Are you familiar with our concept?

Understanding how Bouwstromen shape collaboration and conceptual housing delivery in the Netherlands

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Abstract | The Netherlands is facing a significant housing shortage, with a target of 900.000 new homes by 2030. Bouwstromen have emerged as a promising response to accelerate delivery and improve affordability. However, the organizational and collaborative dynamics within Bouwstromen are not well understood. This thesis examines three active Bouwstromen: WoonST 2.0, NH Bouwstroom and Bouwstroom Haaglanden. Through a comparative case study based on interviews with key actors and project documentation, the research explores how Bouwstromen reshape actor roles, collaboration and governance in urban development. In-depth interviews and qualitative coding are applied to analyze these shifts among involved parties. Findings show that Bouwstromen transform traditional roles: housing associations evolve into coordinators of mutli-year projects within a portfolio; municipalities shift to strategic collaborators and builders step into a reactive product developers role. Early alignment and trust foster ‘no-relearning’ efficiencies and facilitate standardization at scale. Yet, challenges remain in aligning municipal processes, clarifying responsibilities and balancing standardization with site-specific flexibility. This study contributes to the understanding of programmatic housing delivery by linking governance structures to collaboration and IC method adoption. The insights provide a basis for improving permit procedures, strengthening partnerships and supporting scalable housing solutions within the Dutch urban context.

Keywords | Bouwstroom, Conceptualization, Collaboration, Industrialized construction, Governance, Actor roles, Urban development, Programmatic procurement

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I was never an exceptional student in the traditional sense, but this thesis has been a turning point in my academic confidence and personal growth. Seeing my ideas take shape on the page and crafting this document as the finalization of my educational career has given me a profound sense of accomplishment. I am proud to close this chapter feeling stronger, more self-assured and eager for the challenges that lie ahead. As you will read in this thesis, there are a lot of challenges still left in the built environment so I look forward to starting my professional career and try to help solve some of them.

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List of abbreviations

- BZK: Ministerie van binnenlandse zaken en koninkrijksrelaties
- IC: Industrialized construction
- KPI: Key performance indicator
- MMO: Maandagmiddag overleg (monday-afternoon meeting)
- MRE: Metropolitan region Eindhoven
- NCB: Netwerk conceptueel bouwen
- NH Bouwstroom: Nieuw Hollandse Bouwstroom
- PMC: Product-market combinations
- RACI-matrix: Responsible, accountable, consulted and informed matrix
- RVO: Rijksdienst voor ondernemend Nederland
- SGE: Stedelijk gebied Eindhoven
- SVOH: Subsidieregeling verduurzaming en onderhoud huurwoningen
- SVH; Sociale verhuurders Haaglanden
- VRO: Ministerie van volkshuisvesting en ruimtelijke ordening

Reading guide

This thesis explores how Bouwstromen, regional, programmatic models in the Netherlands, reshape actor roles and collaboration in the context of conceptualized building. It provides both a theoretical framework and empirical insights through three in-depth case studies: WoonST 2.0, Bouwstroom Haaglanden and NH Bouwstroom. The document is structured as follows:

- *Chapter 1: Introduction*

Presents the research context, objectives and main research questions regarding Bouwstromen and their role in urban development.

- *Chapter 2: Literature review*

Reviews academic and grey literature on collaboration in construction, actor roles, governance, industrialized conceptual construction and programmatic housing models such as Bouwstromen.

- *Chapter 3: Methodology*

Describes the qualitative research design, including case study selection, data collection through interviews and document analysis, coding procedures and validity strategies.

- *Chapter 4: Findings*

Presents key insights from the three case studies, structured by themes such as collaboration dynamics, governance and actor role changes.

- *Chapter 5: Discussion*

Answers the research questions by synthesizing findings with existing knowledge, highlighting challenges and opportunities in Bouwstroom collaboration and governance.

- *Chapter 6: Scientific relevance*

Summarizes the main research outcomes, theoretical contributions, limitations and suggestions for future research directions.

- *Chapter 7: Societal relevance*

Provides practical recommendations for improving collaboration and delivery at the project, program and national policy level.

- *Reflection*

A personal account of the research journey, learning experience and the development of academic and professional skills during the thesis process.

- *Appendices*

Contain interview protocols, visual models and timelines that support the research process.

Readers interested in practical recommendations may focus on the findings and discussion chapters. Those with a theoretical or academic interest are encouraged to begin with the literature review and methodology. The thesis can be read linearly or consulted thematically, depending on the reader’s focus.

1. Introduction

1.1 What is the problem?

Bouwstromen are programs which respond to the pressing housing shortage, rising construction costs and the ambition to increase sustainability within the Dutch built environment. The concept of the Bouwstroom has gained traction among government bodies, housing associations and construction partners. A Bouwstroom, literally translated as “construction flow”, represents a novel organizational and production method in which multiple housing projects are bundled and realized programmatically rather than as stand-alone developments. Despite growing policy and professional interest, scholarly attention remains limited on these Bouwstroom, with only some grey literature written about the collaboration form.

1.2 What do we know about it?

Bouwstromen are a collaboration form happening within the Netherlands between a combination of municipalities, housing associations and builders who join in a multi-year program. Bouwstromen are primarily aimed at three interconnected objectives.. First is the acceleration of housing production. By bundling projects into a predictable pipeline, planning procedures can be optimized, permitting can be synchronized and IC methods can be applied more efficiently. Second, is standardization. The underlying principle is that repetition enables quality improvement, cost reduction and supply chain integration. Standardized building concepts and modular design are critical enablers. Third, long-term collaboration among public and private actors is central. Rather than re-tendering for each project, Bouwstromen rely on sustained partnerships based on mutual trust, framework agreements and early market engagement (Netwerk Conceptueel Bouwen, 2024). These aims are strongly aligned with broader governmental ambitions, such as the Woondeals, the Nationale Woon- en Bouwagenda and the adoption of conceptual building as a means to address challenges in affordability, quality and sustainability. Although peer-reviewed research on Bouwstromen is scarce, various grey literature sources offer valuable insights. For instance, the evaluation report of WoonST 1.0 highlights several initial successes, including improved alignment between client organizations, greater clarity in product definition and more efficient procurement procedures (WoonST 1.0 Evaluatie, 2024). Furthermore, construction partners reported increasing certainty, which in turn stimulated investment in product development and supply chain optimization. Another positive outcome is the professionalization of demand articulation by housing associations. Instead of tailoring requirements to individual projects, clients are learning to define functional and technical specifications that align with repeatable solutions.

1.3 What do we not know about it?

Despite these encouraging developments, several gaps and critiques remain. One major limitation concerns the fragility of collaboration. Bouwstromen are vulnerable to organizational turnover or shifting political priorities. Moreover, there is uncertainty about the scalability and replicability of successful pilots. While bundling projects appears promising, aligning timelines, local policies and site conditions remains challenging, especially across multiple municipalities. Another critique stems from the perceived rigidity of standardization.

While repetition can enhance efficiency, it may limit architectural diversity or context-specific solutions. There are also concerns that IC methods may not yet be sufficiently mature to deliver the promised levels of circularity or carbon reduction at scale (Platform31, 2023). Finally, Bouwstrome requires a shift in roles and responsibilities. These shifts are not self-evident and require time, capacity and trust to mature.

1.4 Objectives

So, Bouwstromen offers a compelling strategy to address systemic challenges in the Dutch housing sector. They promise acceleration, efficiency and better collaboration. Yet, they also raise fundamental questions about governance, role definition and institutional support. As such, this research contributes to a deeper understanding of what Bouwstromen are, how they function and what their implications are for collaboration and governance in urban development. Underneath, the research questions can be found and Figure 1.1 “Conceptual framework” shows their correlation.

1.4.1. Main question

- What is a Bouwstroom and how does its implementation affect collaboration within the urban development projects in the Netherlands?

1.4.2. Sub questions

- SQ 1: How do actor roles and responsibilities change within a Bouwstroom compared to traditional construction processes?
- SQ 2: What collaboration challenges and opportunities do actors perceive when working within a Bouwstroom?
- SQ 3: How does the governance structure of a Bouwstroom facilitate or hinder collaboration between actors?
- SQ 4: How can Bouwstromen contribute to the broader adoption of IC methods in urban development projects?

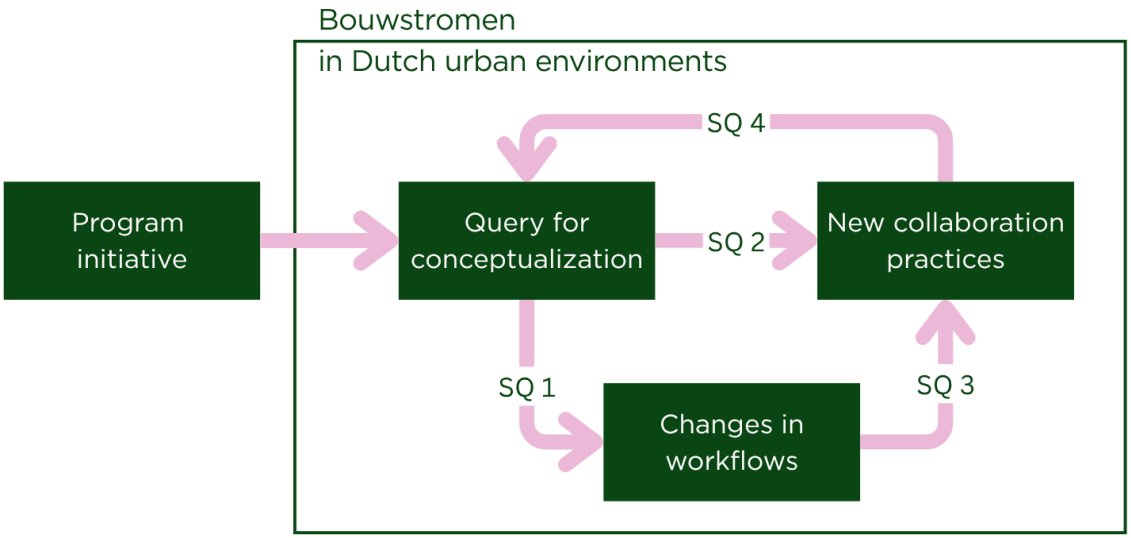

Figure 1.1: Conceptual framework (own image, 5-5-2025)

2. Literature review

The goal of the literature review, and therefore this chapter, is to build a theoretical framework to better understand what is known about Bouwstromen, actor roles, collaboration, governance and industrialised construction. Furthermore, the literature review is used to identify gaps in existing knowledge in order to add to it and justify the empirical research done in this thesis.

