concurrent system. When this continuous rhythm is fully active, it fundamentally transforms the developer's daily workflow. Rather than being trapped in an exploitation mindset (executing familiar routines

for guaranteed profit) they are structurally empowered to embrace an exploration mindset (leveraging calculated risks for long-term strategic value). The professional identity of the developer expands; they are no longer just builders, but active contributors to a future-proof city. This aspirational future state is illustrated by three fictional operational mindsets from developers:

1. Financial focus: *"Thanks to the pre-approved innovation budget, I have clear boundaries that give me focus. I can test a complex bio-based acoustic floor without feeling guilty about threatening my individual project margin."*
2. Challenging assumptions: "*During the quarterly think tanks, I no longer wonder in silence why we use a certain rigid process. I feel safe expressing my doubts to the advisors, actively questioning the why behind our corporate routines and pushing for policy updates."*
3. Knowledge sharing: "*Instead of hiding a failed material test to protect my reputation, I am asked to share the exact hurdle via a three-minute Veldmemo. The entire organisation learns from my experience instantly, and I become a known knowledge node for this specific challenge."*

By moving away from static checklists and embracing this dynamic rhythm of experimentation, captured learnings, communication to receive feedback, and reflection, Heijmans enables true organisational vitality—transforming from a firm merely reacting to the sustainability transition into one actively shaping it.

8.3.1 Implementation Governance & Responsibilities

To maintain this momentum and ensure the transition to the future practice is successful, the 18-month rollout relies on a division of operational responsibilities. The following matrix (Table 11) outlines the governance required to implement the Ontwikkelplaats, clearly defining the shift from solely sustainable advisors to facilitators.

Implementation Phase	Sustainability team	Project developers	Management
Prerequisites	Provide holistic, commercially integrated, and fully costed sustainability advice.	Involve the sustainability team from day one, actively communicating project constraints and commercial realities.	Establish and clearly communicate the unified, overarching corporate narrative for sustainability.
Phase 1: Innovation budget	Manage the innovation budget. Evaluate project pitches, allocate ROI exceptions, and monitor the budget expenditure.	Pitch potential sustainable innovations, calculate the initial increase in investments, and formally request budget allocation.	Formally approve and ring-fence the annual innovation budget at the executive level.
Phase 2: Veldmemos	Record, tag, and upload Veldmemos. Manage and maintain the interactive project map.	Provide honest, unedited field feedback on camera. Consult the project map to learn from others and prevent repeated mistakes.	Build, maintain, and support the long-term IT infrastructure required for the interactive national database.
Phase 3: Partner Sprints	Curate external partners, prepare the sprint briefs, act as neutral facilitators, and explicitly monitor the execution of post-sprint responsibilities.	Act as the problem owner. Prepare and pitch the 80% baseline, and collaborate openly with partners to solve the final 20% friction.	-
Phase 4: Think Tanks	Act as thematic synthesisers. Curate the catalyst Veldmemo, facilitate the session, and translate the reflections into concrete action plans.	Step away from daily delivery pressures to actively challenge systemic assumptions, bureaucratic workflows, and misaligned KPIs.	Receive strategic mandates and authorise systemic updates to corporate KPIs or overarching policies.

Implementation Phase	Sustainability team	Project developers	Management
Phase 5: Iterations	Protect the continuity of the framework. Continuously monitor the shifting Dutch construction field and update the operational guiding questions accordingly.	Transition from an exploitation mindset to an exploration mindset, structurally embedding sustainability into daily professional practices.	Foster an ambidextrous organisation. Use the framework's output to actively lead the sustainable transition within the industry.

Table 11: Responsibilities Overview

8.3.2 Scalability and Capacity Management

As shown in the governance matrix table, the initial facilitation burden relies on the sustainability team. This raises the critical operational risk of team capacity. If the Ontwikkelplaats successfully scales across all regions, the sheer volume of experiments, Veldmemos, sprint sessions, and think tanks could rapidly overwhelm the existing capacity of the advisors. To prevent the framework from collapsing under its own administrative success, the operational management must evolve as the system matures. During the initial 18-month rollout, it is vital that the internal sustainability team retains hands-on control over the capture and upload of Veldmemos to guarantee quality, set the tone of psychological safety, and build trust with the developers. However, once the framework achieves steady-state operation, the heavy administrative lifting can be outsourced. To ensure long-term viability, the operational management of the Veldmemo interface—such as filming, tagging, and platform curation—can be outsourced to a specialised external content agency or managed by dedicated working students. In this mature phase, the sustainability team transitions from acting as operational administrators to strategic directors of the intervention. They simply review the outsourced content for strategic relevance and focus their highly specialised capacity on facilitating the high-stakes sprints and think tanks. By proactively planning for this delegation, Heijmans ensures the Ontwikkelplaats remains a sustainable operational engine rather than a temporary, high-effort project.

8.4 Theoretical and Practical Validation

For an organisational framework to survive, it must be adopted locally. As outlined in the operational phases in Chapter 8.2, implementing the Ontwikkelplaats within the specific culture of Heijmans Rotterdam ensures that its core mechanics—from the rapid Veldmemos to the strict financial boundaries—inherently translate abstract goals into direct action. By aligning the methodology with the local "*niet lullen maar poetsen"* (actions speak louder than words) mentality, the framework ensures that sustainable value is proven through tangible results and pragmatic execution.

This practical application ensures the intervention adheres to both theoretical behavioural constraints and the practical demands of the workforce. While the initial concept successfully identified the necessary components for change as explained in Chapter 7.5—budgets, maps, sprints, and fairs—the refined final design surpasses it by elevating these isolated ideas into a strategic ecosystem that thoroughly answers the established design criteria. For instance, replacing generic regional innovation budgets with structurally lowered return-on-investment boundaries far better satisfies the requirement to ensure commercial integration (Criterion 2): rather than treating sustainability as a separate, external pot of money, this pivot seamlessly embeds financial safety directly into the developers' established commercial metrics. Furthermore, where the initial concept suggested that insights are collected, the final design introduces Veldmemos recorded specifically by the sustainability team. This refinement perfectly addresses the brainstorm insights regarding operational reality and choice architecture: by elevating the sustainability team to strategic knowledge curators, it respects the developers' extreme time scarcity and creates a zero-effort default for knowledge sharing. Similarly, refining generic partner sprints into the 80/20 rule provides actionable clarity (Criterion 1), preventing cognitive overload by focusing external collaboration on a specific 20% hurdle rather than an unstructured, overwhelming brainstorm. Finally, elevating generic internal fairs into quarterly national think tanks actively forces cross-regional generative collaboration (Criterion 3) and

ensures that shared reflections transcend mere networking to achieve true, double-loop conceptual learning (Criterion 5). Ultimately, the final design is significantly stronger because it does not merely offer new collaborative tools, it actively designs away the exact administrative and psychological frictions that cause traditional strategy implementation to fail.

The formulation and implementation of the Ontwikkelplaats therefore marks the definitive realisation of the overarching design goal. To empower project developers to "safely step out of their trusted operational routines," the framework fundamentally alters the commercial baseline by explicitly lowering return-on-investment thresholds for sustainable experiments. This structural financial safety net removes the immediate threat to individual project margins, directly neutralising the core driver of habitual friction. Furthermore, to ensure the Ontwikkelplaats remains "adaptive" and "user-centric," it respects the developers' operational reality and extreme time scarcity. By taking proactive ownership of the knowledge capture through the recording of Veldmemos, the sustainability team actively facilitates the required "continuous, iterative collaboration" between the two disciplines without triggering cognitive overload. This internal synergy is then systematically expanded and stress-tested through the partner sprints and national reflection sessions. Ultimately, by embedding these structural mechanisms for safe experimentation, shared reflection, and outward-facing feedback, the Ontwikkelplaats transcends a traditional, static compliance mandate. Instead, it operates exactly as intended: as a dynamic engine for double-loop learning that constantly challenges underlying assumptions to "create sustainable value and foster long-term organisational vitality."