2.1. Historical context of Dutch urban housing

Urban development in the Netherlands has historically been shaped by a commitment to efficient land use and social inclusivity. These principles have given rise to a distinct planning framework that influences construction practices.

Post-war housing shortage in the mid 20th century prompted large-scale housing programs often characterized by rapid construction using prefabrication techniques. This period introduced an early form of industrialized construction (IC) to meet urgent housing demands, particularly in urban centers such as Rotterdam, Amsterdam and Utrecht (Van der Valk, 2002). However, the methods used then were often criticized for their lack of architectural quality, leading to a decline in public and political support. In the 1990s, the so-called “vinex” housing policy revitalized urban planning by encouraging high-density developments near existing infrastructure. While Vinex neighborhoods prioritized compact and sustainable urban growth, they often relied on traditional construction methods. The lessons from this era emphasized the need for efficient, high-quality construction solutions (Boelhouwer & Van der Heijden, 2018). Today the Netherlands faces a renewed housing crisis, compounded by ambitious climate goals and urban densification pressures. This raises the same types of problems and the need for scalable and sustainable housing solutions.

Figure 2.1: Vinex neighborhood in the Netherland (Tangram Architekten, 2017)

Urban environments are central to this research, as they provide the context in which many of the challenges and opportunities arise. In the Netherlands, urban environments are characterised by high population density, compact spatial planning and a unique set of regulatory, social and environmental considerations. The Netherlands is one of the most densely populated countries in Europe, with an average of over 500 inhabitants per square kilometer (CBS, 2022). Urban areas such as Amsterdam, Rotterdam or The Hague have even higher densities, leading to intense competition for space and resources. This pressure makes efficient land use a priority, necessitating innovative construction methods to meet growing housing and infrastructure demands. Secondly, urban environments have to deal with compact spatial planning. Dutch urban environments are shaped by a tradition of compact and well-organised spatial planning, emphasizing mixed-use developments and accessibility. This approach aligns with the country's "Vinex" housing policy, which encourages densification and efficient land use while minimizing urban sprawl (Van der Valk, 2002). However, this compactness also poses challenges for construction logistics. Furthermore, the Netherlands has a highly regulated construction industry, with stringent building codes and zoning laws that vary between municipalities. These regulations often focus on sustainability, energy efficiency and circularity, aligning with the country's broader environmental goals (RVO, 2020). Dutch urban environments are at the forefront of global sustainability efforts, with cities setting ambitious targets for energy-neutral buildings and waste reduction. For example the "Climate agreement" aims for a 49% reduction in CO2 emissions by 2030, with construction playing a critical role in achieving these goals (PBL, 2021).

Urban environments in the Netherlands present both unique challenges and opportunities. The high density and compact spatial planning demand efficient and space-saving construction methods. However, these same characteristics also introduce logistical difficulties, such as limited space for on-site assembly. The success of projects in these environments depends on how effectively actors can work together to align their goals and overcome systemic barriers. By focusing on urban environments, this research aims to provide insights into how Bouwstromen tailored to the specific needs and challenges of Dutch cities.

2.2. Conceptualization and industrialization

This section explores the distinction between industrialized and conceptual building approaches within the construction sector. Industrialized construction focuses on factory-based prefabrication and standardized production processes aimed at maximizing efficiency and repeatability. In contrast, conceptual building centers on standardized design frameworks that guide construction but allow flexibility in execution, often accommodating traditional building methods. Understanding these differences is crucial for analyzing how Bouwstromen implement housing delivery and balance standardization with adaptability.

2.2.1. Industrialized construction (IC)

Industrialized construction refers to the streamlined approach of designing, producing and assembling building components, primarily in a factory setting. It encompasses various building methods like modular construction, prefabrication and design for manufacturing and assembly. These methods aim to enhance the efficiency and quality of the construction process, minimizing waste and reducing costs (Lessing et al., 2015). Modular construction is a process in which a building is constructed using multiple factory-produced sections, known as modules. These modules are created in a controlled, off-site environment where they are fully finished, before being transported to the final site. Key factors for this method are factory production, scalability and precision (Lawson, Ogden & Goodier, 2014 and Kamali & Hewage, 2016). Modular construction is particularly common in residential projects, hotels and student housing where units can be repeated efficiently. An example is the Balpol 4 building, being built on the TU Delft campus (DaiwaHouse, 2024). A flat of student houses which was built by stacking multiple off-site manufacturer modules, seen in image 2.1.

Prefabrication refers to the process of assembling building components at a factory or other manufacturing site and then transporting them to the construction site for installation. Unlike modular construction, which involves entire sections of a building, prefabrication can involve smaller elements such as panels, beams, columns or facades. Therefore, making it easier to transport which saves time and logistical management. Key characteristics of prefabrications are component-based, gained efficiency and better quality control (Pan & Goodier, 2012 and Blisman et al., 2006). Design for manufacturing and assembly (DfMA) is a design approach that simplifies the manufacturing and assembly processes of building components. It focuses on designing products with ease of manufacturing and assembly in mind, thereby reducing costs and construction time. Key characteristics of DfMA are manufacturing efficiency, easier assembly and reduced material waste. These concepts are part of the broader industrialized construction framework and share common goals (Pan et al., 2012 and Gibb & Isack, 2003). Understanding their distinct characteristics and benefits helps actors choose the appropriate approach for specific projects and improves the overall efficiency and sustainability of the construction process.

Figure 2.2: Construction of Balpol 4 in Delft (Schouten, 2024).

In contrast to traditional on-site construction, IC methods offer better control over the production process. Thereby reducing material waste and shortening construction timelines (Gibb & Isack, 2003). In new buildings, IC has been demonstrated to reduce project timelines significantly. By manufacturing building elements off-site and assembling them on-site, construction projects can minimize disruption caused by weather and other on-site variables. For example, the use of prefabricated surfaces (walls, floors, etc) can speed up the construction process and enhance project predictability (Pan & Goodier, 2012). Moreover, IC can contribute to sustainability by reducing material waste and improving the energy efficiency of buildings, aligning well with increasing regulatory and market demands for sustainable construction practices (Eberhardt et al., 2019).

The full potential of IC lies in its integration across the entire project process, from design and procurement to production, logistics and on-site assembly. The adoption of digital tools like Building information modeling (BIM) facilitate this integration by enhancing communication and collaboration among actors (Goulding & Arif, 2013). When effectively implemented, a streamlined project can reduce delays, improve costs management and enhance overall project quality.

2.2.2. Conceptualization

The shift towards IC methods within Dutch urban development is highly supported and dependent on the use of conceptualized buildings. A great example for conceptualization in the Dutch construction industry are the product-market combinations (PMCs). These concepts represent a strategic response to the need for scalable, cost-efficient and sustainable housing production, especially within the collaborative framework of Bouwstromen. Conceptualized buildings refer to pre-engineered housing typologies developed with repeatability and modularity in mind. PMCs do this by describing tailored combinations of standardized product and target user groups; a table with PMCs can be found in figure 2.4 (Lessing, 2006, de Vries & Wassenaar, 2022). Industrialized construction is always conceptual, but conceptual buildings do not need to be industrialized. However, there is a lot of overlap between the two and, while conceptual houses can also be built in a traditional way, it is more ideally used in combination with industrialised methods (NCB, 2023). A clear distinction between the two is visualized in figure 2.3. Within Bouwstroom programs, these approaches are not merely technical solutions but key structuring elements that reconfigure actor roles, procurement processes and the governance of urban housing development. The integration of conceptualized buildings allows actors to move beyond traditional project-based customization toward portfolio-based production. In this paradigm, contractors offer predefined housing solutions and housing associations choose from these concepts based on their strategic needs and tenant demographics. This transformation echoes a shift from ‘project logic’ to ‘product logic’ (Vrijhoef & Koskela, 2005), wherein building becomes a repeatable, scalable process likely to industrial manufacturing. PMCs therefore act as a translation between technical design and social housing goals, enabling housing associations to align urban demand with supply-side capabilities without engaging in exhausting and tedious design processes (Boelhouwer, 2020).

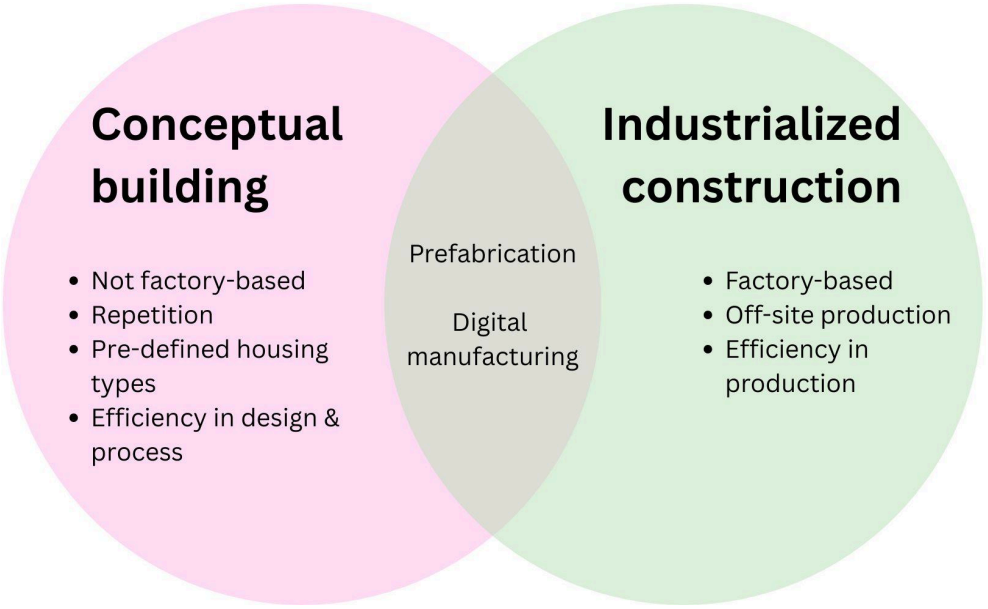

Figure 2.3: Conceptualization vs. Industrialization in the built environment (own image, 7-5-2025)

Conceptualization impacts the nature of collaboration. Tasks like ensuring durability, compliance and aesthetic quality across various sites are now on the contractor's to-do list (Gibb & Isack, 2003). In parallel, housing associations must adapt their demands to these pre-defined, and standardized housing options. As seen from previous industrialized housing projects, implementing industrialization introduces the risk of architectural monotony and social resistance if not balanced with context-sensitive adaptations (Baldwin & Bordoli, 2014). This is where the most critique is based on. While advantages of conceptualized buildings are evident, their successful implementation depends heavily on actor willingness. Research shows that IC adoption is often hindered by fragmented governance and regulatory uncertainty (Mashali et al., 2022). PMCs and conceptual design can serve as stabilizing instruments, offering a 'common language' across disciplines. However, they also introduce a paradox: the more standardized the product, the more crucial the quality of early-stage collaboration and decisions become. If actors are not aligned on the goals and constraints of PMCs, the system risks becoming rigid and unresponsive to urban complexity.

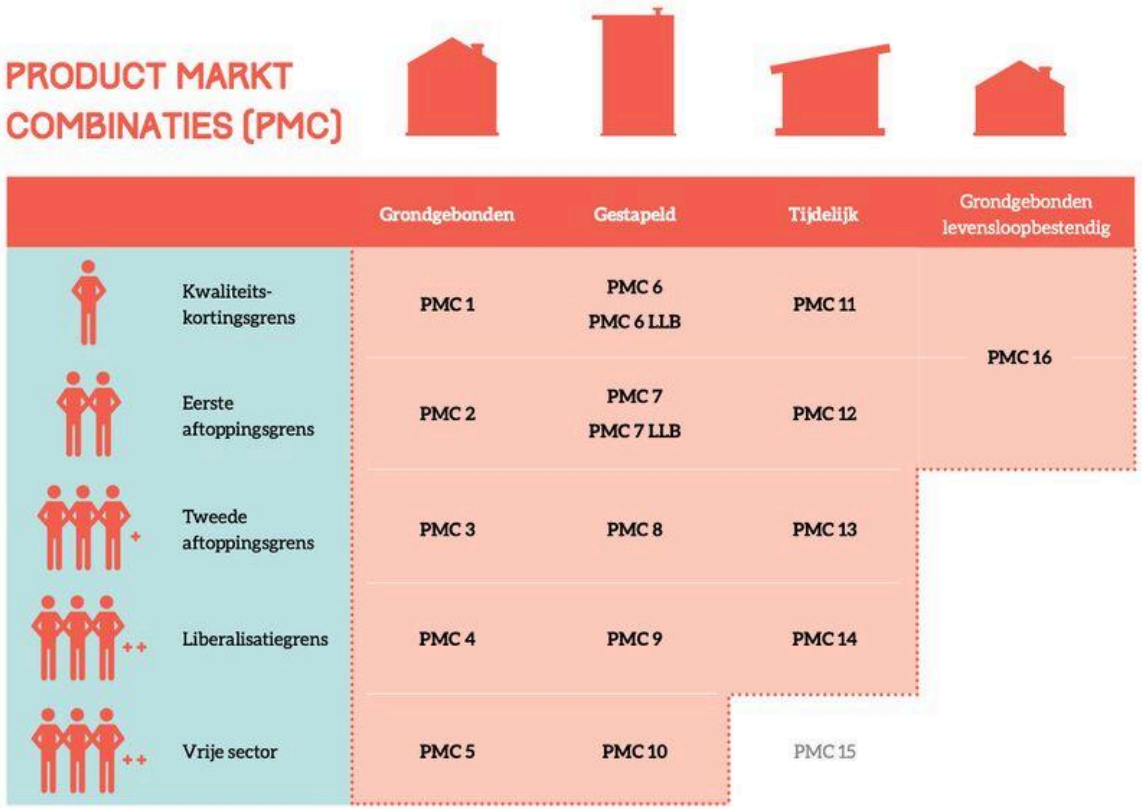

Figure 2.4: PMCs table (Netwerk conceptueel bouwen, 2023)

2.3. Bouwstromen

There is currently no single, universally accepted academic definition of a Bouwstroom, but several governmental and consultancy sources have offered working descriptions. An overview can be found in table 2.1. The concept emerged in response to the well-documented challenges facing the Dutch housing market. Traditional project-by-project development has often been characterized by fragmented decision-making, long lead times, high transaction costs and difficulties in scaling production (NEPROM, 2019). Bouwstromen seek to overcome these barriers by fostering more integrated and streamlined approaches to planning, procurement and delivery (Aedes, 2020)

At their core, Bouwstromen involve bundling housing demand from various housing associations within a region, thereby creating sufficient volume to justify investments in conceptualization or even industrialization. This bundling not only leverages economies of scale but also strengthens the bargaining position of housing associations when negotiating with builders and suppliers (Rijksoverheid, 2022). It enables standardized housing concepts or PMCs to be developed and replicated across multiple sites, significantly reducing design and preparation times. The rise of Bouwstromen is closely linked to broader policy trends promoting sustainability, circularity and innovation in the built environment. By encouraging conceptual builder methods, Bouwstromen support the transition toward more resource-efficient and environmentally friendly housing production (TNO, 2021). Prefabrication and modular construction, which can be components of a Bouwstroom strategy, minimize material waste, reduce construction noise and disruption and improve quality control through factory conditions (Driessen & de Vries, 2019).

A key element of Bouwstromen is their multi-stakeholder governance approach. Unlike traditional development processes where individual actors operate largely independently. Bouwstromen established formal or semi-formal collaborations among municipalities, housing associations and private sector builders. These collaborations create a shared framework for land allocation, design standards, procurement and project sequencing. The alignment of these actors is essential to maintaining the flow of projects and ensuring that the standard housing concepts can be efficiently deployed (Aedes, 2020). In practice, Bouwstromen are often organized around pre-approced housing catalogues or typologies, which define standardized floor plans, facades and technical specifications. These catalogues provide a basis for repeatable production, simplifying permitting and reducing bespoke design work. Moreover, by working with a limited number of prequalified builders under framework contracts, Bouwstromen reduce tendering cycles and increase predictability (Rijksoverheid, 2022).

Several regions in the Netherlands have launched Bouwstroom initiatives. All share the goal of accelerating affordable housing delivery through programmatic approaches. Despite their promise, Bouwstromen face challenges. Standardization requires balancing efficiency with flexibility to meet diverse site conditions and social demands. Coordination among multiple actors demands robust governance, clear role definition and conflict resolution mechanisms. Additionally, shifting traditional organizational cultures and administrative procedures to support programmatic delivery is a complex and ongoing process (NEPROM, 2019). Overall, Bouwstromen represent a significant shift in Dutch urban development, moving from fragmented, project-centric housing production toward coordinated and sustainable delivery at scale. Their growing adoption reflects the urgent need to innovate in housing supply to meet future demand while aligning with environmental and social goals.

Company	Definition
NCB	"In het Programma de Bouwstroom van NCB werken conceptaanbieders met woningconcepten gebaseerd op PMC's uit De Woonstandaard."
Ministry of BZK	"Accelerate housing construction through innovation and collaboration, in line with sustainability and affordability goals"
Brink	"In zo'n bouwstroom kopen woningcorporaties gezamenlijk conceptwoningen in. Dit levert tijdwinst, kostenbesparingen en een beter lopend proces op."
RVO	"A programmatic approach to housing production in which clients cooperate on long-term demand aggregation, resulting in repetitive and industrialized construction with shared learning across projects"

Figure 2.1: Definitions of "Bouwstroom" (own image, 10-6-2025)

2.4. Collaboration

This chapter reviews key concepts and theories related to collaboration in construction and urban development. It highlights the importance of multi-actor cooperation, governance structure and trust building for successful project delivery, especially in complex programmatic settings like Bouwstromen. Understanding collaboration dynamics provides a foundation for analyzing actor interactions in subsequent chapters.