8.4.1 Theoretical Alignment

The implementation strategy is grounded in change management principles to deliberately minimise natural resistance. Rather than forcing a radical top-down disruption, the Ontwikkelplaats utilises an iterative approach. The design explicitly avoids mandatory e-learnings or expansive documentation, satisfying the criterion for low cognitive load. By aligning with the previously established operational pragmatism native to Rotterdam's developers, the intervention acts as a cognitive bridge (Weick, 1996), making sustainable practices feel native to their existing workflow. Furthermore, this design does not attempt to push harder against resistance, instead, it removes the restraining forces (such as the fear of margin loss and administrative burden). The innovation budget in the form of lowered ROI thresholds, acts as the crucial unfreezing factor. By successfully reframing failure, risk-taking transforms from a punishable, individual career threat into a contribution to collective knowledge (Hatchuel & Weil, 2009). Finally, by replacing static advice with bi-directional dialogue, the infrastructure successfully facilitates the double-loop learning required to continually challenge underlying assumptions (Argyris, 1982).

8.4.2 Practical Validation

To verify the viability of this theoretical framework, the Ontwikkelplaats concept was validated with both project developers and the sustainability team at Heijmans through strategic feedback sessions. The validation yielded critical insights that confirmed the framework's core mechanics while directly informing the final refinements of the intervention.

Foremost, the validation sessions strongly confirmed the necessity of the formalised financial safety net. Developers explicitly stated that there is currently no structural time or space to innovate. While Heijmans currently utilises showcases with dedicated experimental budgets, developers noted that these can hinder widespread innovation; because standard projects do not have access to these showcase budgets, developers feel they cannot replicate the sustainable solutions. Furthermore, the sustainability team validated that structurally lowering the required return on investment for sustainable experiments is significantly more feasible than creating separate pots of money. Interestingly, advisors revealed that accepting a slightly lower traditional financial return in exchange for a higher societal return is a practice already happening informally on certain projects. By explicitly integrating this into the framework, the design successfully formalises an existing shadow practice, transforming it from a hidden exception into a legitimate, safe operational baseline. However, both developers and advisors cautioned that the success of this mechanism is dependent on middle management. If regional directors do not explicitly and vocally champion this lowered ROI boundary, the perceived psychological safety will fail to materialise in practice. Furthermore, a recent pilot project—which offered extra budget but only involved sustainability after the initial design phase—proved that without early integration, sustainability remains relegated to the margins. This strongly validated the framework's goal to secure sustainable parameters at the very inception of a project.

The relational and communicative touchpoints of the framework were also validated. The sustainability team noted that the intervention is highly developer-oriented, which fundamentally contrasts with the current top-down, compliance-driven strategy. Advisors emphasised that the framework must continuously clarify the underlying why—explicitly communicating the long-term benefits of these sustainable ambitions to prevent the developers from losing sight of the overarching goal.
Finally, the validation sessions justified the specific choice architecture of the internal and external communication events. The concept of the partner sprints was praised; it was confirmed that adopting an open, vulnerable position to gather external B2B feedback is a powerful tool that Heijmans currently lacks on a structural, project-specific level. However, testing the internal fairs concept with the developers revealed a critical friction point: preparing for a fair requires significant administrative effort, which would immediately trigger cognitive overload. Consequently, this feedback directly validated the pivot towards the quarterly think tank. Because the sustainability team assumes the preparation burden by curating the Veldmemos as conversation catalysts, the sessions require zero preparation from the developers. By simply asking them to show up and share their insights on specific topcis, the think tank perfectly aligns with their operational reality, providing the necessary room for reflection without the administrative burden.

8.4.3 Strategic Validation: Desirability, Feasibility, and Viability

To definitively prove the efficacy of this design, the following section evaluates the Ontwikkelplaats against three core validation metrics of successful product design: desirability, feasibility, and viability. From a human perspective, the framework is highly desirable because it actively resolves the developers' primary friction point: cognitive overload caused by top-down administrative mandates. By introducing zero-preparation touchpoints (think tanks) and frictionless knowledge capture (Veldmemos), the framework provides the psychological safety and space for innovation that developers explicitly crave, without demanding extra mental bandwidth. From an organisational perspective, the intervention is highly feasible because it does not attempt to force an entirely new, foreign operational structure; rather, it formalises existing, undocumented behaviours. As validated by the sustainability team, accepting altered return boundaries for sustainable choices is already happening informally as a shadow practice. By simply legitimising this practice and relying on low-threshold tools—such as three-minute video recordings rather than heavy IT databases—the framework can be implemented smoothly without requiring extensive bureaucratic restructuring. Finally, from a commercial perspective, the framework is strategically viable. While structurally lowering the required return on investment for an experiment slightly impacts short-term, individual project margins, it actively generates long-term organisational vitality and higher societal returns. Crucially, by capturing approved fails and sharing them nationally via the interactive map, the framework actively prevents other regions from repeating the exact same mistakes. This national risk-mitigation strategy ultimately saves the organisation significant future costs, proving that the intervention is not just an ecological ideal, but a highly viable business strategy.

Ultimately, this final validation proves that the Ontwikkelplaats framework successfully balances ambitious sustainability goals with the pragmatic realities of the project developer. With the theoretical mechanics refined and strategically validated, the next critical step is to determine how to systematically integrate this framework into Heijmans' existing corporate rhythm (Chapter 9).