2.4.1. Actor roles and responsibilities in construction

The terminology used in research can shape the lens through which occurrences are understood and analysed. In this thesis, the term 'actors' is deliberately chosen over 'stakeholders' to emphasize the active and dynamic roles of parties involved in the process of IC implementations. While 'stakeholders' is a commonly used term in project management and organisational studies, it carries implications that are less aligned with the objectives of this research. Below, the reasoning behind this choice is elaborated, highlighting the distinctions between the two terms and their relevance to IC projects.

The term 'stakeholders' typically refers to entities or individuals with a vested interest in a project or outcome. Freeman (1984), a scholar in stakeholder theory, defines stakeholders as "*any group or individual who can affect or is affected by the achievement of an organisation's objectives*". This broad definition encompasses anyone with a potential interest, including end-users, regulatory bodies, community members and even maintenance personnel. While comprehensive, this inclusivity may dilute the focus on those directly participating in decision-making processes and project execution. In contract, the term 'actors' originates from social science disciplines and emphasises entities actively engaging in processes, decision-making and interactions (Latour, 2005). Actors are not merely affected by or interested in outcomes; they play an active role in shaping them. This distinction is critical in the context of IC, where the success or failure of implementation depends on the deliberate actions, decisions and interactions of key parties such as developers, contractors, architects and suppliers.

In IC projects, the focus is on collaboration and the transformation of traditional roles within the supply and project chain. By using the term ‘actors’, this research centers on entities directly involved in implementing these IC methods. These roles require proactive engagement and adaptation, making ‘actors’ a more precise and appropriate term. For instance, a contractor in an IC project is not merely a stakeholder with an interest in the project’s completion; they are an actor actively involved in coordinating prefabrication logistics, aligning on-site assembly with off-site manufacturing and integrating digital tools such as BIM. Similarly, developers and suppliers take on roles that involve decision-making and negotiation, further underscoring the active nature of their contribution. The choice of terminology also shaped the theoretical approach to studying collaboration and role adaptation. By narrowing the scope to ‘actors’ this research can more effectively analyse:

1. Role transformations: how traditional roles in urban construction evolve with IC methods
2. Collaboration dynamics: the quality and nature of interactions between entities directly shaping IC projects
3. Decision-making processes: how active participants navigate hierarchical structures and power dynamics to implement IC methods

This targeted approach avoids conflating the interest of peripheral parties with the actions of key participants, allowing for a more nuanced understanding of IC implementation.

2.4.2. Traditional roles and responsibilities

Actor roles and the way actors collaborate play an important focus within this research. Therefore a clear definition is needed of what traditional actor roles entail and how the traditional collaboration practices take place. As mentioned this research makes a specific focus on the following actors; public sector entities, private sector organizations and collaborative entities. In table 2.1. a traditional distribution of roles, responsibilities and involvement is pictured per actor. While each project has its individual needs and requirements, the structure is general. Resulting in a standard method of working and collaborating.

Actor	Key responsibilities	Project phase involvement
Municipal authorities	Approve zoning, permits and ensure urban planning compliance	Pre-construction (Planning & Permitting)
Regulatory bodies	Set building codes, safety standards and conduct inspections	Throughout project lifecycle
Developers	Initiate projects, secure funding and manage overall delivery	Initiation & Pre-construction
Investors	Provide financial backing, assess feasibility and monitor risks	Initiation & Financing

Architects and designers	Develop project designs, ensure regulatory compliance and refine technical drawings	Pre-construction & Design development
Contractors	Manage on-site construction, hire labor and oversee execution	Construction phase
Suppliers and manufacturers	Provide construction materials, ensure quality and manage logistics	Procurement & Construction phase

Tabel 2.2: Traditional role overview per actor (own image 14-02-2025)

2.4.3. Collaboration in the built environment

Collaboration within the built environment refers to the structured interaction and joint efforts between various actors, toward the realization of urban development and construction projects. In essence, collaboration involves the alignment of goals, coordinations of tasks, exchanges of knowledge and negotiation of roles among actors with different priorities, competences and institutional affiliations (Briscoe & Dainty, 2005).

The built environment is characterized by its project-based and multidisciplinary nature. This means that most construction processes require temporary coalitions of organizations that come together for a specific project and disband afterward. As such, effective collaboration is critical for ensuring the timely, cost-effective and sustainable delivery of these projects (Laan, Noorderhaven, Voordijk & Dewulf, 2011). This traditional collaboration in construction has however often been criticized for being fragmented, adversarial and risk-aversive. Contractual boundaries and short-term relations typically dominate, limiting the potential for innovation and continuous improvement (Dubois & GAdde, 2002). In contrast, recent developments in industrialized and programmatic approaches, such as Bouwstromen, are attempting to shift this. A Bouwstroom involves a collaborative construction program in which multiple housing projects are bundled over time, often across various municipalities and housing associations. Within such programs, collaboration is not just project-specific but extends across organizational and temporal boundaries. The emphasis is on long-term partnerships, shared governance structures, early involvement of actors and collective learning (Netwerk Conceptueel Bouwen, 2024). For this research, collaboration is not only a theoretical concept but a central mechanism through which Bouwstromen operate. Understanding how actors collaborate, communicate, resolve conflicts, align goals and share decision-making authority, is essential to evaluating the effectiveness and scalability of IC methods. Moreover, this study focuses on how collaboration shifts when construction processes transition from traditional and project-based approaches to programmatic and standardized ones. In such transition, actors often experience a redefinition of their roles and expectations, requiring new forms of coordination (Bygballe & Swärd, 2019).

2.4.4. Collaboration forms

Bridging the gap between theory and practice in IC requires a deliberate effort to challenge entrenched hierarchies and foster a culture of collaboration. New collaboration methods, such as Bouwstroom, aim to address these structural barriers. Bouwstroom establishes a framework where multidisciplinary actors work together in a continuous production flow, reducing inefficiencies and creating stability in the supply chain. Digital collaboration tools and standardized workflows further support this transition by increasing transparency and coordination (Eastman et al., 2011). As mentioned, there have been a lot of trends within the Netherlands focused on finding the optimal collaboration form. Resulting in various collaboration models, contracts and structures which all define how actors work together, share risks and make decisions in their own unique way. Below is a breakdown of the key differences between these collaboration forms in table 2.2.

Model	Focus	Key actors	Main benefit	Scale
Bouwstroom	Standardized, long-term IC housing production	Municipalities, developers, contactors, suppliers	Lower costs, efficiency, continuous demand	Multi-project
PPP - public-private partnerships	Public-private financing and operation of infrastructure	Government, private investors, operators	Large-scale funding, risk-sharing	Project-based
Bouwteam	Early-stage design-construction collaboration	Client, contractor, architect	Feasibility and cost control	Project-based
DBB - design-bid-build	Traditional separate contracts for design and construction	Client, architect, contractor	Clear risk allocation, competitive pricing	Project-based
IPD - integrated project delivery	Fully integrated, risk-sharing model	Client, designers, contractors, suppliers	Shared responsibility and innovation	Project-based

Table 2.3: Overview of collaboration models (Own image, 21-202-2025)

While the collaboration models presented above differ in structure, scope and intent, they all aim to improve the alignment between actors in complex construction environments. However, their efficiency in supporting conceptualization and programmatic forms varies significantly. Traditional models like DBB and even Bouwteam still operate under the assumption of a single, bounded project with a unique team and timeline. These structures tend to reinforce siloed workflows, transactional relationships and limited feedback, all of which are poorly suited to the standardization, long-term planning and iterative learning required for conceptual and industrial method adoption (Lahdenperä, 2012). Conversely,

more integrated frameworks such as IPD and PPP attempt to align incentives by introducing risk-sharing and joint governance. Yet even these models often remain locked into a single-project logic and with one main developer. Bouwstroom emerges as a unique hybrid model: it combines features of these collaborative approaches, with a programmatic structure that operates across multiple projects, timelines and actors. This enables continuous production, iterative refinement and systemic collaboration between key actors, when done correctly.

2.4.5. Program vs. project governance

The governance of construction initiatives can be conceptualized at two distinct yet interconnected levels: project governance and program governance. Understanding the distinction between these levels is essential for analyzing collaborative frameworks like Bouwstromen.

2.4.5.1. Project governance

Project governance refers to the framework that guides decision-making, accountability and control within a single project. It encompasses the structures, processes and relationships that ensure a project aligns with organizational objectives and actors' expectations. Bekker and Steyn (2009) define project governance as "*a set of management systems, rules, protocols, relationships and structures that provide the framework within which decisions are made for project development and implementation to achieve the intended objectives*". This framework includes elements such as steering committees, audit processes and risk management protocols which are all tailored to the specific context of the project. The primary focus of project governance is on the efficient and effective delivery of a project's output, ensuring that it meets predefined goals regarding scope, time, cost and quality. It operates within the boundaries of the project lifecycle and is concerned with the tactical execution of project activities (Too & Weaver, 2014).