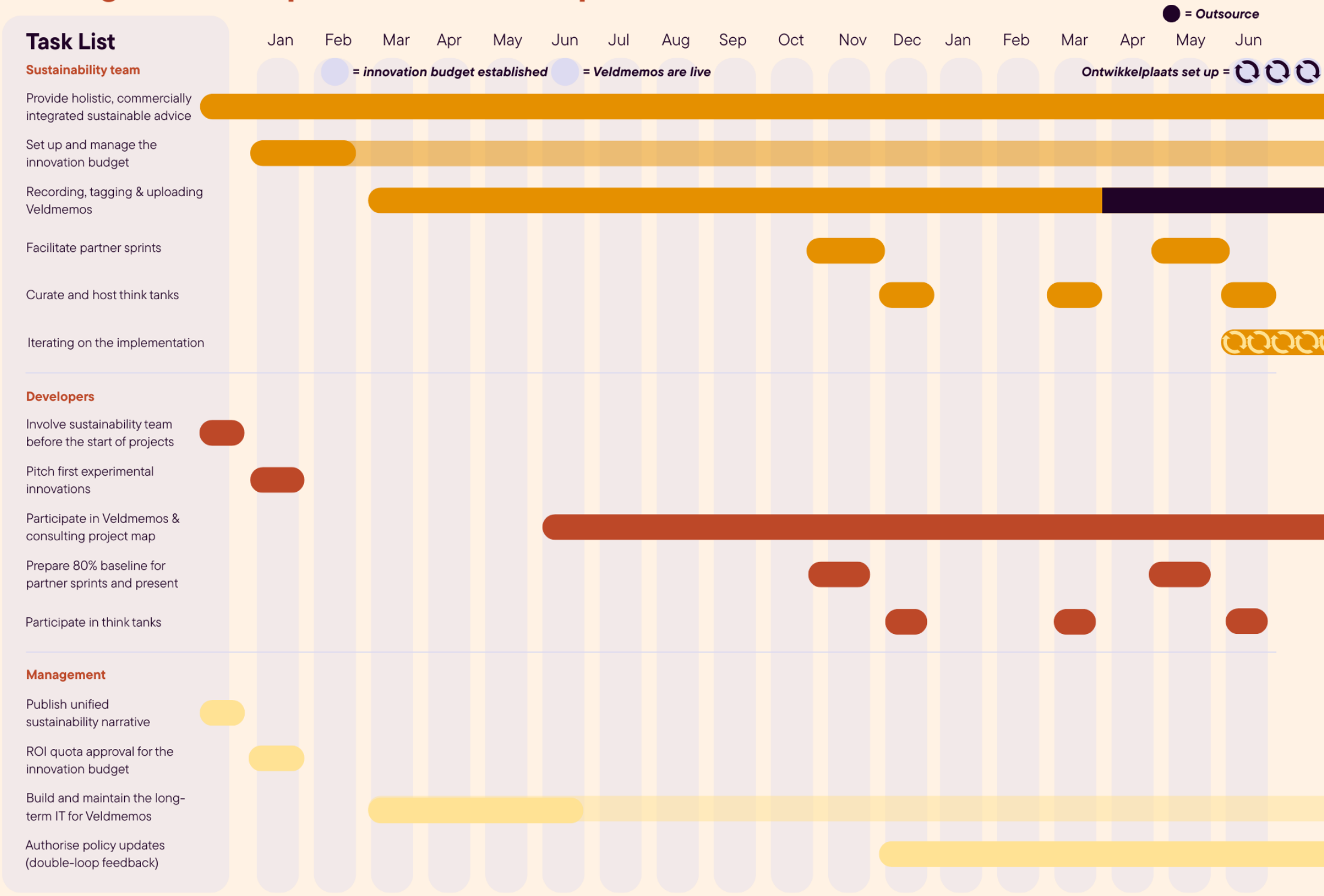
9. Strategic Roadmap

To ensure the successful adoption of the Ontwikkelplaats, the comprehensive theoretical phases detailed in the previous sections must be translated into an actionable, accessible format for Heijmans' stakeholders. The following visualisations provide this strategic translation, serving as the master blueprint for implementation. First, the strategic overview (Figure 33) provides a high-level conceptual summary of the framework, outlining the sequential flow of the intervention—from resolving the foundational prerequisites to activating the continuous iteration loop—while highlighting the core objective and initial timeframe of each phase. Building upon this conceptual overview, the strategic roadmap on the next page uses an 18-month timeline to translate the strategy into a concrete overview. By explicitly mapping the chronological task list across the three key stakeholder groups (the sustainability team, project developers, and management), this blueprint visually demonstrates how the Ontwikkelplaats can be incrementally integrated into existing workflows.



Figure 33: Strategic Overview

Strategic Roadmap of the Ontwikkelplaats



10. Discussion

This chapter interprets the empirical findings and the resulting design intervention through the theoretical frameworks established in the literature review. By diagnosing the underlying behavioural friction and reflecting on the design process, this section answers the research questions. Subsequently, it discusses the theoretical implications of the intervention, acknowledges the limitations of the research, and provides actionable recommendations for both Heijmans Real Estate and the broader academic community.

10.1 Answering the Research Questions

The overarching aim of this research was guided by the main research question: *How can a human-centred design intervention tailored to the project developers improve the implementation of the corporate sustainability strategy to ensure a vital organisation?*

To answer this comprehensively, the research was structured around three sub-questions, following the chronological logic of the Double Diamond method incorporated in this Strategic Product Design thesis.

Sub-Question 1 (Discover/Define): *What barriers and behavioural mechanisms currently cause project developers to revert to traditional processes and resist strategic changes?*
The empirical data revealed that resistance is not driven by a personal disregard for sustainability, but by severe contextual mismatches and cognitive barriers. The organisation struggles to balance exploitation (enforcing strict product parameters) with exploration (customising traditional projects), creating an ambidexterity trap (March, 1991). When applying the Cynefin framework (Snowden & Boone, 2007), developers operating in the complicated, high-pressure domain of urban housing are forced to rely on known, predictable financial metrics to survive.
When a sustainable innovation threatens project margins, developers exhibit single-loop learning (Argyris, 1982): they correct the immediate financial error by cutting the sustainable element, without ever questioning the underlying corporate policy. Because abandoning cost-efficient routines is perceived as an existential risk, developers refuse to “drop their tools” (Weick, 1996), clinging defensively to traditional financial routines to protect their professional identity.

Sub-Question 2 (Develop): *Which design principles and frameworks can be utilised to disrupt the found cause (their routines) and foster organisational learning within a project-based firm?*
To break this cycle of single-loop learning, the organisation requires an infrastructure that facilitates double-loop learning, empowering developers to safely challenge baseline assumptions. The research identified Kees Dorst’s studio model (Dorst, 2025) as the ideal framework. The governing design principles extracted from this model focus on establishing a continuous, integrated rhythm of four activities: Experimenting (in bounded, safe environments), Learning (extracting data from failures), Communicating (sharing insights openly for feedback), and Growing (critically reframing practices). By embedding these principles, the organisation enables its long-term vitality, the energetic capacity to creatively tackle complex, open-ended transitions rather than retreating into rigid rules.

Sub-Question 3 (Deliver): *How can these insights be translated into a validated strategic design intervention and an actionable implementation roadmap for Heijmans Real Estate?*
These principles were translated into the Ontwikkelplaats, a systemic, collaborative, and continuous methodology. Crucially, the intervention initiates this transition by introducing a formalised innovation budget in the form of structurally lowered return-on-investment boundaries. By legitimising existing shadow practices, this financial safety net removes the individual career risk for experimentation, successfully unfreezing the transition from an exploitation mindset to an exploration mindset. Building upon this financial safety, the design ensures adoption by adhering to a low cognitive load; it replaces heavy formal administration with raw, three-minute Veldmemos recorded and curated by the sustainability team. This shift transforms advisors from compliance checkers into strategic knowledge curators while providing developers with a frictionless interface for peer-to-peer learning. Furthermore, by replacing generic advice with highly structured, bi-directional touchpoints—specifically the 80/20 partner sprints and quarterly national think tanks—

the framework provides the structural agency developers require to challenge systemic assumptions. By translating this framework into the pragmatic, “niet lullen maar poetsen” (actions speak louder than words) culture of the Rotterdam regional office, the intervention acts as a cognitive bridge. It ensures that double-loop learning and sustainable practices feel native to the developers’ existing, results-driven professional identity, ultimately fostering long-term organisational vitality.

Concluding to answer the main Research Question, corporate sustainability strategies frequently fail because they rely on a top-down, single-loop transfer of knowledge that clashes with the complicated, financially driven reality of project developers. A human-centred design intervention improves implementation not by forcing compliance, but by providing a psychologically and financially safe collaborative infrastructure. By shifting the organisation from isolated execution towards collective, double-loop learning, the Ontwikkelplaats ensures that developers and strategy makers collaboratively challenge assumptions, continuously evolving their professional practices to navigate the complex transition as a vital, resilient organisation.

10.2 Theoretical Implications

The primary strength of the Ontwikkelplaats intervention is that it does not treat habitual friction as a singular problem, but as a symptom of overlapping structural, cognitive, and epistemological misalignments. By reflecting on the design through the core theoretical frameworks of this research, it becomes evident exactly why this intervention successfully breaks traditional routines and restores organisational vitality.

10.2.1 Resolving Strategic Misalignment

The delayed adoption of the corporate strategy is primarily the result of contextual friction between the strategic intent and the operational reality. Drawing on the Cynefin framework (Snowden & Boone, 2007), corporate sustainability targets were initially deployed using the logic of a simple domain, expecting linear compliance. However, while project developers operate within a complicated domain—managing dense urban logistics, expert planning, and conflicting financial constraints—the overarching sustainability transition they must navigate is inherently complex and ever-changing. Attempting to manage a complex transition with rigid, simple directives creates an ambidexterity trap (March, 1991), where the organisation demands exploration (innovation) but structurally only rewards exploitation (financial execution). The Ontwikkelplaats explicitly resolves this misalignment by adopting the studio model following from the Game Changers model (Dorst & Watson, 2023). It acts as a structural bridge, creating a dedicated space where top-down strategic intent and bottom-up operational reality can safely collide and continuously synchronise.

10.2.2 Enabling Sensemaking

Within this complicated environment, developers rely on familiar financial metrics as their primary tools for survival. When a new sustainable material threatens project viability, cognitive dissonance occurs. According to Weick’s (1995) theory of sensemaking, professionals facing ambiguity will revert to their most deeply ingrained routines. Expecting a developer to adopt an uncosted sustainable material is akin to asking Weick’s (1996) firefighters to “drop their tools”, it fundamentally threatens their professional identity and control. The Ontwikkelplaats succeeds because it removes the existential threat associated with sensemaking. By introducing a regional innovation budget, pragmatic Veldmemos, and internal think tanks, the intervention provides the psychological and financial safety required for developers to confidently drop their tools and experiment with new sustainable practices without risking their individual competence or project margins.

10.2.3 Fostering Double-Loop Learning

Heijmans developers manage sustainable friction through single-loop learning (Argyris, 1982): correcting an immediate error (e.g. an exceeded budget) by eliminating the sustainable ambition, while leaving the underlying financial policies unquestioned. The introduction of transparent Veldmemos and quarterly think tanks actively disrupts this cycle. Instead of isolated problem-solving, the intervention forces the sustainability team and developers to reflect jointly upon aggregated, real-world project data. This infrastructure enables true double-loop learning,

empowering the organisation to collectively question and adjust the underlying assumptions, such as redefining how sustainability is financially valued in project KPIs.

10.2.4 Learning as Knowledge Generation

This shift from isolated to collective learning is further validated through C-K Design Theory (Hatchuel & Weil, 2009). Previously, sustainability experts independently translated abstract sustainable concepts (C-space) into operational proposals (K-space), handing over finalised "Knowledge" to the developers. Because the developers did not participate in this generative transition, the new knowledge lacked coherence within their existing mental models and was summarily rejected. The Ontwikkelplaats structurally prevents disciplines from moving from C → K alone. By leveraging the regional innovation budget to mandate shared experimentation, and utilising quarterly think tanks to co-evaluate these learnings alongside the sustainability team, the creation of knowledge is democratised. Because developers are now active co-creators rather than passive recipients of sustainability directives, the expansion of the K-space becomes a shared cognitive journey, effectively embedding new sustainable knowledge into the collective mental models of the organisation simultaneously.

10.2.5 Restoring Organisational Vitality

Ultimately, by aligning the contextual reality (Cynefin), providing a safe space for sensemaking (Weick), facilitating double-loop learning (Argyris), and bridging epistemic silos (Hatchuel & Weil), the intervention achieves its primary design goal. It shifts the organisation away from rigid compliance and facilitates its vitality (Dorst, 2025), the energetic, systemic capacity to creatively adapt, learn, and lead within the open and dynamic sustainability transition.

10.3 Limitations

While this research aims to provide a robust strategic framework for organisational learning, several limitations must be acknowledged regarding the generalisability and scope of the findings. Primarily, the empirical findings are derived from a highly specific organisational context within the Dutch construction sector. Consequently, the conclusions regarding dense urban logistics and specific national sustainability regulations (such as BENG and MPG) are highly context-dependent. Furthermore, the final design intervention was explicitly tailored to the unique, pragmatic professional culture of the Rotterdam regional office, meaning the exact framework is not universally applicable without cultural translation.

A second limitation relates to the temporal boundaries inherent to a Master's thesis, which restricted the depth of the iterative validation process. The primary objective of this research was to diagnose the operational friction and conceptualise a strategic design intervention, rather than to execute a complete organisational transformation. However, because establishing a fully functioning studio environment in practice requires approximately eighteen months (Dorst, 2025), the final Ontwikkelplaats framework remains a validated conceptual foundation rather than a fully proven corporate system. Consequently, the findings presented in this thesis are grounded in initial stakeholder member-checking and theoretical projections. The true empirical effects of this intervention—specifically regarding its long-term survival against deeply entrenched routines—can only be definitively measured through a continuous, multi-year rollout.

Finally, this research approaches the problem from a Strategic Product Design and behavioural perspective, focusing exclusively on the organisational process of implementation. It assumes the technical viability and physical performance of the sustainable ambitions themselves as a baseline constant, rather than a variable to be engineered or optimised.

10.4 Recommendations

The complexity of the sustainability transition requires continuous investigation and iteration. Based on the findings of this research, several actionable recommendations are proposed for both Heijmans Real Estate and the broader academic community.

To ensure a successful national rollout of the Ontwikkelplaats, Heijmans must approach the implementation by actively managing the inevitable behavioural resistance. Leadership must anticipate a temporary period of organisational frustration, as transitioning away from entrenched workflows—although minimised in the Ontwikkelplaats—inherently increases the cognitive load of

the developers. To survive this initial phase, minimising administrative friction is critical. If a new system is valuable but perceived as too complex to navigate, developers will naturally fall back on their trusted defensive routines. Therefore, it is highly recommended that Heijmans not only introduces the new framework but actively dismantles the old, friction-heavy administrative infrastructure, effectively making the retreat to traditional, single-loop problem-solving impossible.

Furthermore, because the current intervention was explicitly tailored to the direct culture of Rotterdam, applied research is required to determine how this framework translates to local subcultures and specific cognitive barriers in other regional offices.

In addition to the systemic rollout, further internal research must zoom in on the micro-operational level of the developer. Currently, the organisation possesses vast amounts of sustainability knowledge, yet it frequently goes unused. Heijmans must investigate exactly why this occurs on a task-by-task basis—whether knowledge is unfindable, unrecognised, or simply perceived as lacking practical value. Future studies should map the exact, granular workflows of a developer, zooming in on specific processes like drafting a project budget or navigating existing IT systems. By investigating what the developer truly perceives as adding value, Heijmans can continuously refine highly targeted interventions, such as the Veldmemos, ensuring they seamlessly intercept the developer's exact workflow rather than adding to the noise.

Strategically, the specific mechanics of the newly proposed safety nets require further financial formalisation. The organisation must explicitly quantify the regional innovation budget, determining the exact financial margins required to actively motivate developers to experiment. This should include exploring novel funding structures, such as leveraging internal carbon credits to offset the costs of sustainable risks. Furthermore, the conceptual partner sprints and think tanks must be formalised into the standard corporate calendar to ensure they do not become ad-hoc, disposable activities when time scarcity peaks. Parallel to this, Heijmans should investigate how to strategically utilise their portfolio of standardised housing products. By relying on these standard products as efficiency engines to handle baseline logistics, developers can free up the cognitive space necessary to craft complex, bespoke urban integrations. Ultimately, as administrative friction drops and collaborative sustainability becomes the core practice, Heijmans must proactively define the 'Developer of the Future,' determining what specific new skills and training will be required for their professionals to thrive.

For the academic community, this study tests the boundaries of the studio model—an existing theoretical model for double-loop learning—by translating it into a radically different context. While Kees Dorst's (2025) studio model was researched and found within creative, architectural, design and public policy environments, this research opens a new academic avenue by adapting its infrastructure (via the Ontwikkelplaats) for the hyper-rational, margin-driven sector of commercial real estate. However, while the theoretical translation is successful, its long-term survival in such a risk-averse corporate environment remains to be proven. Longitudinal research spanning three to five years is highly recommended to track whether continuous feedback loops and structural risk budgets genuinely alter overarching corporate real estate strategy. Ultimately, future research should explore how these translated design principles can be further adapted to overcome behavioural resistance in other highly regulated, traditional industries.