2.4.5.2. Program governance

In contrast, program governance operates at a higher level, overseeing a group of related projects that are managed in a coordinated manner to obtain benefits not available from managing them individually. Program governance provides a strategic framework that aligns multiple projects with broader organizational or societal objectives. It involves establishing policies, procedures and standards that guide project selection, prioritization, resource allocation and performance monitoring across the program. Program governance is particularly pertinent in complex, multi-actor environments where long-term collaboration and integration are required. It addresses challenges such as inter-project dependencies, cumulative risks and the alignment of diverse actor interests. By providing a cohesive governance structure, program governance facilitates consistency, efficiency and strategic alignment across projects (Müller, 2009).

3. Methodology

This research aims to understand how Bouwstromen can be implemented in urban development projects by focusing on the roles, challenges and collaborative dynamics among actors. This study will use a comparative case study approach guided by the Eisenhardt method and supported by the in-depth interviews and co-occurrence diagrams to better understand actor dynamics. This section outlines how the research will be executed, including case selection, data collection and analysis methods, while addressing the theoretical and practical challenges of collaboration and conceptualization.

3.1. Unit of analysis

The Bouwstroom can be described as a program in which housing associations realise individual projects. This initiative represents a collaborative framework where a variety of housing associations, developers, municipalities, designers and builders work together to streamline and accelerate the construction of affordable housing through standardized processes and industrialized building methods. By focusing on the Bouwstroom as the unit of analysis, this research can delve into the systemic interactions, efficiencies and innovations that characterize this approach. Analyzing the Bouwstroom offers a comprehensive understanding of how integrated strategies can address multiple critical occurrences such as housing shortage and the need for sustainable buildings. This focus allows for the exploration of collaborative mechanisms, scalability of IC and impact of standardization on construction timelines. Such an analysis is instrumental in identifying best practices and potential challenges within the program's framework. Focusing on the program level, as opposed to individual projects or organizations, provides several advantages;

1. A programmatic analysis captures the collective efforts and outcomes of multiple actors working towards a common goal, offering a broader understanding of systemic efficiencies and bottlenecks.
2. Evaluating the program enables the assessment of scalability and replicability of successful strategies across different regions or contexts.
3. Insights gained from program level analysis can inform policy decisions, guiding the development of supportive frameworks for similar initiatives.

The efficacy of program-level analysis is supported by previous research. For instance, examining collaborative housing programs reveals that integrated approaches can lead to more efficient resource utilization and improve project outcomes (Giesel & Köhler, 2020). Additionally, studies on IC highlight the benefits of standardized and prefabrication in reducing costs and construction timeframes (Pan & Goodier, 2012). By selecting the Bouwstroom as the unit of analysis, the research can gain valuable insights into the collaborative and standardized methodologies that underpin successful large-scale housing initiatives. This perspective not only enhances the understanding of current practices but also contributes to the development of more effective strategies in implementing collaborative frameworks and IC-methods.

3.2. Case selection

The selection of the case studies in this research has been an evolving process, shaped by theoretical inquiry and practical constraints. Initially, the research was set up to focus on project-based applications of IC, aiming to explore how IC methods influence collaboration and role distribution among actors in urban development. A potential case study, Little C in Rotterdam, was identified early on due to its striking appearance and perceived innovative qualities. However, as the research progressed and access to key actors was pursued, it became clear that Little C did not align with the core criteria of this study. Despite its architectural appeal, the project was traditionally developed by a single-party acting as both developer and contractor, lacking the multi-actor collaboration and programmatic consistency that defines conceptualized building processes. Furthermore, it became evident that the project was not part of a broader effort to standardize or replicate building concepts, disqualifying it from the intended focus on collaboration and innovation in housing. This realization marked a pivotal moment in the research design.

3.2.1. New research focus

This insight triggered a fundamental reorientation of the study. Rather than isolating innovation in standalone, pilot projects, the emphasis shifted toward initiatives that reflect a programmatic, long-term commitment to building with standardized housing concepts. In practical terms, this meant redefining case-selection criteria to target Bouwstromen that embodied long-term commitments, programs in which the same consortium of actors delivered multiple housing tranches using a common product catalogue. Methodologically, it prompted a rewrite of the interview protocol to probe not only one-off implementation challenges but also the mechanisms by which conceptual designs are adapted and scaled across sites.

Equally important was disentangling conceptualization from IC. While these terms are often used interchangeably in literature, the distinction became essential: conceptualization involves the development and reuse of pre-defined housing concepts across multiple sites, whereas industrialized construction more narrowly refers to off-site, factory-based production. By clarifying this distinction, the research was able to tailor its analytical framework: conceptualization became the lens through which actor alignment around repeatable building is understood.

The clearest and most ambitious examples of conceptualization effort can be found in the Bouwstromen. Three specific Bouwstromen were selected for this research: NH Bouwstroom, Bouwstroom Haaglanden and WoonST 2.0 (Bouwstroom Eindhoven). Although each has a shared commitment to collaborative procurement and the use of standardized housing concepts, they differ in regional context, governance design and execution strategies; the shared and differentiating characteristics are bundled in Chapter 3.2.2. Further elaboration on the three individual case studies can be found in Chapters 3.3. Bouwstroom Haaglanden, 3.4. NH Bouwstroom and 3.5. WoonST 2.0.

The selection of these three cases allows for meaningful comparison while acknowledging variation in ambition, structure and regional dynamics. Together, they reflect the broader Dutch trend toward conceptualized building and provide an opportunity to understand how collaboration unfolds under different governance conditions. In addition, by focusing on program-level initiatives rather than isolated projects, this research is able to surface dynamics that only become visible over multiple iterations and across varied contexts. Single projects often obscure systemic frictions that only reveal their full impact

when they recur across successive developments (Yin, 2014). In contrast, Bouwstromen operate as continuous production flows, bundling hundreds housing units under the same governance framework. This enables an examination of how standardized building concepts are not only delivered once, but repeatedly refined, renegotiated and embedded within institutional routines. Such a programmatic lens captures how actors develop shared heuristics and how power, legitimacy and urgency shift as projects move from pilot to scale (Mitchell, Agle & Wood, 1997). It also reveals how municipalities adapt zoning and permit pathways over time to accommodate IC and conceptualization, or how standardized processes may stall when local conditions exert pressure on one project and ripple across the program. By examining a program, which includes multiple projects, this study thus now focuses both on the repeating patterns that enable scale and the persistent negotiating points that shape institutionalization of IC in Dutch urban development.

	Literature review/ Document analyses	Expert interviews/ co-occurrence tables	Eisenhardt method
SQ 1: How do actor roles and responsibilities change within a Bouwstroom compared to traditional construction processes?	✓		
SQ 2: What collaboration challenges and opportunities do actors perceive when working within a Bouwstroom?		✓	✓
SQ 3: How does the governance structure of a Bouwstroom facilitate or hinder collaboration between actors?		✓	✓
SQ 4: How can Bouwstromen contribute to the broader adoption of IC methods in urban development projects?	✓	✓	✓

Table 3.4: methodology overview (own image, 9-6-2025)

3.2.2. Case study characteristics

All three Bouwstromen exhibit a commitment to collaborative frameworks involving multiple actors and are currently active within the Netherlands. They emphasize the use of standardized houses to enhance efficiency and reduce costs. Each program aims to deliver affordable, sustainable housing solutions to meet regional demands. These initiatives also focus on streamlining procurement processes and fostering long-term partnerships with industrial builders, aligning with the principles of conceptualization. However, they each have their own identity and adaptations. The differentiating characteristics of each Bouwstroom can be found below in table 3.3.

Aspects	**NH Bouwstroom**	**Bouwstroom Haaglanden**	**WoonST 2.0**
Geography	Province of Noord-Holland	Haaglanden region	Southeast Brabant
Partners	Eleven housing associations + 6 builders	12+ housing associations + 2 contractors	13 housing associations + 9 municipalities + 2 contractors
Approach to concepts	Co-development of new PMCs (including timber & innovative systems)	Joint procurement of off-the-shelf PMCs under one framework agreement	Procurement of predefined PMCs with minor local adaptations, strong municipal permit alignment “WoonST, unless…”
Scale	750 homes per year, for the next 5 to 10 years	2500 homes by 2030 (1750 stacked and 750 single-family homes)	1750 homes by 2028

Table 3.5: differentiating characteristics per Bouwstroom (own image 10-5-2025)

3.3. Case study 1 - Bouwstroom Haaglanden

Bouwstroom Haaglanden is a collaborative initiative launched in early 2023 by a consortium of twelve housing associations in the Haaglanden region, including Staedion, Haag Wonen and Vidomes among others. The primary objective of this initiative is to accelerate the production of affordable housing by constructing 2.000 (standardized) homes by 2028. This effort aims to address the pressing housing shortage in the region by streamlining the construction process through standardized, conceptual building approaches. A large driver to start the initiative in the Haaglanden region was the success seen with the Bouwstroom in MRE.

The tendering process for Bouwstroom Haaglanden was meticulously structured to focus on PMCs, emphasizing standardized housing solutions applicable to various locations. The tender was divided into two categories: stacked- and modular housing. Boele & van Eesteren were awarded the contract for stacked housing, employing traditional construction methods. Heddes Bouw & Ontwikkeling secured the modular housing contract, utilizing industrialized, off-site construction techniques. The project encompasses both conceptual and industrial construction methods. Boele & van Eesterens' approach is conceptual, focusing on standardization without industrialization. In contrast, Heddes Bouw & Ontwikkelings' method is both conceptual and industrial, involving prefabrication and modular assembly. The first project is situated across the Haaglanden region and was handed to Boele & van Eesteren, with the first development in Waelpolder, 's-Gravenzande, seen in figure 3.5. This pilot includes 104 social rental apartments, serving as a model for subsequent constructions. This initiative represents a significant step forward in addressing the housing crisis in the Haaglanden region, demonstrating the potential of collaborative, standardized approaches in the construction industry.