11. Conclusion

The transition towards a sustainable built environment is frequently treated as a technical, logistical, or regulatory challenge. However, as this research has demonstrated, the true barrier to sustainable urban development is fundamentally organisational and behavioural. This study set out to answer how a human-centred design intervention, tailored to project developers, can improve the implementation of a corporate sustainability strategy and ensure a vital organisation. The empirical investigation revealed that top-down sustainability targets inevitably stall when they collide with the complicated, high-pressure reality of the project level. When faced with rigid financial KPIs, tight schedules, and abstract environmental advice, developers naturally retreat to familiar, cost-driven routines. This is not an act of malice or anti-sustainable sentiment, but a rational act of professional self-preservation. It is a manifestation of single-loop learning, where the profound cognitive barrier of “dropping one’s tools” (Weick, 1996) prevents professionals from embracing risky, unfamiliar innovations. The organisation’s strategic failure lay in expecting developers to individually adopt new sustainable knowledge without providing the structural or financial safety to do so.

To resolve this systemic disconnect, this research concludes that the organisation cannot rely on static policies, mandatory checklists, or one-way expert advice. Navigating a complex, open, networked, and dynamic sustainability transition requires an ongoing, collaborative infrastructure. The proposed design solution, the Ontwikkelplaats, provides this exact infrastructure. By adapting Kees Dorst’s (2025) theoretical studio model into the pragmatic, results-driven culture of Heijmans Rotterdam, the design introduces a continuous rhythm of four core activities: experimenting, learning, communicating, and growing. It achieves this not through corporate mandates, but through highly functional, grounded interventions: guaranteeing financial safety by structurally lowering return-on-investment thresholds, capturing raw field reality via low-threshold Veldmemos, and cultivating psychological safety through biannual partner sprints and zero-preparation think tanks.

The Ontwikkelplaats serves as the critical bridge between strategic exploration and project-based exploitation. By removing the strict financial penalty for failure and forcing disciplines to move from abstract sustainable concepts to practical operational knowledge together (Hatchuel & Weil, 2009), the intervention successfully pulls developers out of their defensive routines. It shifts the role of the sustainability team from external compliance monitors to integrated facilitators. More importantly, it creates the structural capacity required for double-loop learning (Argyris, 1982), empowering developers to actively question the why behind their daily operations rather than merely executing the how.

Ultimately, if Heijmans is to lead the transition in urban development, sustainability must cease to be viewed as a mandatory afterthought or an administrative burden. It must be seamlessly woven into the core professional identity and craftsmanship of the project developer. By committing to the continuous, collaborative rhythm of the Ontwikkelplaats, the organisation transforms the friction of the sustainability transition from an operational threat into an engine for systemic vitality, equipping its professionals to confidently and creatively build the future city.

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Appendix A

INTERVIEW GUIDE (TRANSLATED)

Introduction (5 min)

- Brief introduction of the researcher and the Master's thesis focus (implementation of the corporate sustainability strategy within Heijmans Real Estate).
- Explanation of the research scope: Investigating decision-making processes in dense urban environments, comparing traditional custom builds with standardised development concepts.
- Emphasis that there are no right or wrong answers; the goal is to understand their personal experiences, routines, and perspectives.
- Confirmation of anonymity, confidentiality, and request for permission to record (informed consent check).

Start: Opening & Context (5 min)

- Could you briefly explain what your project entails and what your specific role was?
- When did you become involved in this project?
- Looking back at the project, what are you most proud of?
- In general, what elements make you proud of a project? What motivates you? (Why? What does that depend on?)

Theme 1: Decision-Making Routines & Frameworks (15 min)

- How did you determine the development method for this project (e.g. choosing between traditional custom builds or implementing standardised concepts)?
- What was the decisive factor in that choice, and why was it crucial?
- Were alternative options considered? Why were they ultimately rejected?
- When looking at process efficiency and your daily routine, which development method do you personally prefer and why?
- When looking at the final result, which method do you prefer and why?
- Priorities: What were the main objectives in the project? Which of these were most important to you personally, and why?
- What caused frustration or demotivation during the project? (Why?)

Theme 2: Prioritisation & Strategic Translation (10 min)

- What were the primary sustainability goals in your project (e.g. regarding Climate, Water, & Biodiversity)?
- How were these specific goals established and operationalised?
- Did the approach to sustainability differ depending on the development method used (traditional vs. standardised)? Why?
- Trade-offs: What conflicting interests or trade-offs occurred during your project?
- How were these contradictions managed? When pressure increased, what was dropped first, and why? (Why? What did that depend on?)

Theme 3: Organisational Support & Knowledge Transfer (10 min)

- How were you (in)directly supported in making sustainable choices? Did you feel you had the right data/tools to defend those choices?
- By whom were you supported, and in what phase of the process?
- What would the ideal sustainability support system look like for your daily practice?
- Knowledge Sharing: How was knowledge regarding sustainability introduced into your project?
- How did you personally share or transfer lessons learned regarding sustainability during or after your project? To whom was this fed back?

Closing Questions (5 min)

- How have you seen your professional practice and daily work change over the past 10 years? How do you feel about that?
- How do you foresee your work changing in the next 5-10 years?
- In your opinion, what is the biggest untapped opportunity for Heijmans in Rotterdam regarding sustainability right now?
- Are there any relevant documents or contacts you recommend I review for this case?
- Thank you and closing statement.

Appendix B

INFORMED CONSENT FORM

You are being invited to participate in a research study titled ‘Shaping the transition towards sustainable living.’ This study is executed by Rosa Philippa, a master student of the Faculty of Industrial Design Engineering, TU Delft as their graduation project.

The purpose of this research study is to understand how the sustainability strategy of Heijmans is implemented in projects in an urban environment, comparing the traditional build with standardised build. You are invited to share your experiences of how this is done in projects you are involved through an interview. The interview will last approximately 1 hour and will be recorded (audio). The recording will be transcribed and anonymised immediately afterwards.

We will ask you to answer open questions about your experience in relevant contexts and ask possible follow-up questions.

As with all (digitally) stored data, there is always the risk of a data breach. Your answers to this survey will be kept confidential to the best of our ability. We will minimise any risks by deleting the recordings after the anonymised transcription. In the transcript, we refer to your name by [interviewee X], your case by [case Y], and any organisations mentioned by [organisation Z]. This data is securely stored on OneDrive and is only accessible to the researcher and her (academic) supervisors. Also, if signed, this Letter of Informed Consent will be securely stored on this drive. Aggregated, anonymised data may be publicly available to other scientists for research purposes.

Participation in this research is entirely voluntary, and you can withdraw anytime. You are free to omit/remove any questions. Within one month after the recording of the interview, you can request that (part of) your interview answers be omitted for further analysis by sending a written request to the Corresponding Researcher.

Thank you for participating in this research!

For further details or in case of questions, feel free to contact me anytime via:

Rosa Philippa (Corresponding Researcher)