Figure 3.5: Project Waelpolder (own image 28-4-2025)

3.4. Case study 2 - NH Bouwstroom

The NH Bouwstroom, also known as the Nieuw Hollands Bouwstroom, is a collaborative initiative launched to accelerate the production of affordable and sustainable housing in the province of Noord-Holland, Netherlands. The project brings together nine housing associations and industrial builders to streamline the construction process through standardized and possible industrialized building approaches. The participating housing associations include Ymere, Rochdale, Eigen Haard and Parteon among others. The involved builders are Fijn Wonen, Homes Factory and Heddes Bouw & Ontwikkeling among others. This collaboration aims to double the production of high-quality, sustainable and affordable homes in half the time compared to traditional construction methods.

NH Bouwstroom operates through a coordinated procurement process that emphasizes reliability, scalability and innovation. The selection procedure focuses on partnership-based procurement models, allowing for close collaboration between housing associations and builders from the early stages of project development. This approach facilitates the joint development of modular housing concepts that meet predefined standards and requirements. The construction methods employed in NH Bouwstroom are primarily industrial and modular, utilizing prefabricated components to expedite the building process.

NH Bouwstroom operates on a partnership model involving the housing associations and industrial builders. This collaboration fosters knowledge sharing and innovation, leading to more effective project execution.Since the NH Bouwstroom has started, several projects across North Holland have been initiated, focusing on the rapid deployment of modular housing units. These projects aim to provide high-quality, sustainable homes in a fraction of the time required by traditional construction methods. The use of standardized designs and prefabricated components has enabled NH Bouwstroom to reduce construction timelines significantly, delivering homes faster to meet the pressing demand. The initiative has already seen the execution of several projects, such as Brasa Village in Amsterdam Zuidoost, seen in figure 3.6, Rosmolenbuurt and Appelweg. NH Bouwstroom's KPIs include the acceleration of housing production, reduction of construction costs, enhancement of sustainability and energy efficiency and improvement of spatial quality. The NH Bouwstroom represents a concerted effort by housing associations and industrial builders in Noord-Holland to address the region's housing shortage through the construction of affordable, sustainable and standardized homes.

Figure 3.6: Brasa Village (*Groen Licht Voor Brasa Village: 520 Flexwoningen in Amsterdam-Zuidoost | NUL20*, 2023)

3.5. Case study 3 - WoonST 2.0

WoonST 2.0 is a collaborative housing initiative launched in 2023, building upon the success of its predecessor, WoonST 1.0. The program is a joint effort by 13 housing associations and 9 municipalities in the Southeast Brabant region of the Netherlands, specifically within the Metropolitan Region of Eindhoven (MRE) and the urban area of Eindhoven (SGE). The primary objective of WoonST 2.0 is to accelerate the production of affordable and sustainable social rental housing by constructing standardized homes through a streamlined process. The program was initiated by several municipalities who actively gathered housing associations to collectively try and find a faster solution for building sustainable and affordable homes.

The participating housing associations include WoonBedrijf, Wocom, Volksbelang, Compaen and Goed Wonen among others. This collaboration is notable for the active participation of municipalities, which is relatively uncommon in similar housing initiatives. The tendering process for WoonST 2.0 was divided into two categories: one for single-family homes and another for multi-family apartment buildings. Hurks was selected for the single-family homes. BAM Wonen was chosen for the apartment buildings, a project example can be found in figure 3.7. The selection of these contractors was based on their ability to deliver standardized yet adaptable housing solutions that meet the program's goals. The program aims to construct a total of 2500 homes by 2030, compromising 750 single-family homes and 1750 apartments.

The housing designs are standardized to expedite the construction process, but they allow for variations in face color, size, layout and finishes to suit different locations and preferences. WoonST 2.0 places a strong emphasis on sustainability and reducing environmental impact. The housing units are designed to be energy-efficient, incorporating features such as heat pumps and underfloor heating. Additionally, the use of biobased materials and circular construction methods is encouraged to minimize the ecological footprint of the buildings. WoonST 2.0 has initiated several projects across the participating municipalities, focusing on the rapid deployment of new homes. The use of standardized designs and prefabricated components has significantly reduced construction timelines, delivering homes faster to meet the pressing demand. The initiative also emphasizes sustainability, with a construction concept meeting high environmental standards and incorporating the latest insights into sustainability, like "*Het nieuwe normaal*".

The collaborative nature of WoonST 2.0 extends beyond construction, as municipalities have streamlined their permitting processes to align with the standardized housing designs. This coordination allows for faster approval times and reduces administrative burdens, contributing to the overall efficiency of the project. WoonST 2.0 represents a concerted effort by housing associations and municipalities to address the housing shortage in the MRE through the construction of affordable, sustainable and standardized homes. The program's innovative approach to collaboration, design and construction serves as a model for similar initiatives aiming to tackle housing challenges in other regions.

Figure 3.7: Genderdal Eindhoven (*Woonbedrijf Bouwt 89 WoonST-appartementen in Genderdal (Eindhoven)*, 2024)

3.6. In-depth semi-structured interviews

The primary data collection method will be semi-structured, in-depth interviews with key actors from each project. These interviews are designed to elicit rich, qualitative data about the motivations, challenges and collaborative dynamics of Bouwstromen and conceptualization. Each interview will last ideally 1 hour, allowing participants to reflect deeply on their experiences. Key participants will include developers, architects, contractors and municipal authorities. More information about the to be interviewed participants can be found in part 3.6.1. Target group. The interviews will follow an open-ended format, encouraging participants to share stories and elaborate on their experiences. Questions will focus on five main themes:

1. Role change in Bouwstromen
2. Impact of Bouwstromen on collaboration dynamics
3. Challenges and opportunities within Bouwstromen
4. The enabling of IC-methods caused by Bouwstromen
5. The future of Bouwstromen

These interviews will be recorded (with consent) and transcribed verbatim to ensure accuracy and depth in subsequent analysis. The proposed interview questions, follow-up questions and expected outcomes can be found in Appendix 2. In addition to interviews, project documentation will be analysed to provide context and findings. This includes design reports, meeting minutes, contracts and regulatory submissions. These documents will offer insights into how decisions were made, the formal structures governing collaboration and the extent to which IC methods were integrated into the project lifecycle.

3.6.1. Target group

The interviews in this research target key actors involved in Bouwstromen. These actors are integral to the collaborative processes that shape the programs. Their roles and perspectives provide critical insights into the challenges and opportunities of collaboration in this new form. The target group includes developers, investors, contractors, architects and municipal bodies, each playing distinct and interdependent roles within the construction ecosystem.

Developers

Developers act as project initiators, responsible for assembling the team and defining project goals. Their decision significantly influenced the trajectory of conceptualization, including the choice for IC-methods. Developers also act as intermediaries between various actors, balancing the priorities of all parties to ensure project feasibility (Gibb & Isack, 2003). Understanding their perspective is critical to identifying the motivations behind joining a Bouwstroom as well as the barriers they face in integrating IC into urban projects.

Investors

Investors provide the financial resources necessary to realize projects, making their role pivotal in decision-making. They evaluate the risks and rewards associated with IC methods, often balancing the higher upfront costs or prefab and modular systems against potential long-term savings and returns. Investor's perspectives can reveal how financial constraint or risk aversion influence the adoption of IC and how they perceive collaboration with other actors (Lessing et al., 2015). Their role is particularly important in urban environments, where projects may require innovative financing mechanisms or alignment with public-private partnership models.

Contractors

Contractors oversee the execution phase of projects, managing on-site activities and coordinating with suppliers to integrate prefab components effectively. Unlike traditional projects, conceptualization demands early involvement of contractors to ensure that manufacturing processes align with site conditions and assembly workflows. Contractors' insights into logistical challenges are essential for understanding practical barriers (Meiling et al., 2012). Their experiences also highlight the impact of Bouwstromen on labor dynamics and skill requirements, which are critical for assessing the broader implications of conceptualization.

Architects

Architects are central to the design phase, ensuring that the aesthetic, functional and technical aspects of the project align with conceptual models. Unlike traditional construction, conceptualization requires architects to collaborate closely with manufacturers and contractors during the early stages to ensure that designs are fit (Eastmann et al., 2011). This integration often challenges traditional design practices, requiring architects to balance creative aspirations with the constraints of standardization. Their perspective is crucial for understanding how conceptualization reshapes the design process and how they navigate the tension between innovation and practicality, especially in Bouwstroom programs.

Municipal bodies

Municipal authorities regulate urban construction projects by enforcing zoning laws, building codes and sustainability mandates. Their role in Bouwstromen is twofold: as regulators and facilitators. They ensure that projects comply with local policies and regulations while also supporting innovation through incentives or approval processes. In conceptual projects, municipal bodies face the challenge of using traditional regulatory frameworks to accommodate new construction methods, which often leads to delays or misalignment between actors (Kent & Becerik-Gerber, 2010). Interviewing municipal representatives provides insights into the systemic barriers and opportunities for policy alignment in programmatic collaboration.

This diverse group of actors ensures a holistic understanding of Bouwstromen, capturing the interplay of financial, technical, regulatory and creative considerations.Together their input will showcase the collaborative dynamics that characterise programmatic workflows, highlighting both the struggles and opportunities inherent in these conceptual developments.