PLEASE TICK THE APPROPRIATE BOXES	Yes	No
A: GENERAL AGREEMENT – RESEARCH GOALS, PARTICPANT TASKS AND VOLUNTARY PARTICIPATION		
1. I have read and understood the study information dated 15/01/2026, or it has been read to me. I have been able to ask questions about the study and my questions have been answered to my satisfaction.	☐	☐
2. I consent voluntarily to be a participant in this study and understand that I can refuse to answer questions and I can withdraw from the study at any time, without having to give a reason.	☐	☐
3. I understand that taking part in the study involves: Audio recording of the interview recorded through video conferencing software or voice recording application, respectively. These recordings will be stored temporarily on a dedicated and secured OneDrive from the TU Delft. The recordings will be transcribed and anonymised, and destroyed after completion of the transcription.	☐	☐
4. I understand that the study will take approximately 60 minutes.	☐	☐
B: POTENTIAL RISKS OF PARTICIPATING (INCLUDING DATA PROTECTION)		
5. I understand that taking part in the study also involves collecting specific personally identifiable information (PII) such as my name, the case I worked on and my role in the project with the potential risk of my identity being revealed.	☐	☐
6. I understand that the following steps will be taken to minimise the threat of a data breach, and protect my identity in the event of such a breach: - storage of recordings and transcriptions on a secured and dedicated project drive, accessible to the research team only; - anonymisation of name, case, organisation in transcription; - aggregation of my answers; - destruction of recordings after completion of transcription.	☐	☐
7. I understand that personal information collected about me that can identify me, such as name, role, location, will not be shared beyond the research team.	☐	☐
8. I understand that the (identifiable) personal data I provide will be destroyed after completion of the transcription.	☐	☐
C: RESEARCH PUBLICATION, DISSEMINATION AND APPLICATION		
9. I understand that after the research study the de-identified information I provide will be used for analysis and a report in the form of a master thesis.	☐	☐
10. I agree that my responses, views or other input can be quoted anonymously in research outputs.	☐	☐
11. I understand that only overarching patterns and no details of specific individuals, projects, or organisations will be shared with Heijmans. Details of specific experiments will only be shared in anonymised form with Heijmans.	☐	☐
D: (LONGTERM) DATA STORAGE, ACCESS AND REUSE		
12. I give permission for the de-identified transcriptions that I provide to be archived in a TU Delft OneDrive, so it can be used for future research and learning. I understand that access to this drive is restricted to the involved TU Delft Researchers.	☐	☐

SIGNATURES

_____	_____	_____
Name of participant	Signature	Date

I, as researcher, have accurately read out the information sheet to the potential participant and, to the best of my ability, ensured that the participant understands to what they are freely consenting.

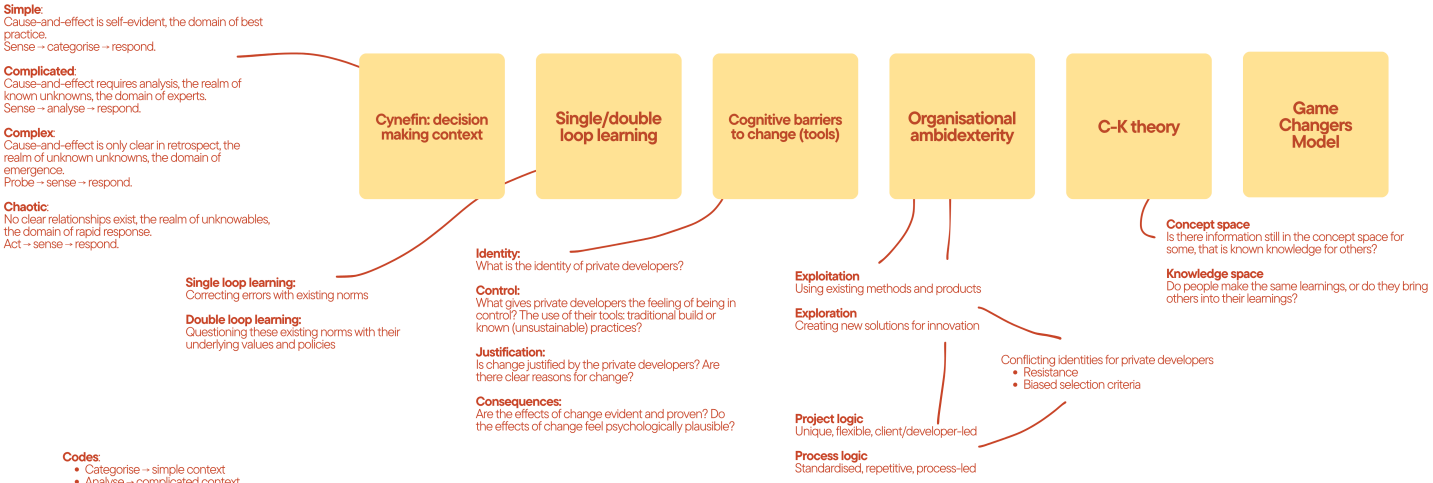
_____	_____	_____
Name of researcher	Signature	Date

Study contact details for further information:

Rosa Philippa (Corresponding Researcher)
M: R.Philippa@student.tudelft.nl
T:

Appendix C

CODING FRAMEWORK



Codes:

- Categorise → simple context
- Analyse → complicated context
- Probe → complex context
- Act → chaotic context

- Using existing norms → single loop learning
- Questioning existing norms → double loop learning
- Questioning underlying values → double loop learning
- Questioning underlying policies → double loop learning

- Identity of private developers
- Feeling of being in control
- Justification for change
- Consequences of change

- Exploitation (existing methods and products)
- Exploration (new solutions for innovation)
- Project logic (unique/flexible/client/developer-led)
- Process logic (standardised, repetitive, process-led)

- Conflicting identities
  - Resistance
  - Biased selection criteria

- Concept space
- Knowledge space
  - Misaligned learnings

- Values private developers

Appendix D

INITIAL IDEATION

Analogies

In plaats van auto naar werk en daarnaast sporten, integreren door te fietsen naar werk.

The use of Microsoft Teams, next to Outlook. First the only way of keeping in touch was trough emails, then important decisions were also done on chat platforms such as Teams. Social pressure to use it as well. But Teams (old routine) still exists.

A dutch person eating AVG, where "groente" is an extra, to becoming vegetarian and "groentes" will be most important. Forced to use the old "extra" as an integral ingredient.

Saving money with whatever is left that month vs. saving 15% immediately when their income is transferred. Saving is now the primary, unavoidable action because of the "choice architecture".

Accessibility in buildings: accessibility was added later on, with a ramp built at every exit. Now buildings have integrated accessibility features such as a maximum of 2cm steps when moving from in- to outside. Or else a ramp is mandatory.

Backpacking with a huge backpack to fit everything in, or buying a smaller backpack to force yourself to choose what you want to bring.

Analogies

Seatbelts in cars: from having lap belts as an optional extra, where the industry focussed on aesthetics and horsepower, to a mandatory (three-point) seatbelt

Waste managements in restaurants is seen as an extra, whereas some restaurants have it at their core business to waste nothing. Recipes are created completely different to use up all parts of animals/vegetables.

Farming: from using one crop on the same field for years until it was depleted, to switching to crop rotations, where each field would have a different crop each year to prevent depletion.

High jumpers used to jump like the scissors jump, until the fosbury flop made an introduction, and everyone changed and used that method. This was possible because they jumped on mats in stead of sand.

Smoking everywhere was normal. With new information about second hand smoking, people learned that it was important not to smoke around others. So parents stopped smoking around their children, and actively went outside to smoke. Change in their identity.

In stead of learning a language from your books, the traditional way, to immersing yourself in a foreign country, not reverting back to your native language, you learn easily.

Veiligheid transitie binnen Heijmans!

Mandatory software system change

Non-mandatory software system change: stop supporting the old system, which becomes a hostile place to work.

Same with updating software and apps etc. If apps or other tools are not supported anymore, you will want to update the software yourself.

Drinking & driving: not drinking was seen as a negative partypooper. "Bob" was introduced → the hero who isn't drinking to drive everyone safely home. It was made socially acceptable (social reward).

Interview notes (translated and highly summarised)

Interview Questions

- What are the fundamental requirements for making a large-scale change acceptable to staff?
- How has the transition to new software and the new model impacted daily work?
- Why has the new system failed to support the newsroom during high-pressure deadlines?
- How involved were the employees in the creation and rollout of these new processes?
- What are the positive outcomes of this modernisation, and what does the future look like for the department?