3.6.2. Number of interviews

The research aims to strike a balance between gathering diverse perspectives and maintaining the depth of individual interviews. To achieve this, the number of interviews will be limited to a manageable sample size, focusing on quality over quantity. Ideally, the research will involve 12-15 interviews across the three selected case studies. This number is realistic given the scope of the research and the time constraints, while still allowing for a deep exploration of each participant's experiences and perspectives. Each case study will include 4-5 interviews, covering 1 or 2 key actors per group discussed in 3.6.1. "Target groups". This allocation ensures that all critical actor groups are represented while maintaining a manageable workload for in-depth data collection and analysis.

3.7. Eisenhardt method

The Eisenhardt method provides a structured framework for analysing qualitative data through two steps: within-case analysis and cross-case analysis.

1. Within-case analysis: each case will first be analysed individually to develop a comprehensive understanding of its context, actor dynamics and challenges. This step involves thematic coding, identifying patterns and key insights related to collaboration and conceptualization. For example, in Bouwstroom Haaglanden, the analysis may reveal specific moments where actor alignment broke down due to regulatory constraints.
2. Cross-case comparison: once the individual cases are analysed, a comparative analysis will be conducted to identify similarities and differences. Patterns across cases will highlight common struggles, such as regulatory misalignment and unique challenges such as varying levels of actor engagement. This step is essential for drawing broader conclusions about the systemic barriers and opportunities within Bouwstromen.

3.7.1. Case comparison via the Eisenhardt method

The Eisenhardt method is a structured approach for building theory from case studies and is particularly effective for exploratory research where in-depth understanding of complex problems is required (Eisenhardt, 1989). This study uses the Eisenhardt method to investigate collaboration among key actors within a Bouwstroom program. The choice for this method reflects the study's focus on theory-building using empirical evidence gathered for multiple case studies. The research will gather insights from actors, including key actors such as contractors, architects, project developers and municipal authorities, each directly involved in a Bouwstroom. These actors are the focal point for understanding role changes, collaboration challenges and successes and the future of Bouwstromen.

The Eisenhardt method, developed by Kathleen Eisenhardt (1989), is particularly suited to this research because it allows for the systematic comparison of multiple case studies. By analysing three Bouwstroom programs in the Netherlands, patterns and dynamics can be uncovered that may not be evident from one single case. In each case, data will be collected through semi-structured interviews, document analysis and, when possible, site visits. Document analysis will include project documentation, policies and meeting records to provide context and supplement qualitative findings. Site visits will offer firsthand insight into the practical aspects of conceptualization. This triangulation ensures a comprehensive understanding of each case, increasing reliability of findings.

3.8. Coding and analysis

The qualitative data analysis in this research is conducted through a systematic coding process, supported by the use of Atlas.ti software. The aim is to explore key themes related to actor roles, collaboration dynamics, governance and the adoption of IC within Bouwstromen. These themes are related to the research questions. The process begins with the coding of the interview transcripts. As illustrated in figure 3.8, quotes or remarkable sayings were color-coded and categorized to represent key actor groups and thematic concepts such as collaboration or meeting moments. The analysis was structured around the main research question and sub-questions. Each quote was examined for co-occurences between codes to identify how different themes and actors intersected in practice. For

example, the co-occurrence of "municipality" and “collaboration” codes highlighted where municipalities’ role changes impacted collaborative efforts. Similarly, linking “meeting moments” with “responsibilities” revealed how increased interaction opportunities fostered collaboration. This coding and thematic mapping allowed for an in-depth understanding of patterns within the data. The division into sub-questions ensured that findings could be clearly related back to the research aim. The iterative process of coding, co-occurrence analysis, which images can be found in Appendix 4, and theme identification culminated in the formulation of conclusions about opportunities and challenges within Bouwstroom collaboration and governance. The visual representation in the figure provides a clear overview of this workflow, from raw quotes through coding, thematic grouping, co-occurrence analysis to drawing final conclusions, demonstrating the rigor and transparency of the qualitative analysis approach.

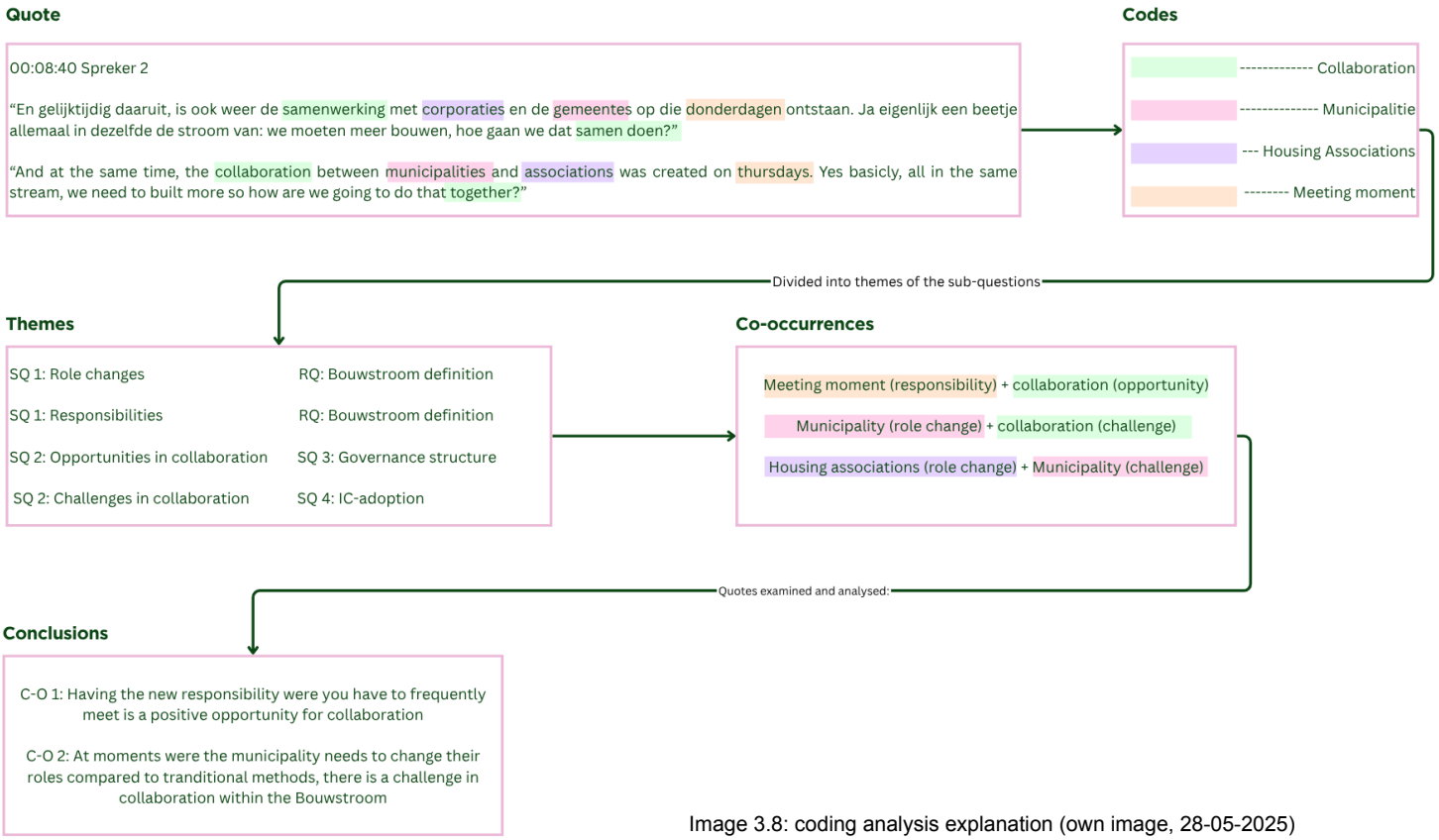

Image 3.8: coding analysis explanation (own image, 28-05-2025)

3.10. Validity and reliability

In qualitative research, ensuring the validity and reliability of the research process is essential to enhance the credibility and trustworthiness of the findings (Leung, 2015). In this research, validity refers to the accuracy and relevance of the findings in representing the perspectives of the interviewees and the real-world dynamics of the Bouwstroom programs. Reliability relates to the consistency and transparency of the research process, including the replicability of the methods used for data collection and analysis.

3.10.1. Validity

To ensure internal validity, the interview protocol was designed based on a thorough literature review and aligned with the research questions. Questions were open-ended and formulated to allow participants to elaborate on their roles, experiences and interpretations. Triangulation was employed by interviewing multiple actor types, from all three Bouwstroom case studies. This enabled cross-verification of perspectives and highlighted areas of convergence and divergence. Furthermore, interview transcripts were coded systematically using Atlas.ti software and emerging themes were continually compared against raw data to avoid misinterpretation or research bias (Nowell et al., 2017). Interpretive validity was enhanced through reflexive memo writing during the analysis process and discussions with academic supervisors to challenge and refine interpretations.

3.10.2. Reliability

While reliability in qualitative research does not imply exact replication, efforts were made to enhance procedural reliability by clearly documenting the research process. This includes a detailed explanation of the interview selection, protocol development and coding procedures. A codebook was developed and iteratively refined to ensure consistent interpretation across interviews.Moreover, member checking was informally applied during the interview process by summarizing and reflecting key points back to participants to confirm their intended meaning both during and after the interview. Although full transcript validation by respondents was not conducted, this approach helped to mitigate misinterpretation during data collection.