Topics Covered

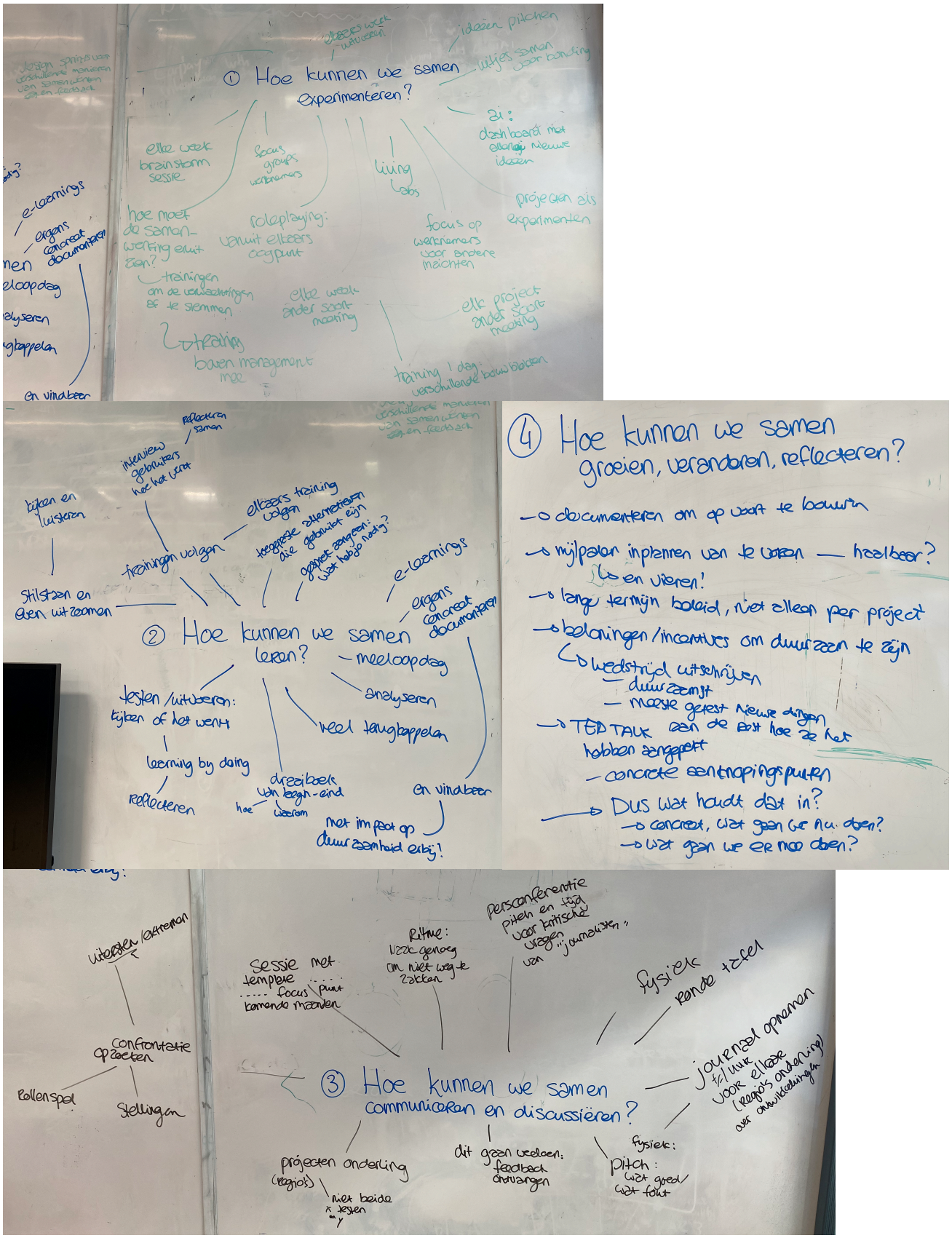
- Effective Change Management: The importance of honesty, clear justification for changes, and the high emotional toll on staff acting as intermediaries.
- Workflow Impracticality: The failure of the new approach, which led to data clutter and hindered speed during breaking news events.
- Shadow IT/Workarounds: How staff are forced to use hidden folders and personal systems to remain efficient because the official software is non-intuitive.
- Engagement and Feedback: The initial suppression of criticism and the lack of staff involvement during the development phase of new tools.

Appendix E

BRAINSTORM SESSIONS

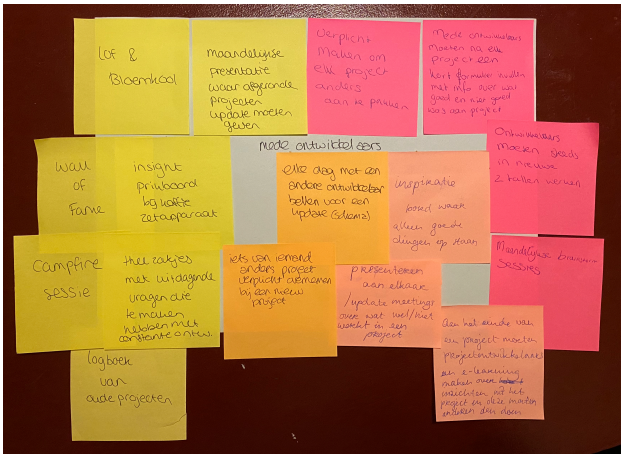
Brainstorm Sessie 1

Regarding the design of the fundamental basis of the studio model. How do we shape the studio model within this context?



Brainstorm Session 2
On shaping how we learn from projects.

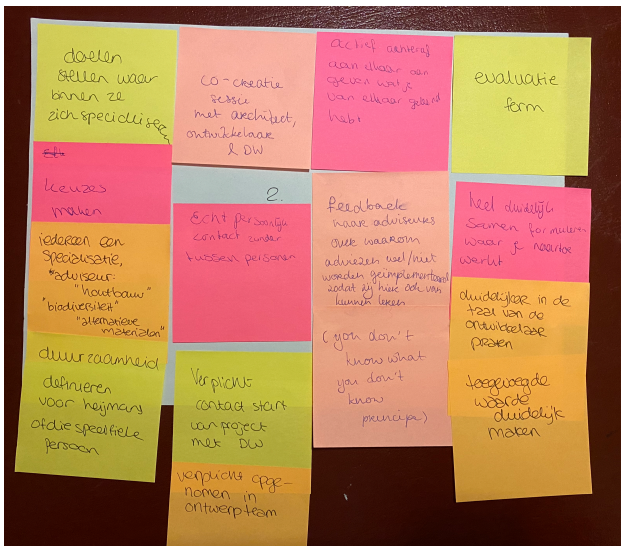
1. How can we learn from fellow developers?



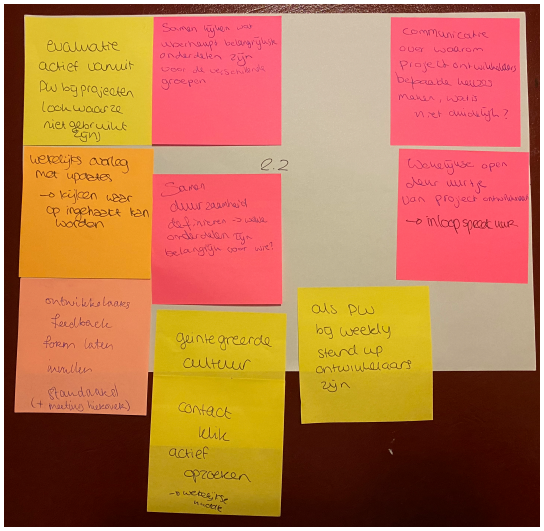
1.2 How can we learn from fellow developers in other regions?



2. How can we facilitate mutual learning between project developers and consultants from the sustainability team?



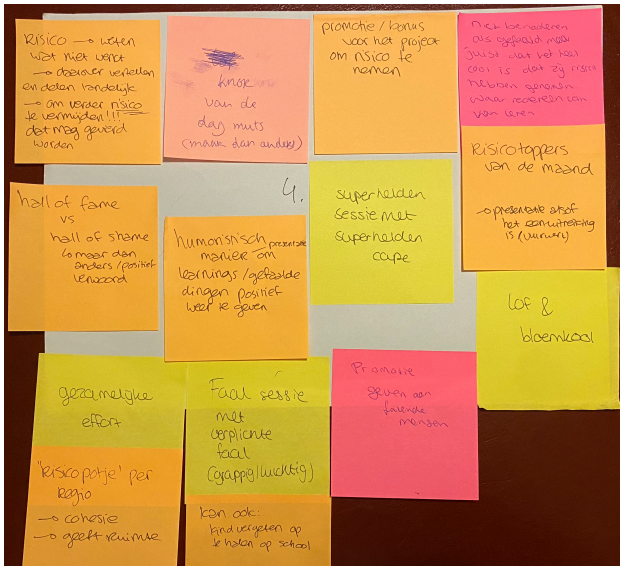
2.2 Conversely, how can consultants from the Sustainable Housing team learn from project developers?



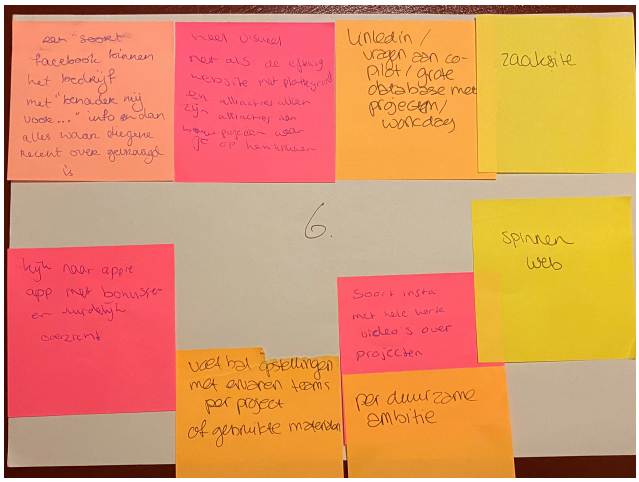
3. How can we incentivise people to make time for knowledge sharing in a work culture where being ‘constantly busy’ is the norm?



4. How can we make sharing a failed sustainability ambition so engaging, safe, or rewarding that colleagues are eager to discuss their mistakes with others?



5. How can we design a system or platform where you can find answers from experienced colleagues with a single click, just like Google?





Appendix F

USE OF AI

This appendix outlines the use of Artificial Intelligence (AI). For this research I have used artificial intelligence tools during the development and writing of this thesis. Its application was strictly bounded by my own findings, theoretical frameworks, and final critical judgement. The specific applications of the AI included:

- Helping with brainstorming and ideation. A large language model (LLM) was used to expand upon raw ideas, particularly to prepare the brainstorm sessions and during the ideation phase for the Ontwikkelplaats interventions. It assisted in categorising brainstorm notes and separating design criteria from concrete concepts.
- Restructuring texts and reformulating sentences. To ensure a cohesive academic narrative, a LLM was employed to improve the flow of transitions between chapters, and ensure consistent application of UK English.
- Refining theoretical thoughts. A LLM helped to test the logic of connecting the empirical findings to established literature (e.g Argyris' double-loop learning and Weick's cognitive barriers) as someone to discuss with.
- Prototyping digital interfaces. The AI-powered development platform, Lovable, was utilised to translate conceptual designs into tangible digital prototypes. Specifically, it was used to build the functional interface for the Veldmemos, as well as the initial interface design for Concept A. This allowed for the visual translation and validation of the proposed digital interventions.
- Generating images. As seen in the report, multiple illustrative images were created using AI image generation (Gemini).

It is important to note that all data collection, thematic analyses, and conceptual directions originated solely from the author—me. The AI did not conduct its own research, analyse raw or anonymised interview transcripts, or draw independent conclusions. Every draft or suggestion that was assisted by the AI was critically reviewed, edited, and validated by myself to ensure clear alignment with my thesis and the reality of Heijmans.

Appendix G

MORPHOLOGICAL CHART

Core Function			
1. Room for experimenting	**Regional innovation budget**	**Bonus as a reward for sustainable risk**	*Risk champion of the month*
2. Learning	**E-learnings of every project**	*Hall of fame including learnings and insights*	**Visual map with voice memos**
3. External communication for feedback	*Museum exhibition*	**Exclusive event with brainstorm/sprint sessions**	**Sharing learnings when celebrating milestones**
4. Growing	*Project autopsy at the end of a project*	**Internal fair**	**Evaluation forms**

Table A: Overview of the Morphological Chart

FOLLOWING CONCEPTS

Core Function	Selected Solution from Morphological Chart
1. Room for experimenting	Bonus as a reward for sustainable risk
2. Learning	E-learnings of every project
3. External communication for feedback	Sharing learnings when celebrating milestones
4. Growing	Evaluation forms

Table B: Concept A, following the Morphological Chart

Core Function	Selected Solution from Morphological Chart
1. Room for experimenting	Risk champion of the month
2. Learning	Hall of fame and shame including learnings and insights
3. External communication for feedback	Museum exhibition
4. Growing	Project autopsy at the end of a project

Table C: Concept B, following the Morphological Chart

Core Function	Selected Solution from Morphological Chart
1. Room for experimenting	Regional innovation budget
2. Learning	Visual map with voice memos
3. External communication for feedback	Exclusive event with brainstorm/sprint sessions
4. Growing	Internal fair

Table D: Concept C, following the Morphological Chart

Appendix H

FACILITATOR'S GUIDE FOR THE ONTWIKKELPLAATS

This matrix serves as a chronological, actionable agenda for the regional sustainability advisors to guide the 18-month implementation of the Ontwikkelplaats. It included the guiding questions that are mentioned throughout Chapter 8.

Implementation Phase	Addressed Strategic Theme	Guiding Questions for Co-Creation	Phase Goal / Desired Outcome
Phase 1: Financial Formalisation **(Internal Management)**	Cultivating Safety & Translating Strategy	• How can we translate the ambiguity of a corporate sustainability strategy into concrete financial boundaries for an individual project developer? • How can we create space for a developer to test new materials without threatening their individual project margin? • How can we ensure that sustainability is no longer viewed as a delaying factor, but as the foundation of professional success?	The Safety Net: A redefined, commercially viable project baseline that strictly prevents single-loop financial routines.
Phase 2: Frictionless Knowledge Capture **(Veldmemos)**	Cultivating Safety	• How can we document and share the lessons from an experiment so that the entire organisation learns from them without adding administrative friction? • How do we shift our corporate culture so that sharing a failed material test is celebrated as a strategic learning rather than hidden as a personal failure?	The Baseline Habit: A psychologically safe environment that actively rewards transparent sharing, capturing data without adding administrative friction.

Implementation Phase	Addressed Strategic Theme	Guiding Questions for Co-Creation	Phase Goal / Desired Outcome
Phase 3: Activating External Feedback **(Biannual Partner Sprints)**	Integrating Disciplines	• How can we remove the procedural distance between Heijmans developers and the external supply chain? • How can we ensure every proposed sustainable solution is directly linked to a practical feasibility test? • How can we design a culture in which making calculated mistakes with unknown materials is seen as valuable data rather than a personal failure?	The Workflow: A frictionless, cross-disciplinary workflow where sustainable collaboration with external partners becomes a native reflex.
Phase 4: National Reflection **(Quarterly Think Tanks)**	Translating Strategy & Integrating Disciplines	• How can we ensure that it is practically impossible for developers to automatically fall back on their familiar routines? • How can we structure project KPIs so that sustainability performance carries as much weight as financial return?	The Double-Loop Engine: A systemic, cross-regional reflection mechanism that constantly challenges underlying assumptions and feeds back into corporate strategy.
Phase 5: The Infinite Iteration Loop		• Are we still doing the right things? • Are we doing them for the right reasons? • Why are we executing them in this specific way? • Does our strategy still align with the shifting realities of the broader Dutch construction field?	Vitality: A permanent, self-correcting strategic engine.

Table E: Facilitator's Guide for the Ontwikkelplaats