3.11. Ethical considerations

Ethical rigor is fundamental to this study's credibility and to safeguard the rights and well-being of all participants. Given the competitive and networked nature of Bouwstroom initiatives, particular attention is paid to transparency, respect and data protection, in accordance with TU Delft's institutional guidelines. First, informed consent will be obtained from each interview in advance of data collection. Prospective participants will receive an information sheet detailing the study's purpose, their voluntary role , the topics to be covered and how findings will be used. They will be reminded that they may decline to answer any question or withdraw entirely at any stage without consequences (Creswell, 2013). Second, the principle of nonmaleficence underpins the interview process. Questions will be framed to avoid undue pressure of exposure of commercially sensitive or reputational risky information. Interviews will be scheduled at times and locations convenient to participants (including secure online alternatives), and the research will adopt a neutral, open demeanour to foster honest reflection without fear of judgement (Orb, Eisenhauer & Wynaden, 2000). Third, confidentiality and data security are ensured through several measures. All audio recordings and transcripts will be pseudonymized immediately: personal and organisational identifiers

will be replaced with codes. Raw data will be stored on TU Deft's secure servers, accessible only to the research team. Any direct quotes used in the thesis will be de-identified to prevent attribution of sensitive remarks to specific actors. Data retention and destruction procedures will follow institutional requirements, with all identifiable material destroyed upon completion of the study's write-up and oral defense (European Parliament, 2016). Fourth, anonymity in reporting will be extended to organisations where requested. While some housing associations and municipalities may wish to be acknowledged, the default position is to refer to actors by role rather than by name. This balance allows for rich, contextual insights while mitigating risks to participant's professional standing. Finally, reflexivity and research integrity are integral throughout. Any potential conflicts of interest, such as prior collaborations with participating organisations, will be declared in the thesis. By embedding these ethical safeguards, the research upholds academic integrity, protects participants and supports the generation of trustworthy insights into the complex, multi-actor dynamics of Bouwstroom programs.

4. Findings

This chapter presents the findings from the interviews. The chapter first details the distinct characteristics and experiences of each bouwstroom and then compares them across critical themes. The analysis provides a basis to understand how industrialized housing delivery unfolds in different regional and institutional contexts. Appendix 4 shows the co-occurrence tables of each case study Bouwstroom which were used for these findings.

4.1 WoonST 2.0

The WoonST initiative brought together associations and municipalities to accelerate housing delivery within MRE. The interviews revealed five main themes that shaped the implementation and perceived success of this program. Focusing on its formalized public-private collaboration and the co-development of standardized housing concepts.

4.1.1 Public-private collaboration as a foundation

From the perspective of respondents involved in WoonST 2.0, the collaboration between housing associations and municipalities formed the structural and cultural basis for how the program was set up and operated. This collaboration was not merely supportive or peripheral, it was formally embedded in the procurement approach. Several participants pointed to the importance of the fact that both municipalities and associations signed the framework agreement at the start of the initiative. This gave the partnership not only political legitimacy but also organizational weight. One interviewee highlighted this dual commitment as essential: "*Bij WoonST is er in de aanbesteding gekozen om corporaties en gemeenten te betrekken. Die hebben samen de samenwerking ondertekend.”*. Municipalities were not seen as external stakeholders, but as active co-developers in shaping the Bouwstroom. Their involvement created the possibility to discuss location-specific constraints early on. According to one interviewee, this gave the associations "*lucht en snelheid*" because conversations around planning conditions could happen upfront, instead of becoming bottlenecks later in the process.

Still, interviewees also noted that collaboration at the strategic level did not always translate smoothly to operational levels. While upper-level officials from municipalities supported the initiative and participated in the signing of the framework, awareness and understanding of the Bouwstroom were not always present among project leaders or civil servants. This occasionally caused friction or confusion when implementation began. As one interviewee explained: "*We moesten alsnog alles uitleggen aan projectleiders bij de gemeente. Terwijl we dachten dat het al geregeld was op bestuurlijk niveau.*". This discrepancy between strategic intent and operational execution meant that WoonST coordination team spent significant time on clarifying roles, expectations and procedures. Several associations noted that they were surprised by how much time internal and external communication was required to align everyone on what had already been agreed to at the start. One interviewee described it as: "*Veel werk achter de schermen om iedereen op één lijn te krijgen.”*.

Despite these early challenges, the collaboration foundation eventually started to show results. Interviewees described improvements in municipal responsiveness and a growing familiarity with the concept catalogue. For instance, one respondent shared that after the initial months, "*Gemeente beter begrepen wat we nodig hadden. Ze dachten mee in mogelijkheden, niet alleen in regels.*". In addition to the practical benefits, the involvement of

municipalities also appeared to influence internal decision-making within associations. Standardized housing concerts, initially met with some internal skepticism, were easier to justify when associations could refer to municipal approval or alignment. Creating a scenario in which the standard was better accepted because the municipality was supportive of it. Over time, the collaboration matured and relationships between associations and municipalities became more direct and efficient. One interviewee pointed out that the contact and trust built during WoonST now also benefited other projects outside the program: "*De lijnen zijn korter geworden, ook bij niet-WoonST projecten.*". In this way, the collaborative basis of WoonST not only supported individual projects but helped shift institutional culture toward a more joined and regionally coordinated approach to housing development.

The formal and strategic involvement of municipalities in WoonST played a crucial role in shaping the operational conditions under which associations and builders could work. While the collaboration required ongoing explanation and investment in the early phases, the joint framework created a foundation for trust, shared goals and streamlined development processes. The experience of WoonST suggests that public-rivate collaboration, when institutionalized at both governance and project-level, can strengthen both the pace and coherence of housing delivery.

4.1.2. Early confusion and growing clarity

While the WoonST program was launched with a clear ambition and formalized partnerships, the practical implementation revealed considerable confusion in the early stages. Interviewees described the initial phase, mostly happening during WoonST 1.0, as marked by a lack of shared understanding about what had been procured, how it could be used and what processes and expectations were associated with the new way of working, This confusion was felt both internally, within participating associations, and externally, particularly in communication with project partners such as builders and municipalities. A recurring theme in the interviewees was the limited familiarity of association project teams with the new procurement format. Although the central framework and concept catalogue has been developed, it was not always clear to staff how to translate these "lego-blocks" into operational choices. One respondent reflected that: "*Het was voor veel mensen wennen, want je kon niet meer zelf een ontwerpproces starten. Alles was eigenlijk al bedacht en dat was niet iedereen gewend*". This shift, from a tailor-made development process to one based on predefined housing types, required a mental and procedural adjustment that was not immediate. The uncertainty extended to how projects were selected and whether they were suitable for the WoonST concept. In the early phase, associations sometimes submitted locations that turned out to be incompatible with the standardised building concepts, either due to spatial constraints, planning complexity or deviation from the intended typologies. This led to inefficiencies and, in some cases, frustration.

"*Er zijn projecten opgepakt waarvan we later moesten concluderen dat ze eigenlijk niet pasten binnen de kaders van WoonST.*"

The lack of a clear intake or filtering mechanism meant that resources were initially spent on projects that would not qualify for streamlined implementation. In addition to this, the expectation regarding speed and simplicity often clashed with established development

practices. Several interviewees recalled that despite being offered ready-made product catalogues and fixed pricing, project teams reverted to familiar routines, initiating feasibility studies, conducting technical reviews or requesting modifications to standard designs. While these actions mere often well-intentioned, they diluted the benefits of the Bouwstroom approach. As one interviewee described it: "*Veel collega's wilden toch eerst alles dubbelchecken, terwijl het idee juist was dat die stappen al gedaan waren.*". Despite these early complications, clarity and confidence grew over time. The coordination team once again played a crucial role in facilitating this transition by offering guidance, documentation and support to internal teams. Regular information sessions were organized to walk colleagues through the housing typologies, application procedures and the logic behind the procurement structure. The improved understanding enabled more targeted project selection and reduced internal resistance to standardized development pathways.

Another driver of increased clarity was experience itself. As the first WoonST projects progressed from planning to execution, teams developed a better sense of what the process entailed and what to expect from partners. Successful examples began to function as internal proof points, reinforcing the feasibility and utility of the approach. Teams that were initially skeptical or hesitant became more engaged and proactive, recognizing the benefits of working within a pre-defined framework. "*Toen de eerste projecten echt gingen lopen, viel het kwartje bij veel mensen. Ze zagen dat het werkt én dat het sneller kan.*". Moreover, builders involved in WoonST 2.0 also contributed to the increasing clarity. They began refining their product libraries, offering clearer communication about what was feasible within the standardised formats and supporting associations in matching specific sites to suitable housing types. This mutual learning process created stronger alignment between partners and allowed for more efficient planning in subsequent project phases.

The early phase of WoonST was characterised by considerable ambiguity and adaptation. Both internal and external actors had to reorient themselves to a development mode that challenged previous routines and assumptions. The lack of clear intake criteria and the novelty of working with a fixed product led to inefficiencies and, at times, confusion. However, through experience, targeted support and continuous engagement, the involved associations developed a clearer understanding of how to use the WoonST product effectively. This evolution laid the groundwork for more focused, confident participation in the later phases of the program.

4.1.3. The role of standardization and flexibility

One of the central operational elements of the WoonST program is the use of standardized housing concepts. These productised typologies, offered through a catalogue of pre-approved designs, were intended to simplify the development process, shorten lead times and create scale efficiencies. From the perspective of the participating housing associations, the availability of standardized products was generally seen as a major advantage. It allowed for quick scoping of new projects, easier cost estimation and fewer uncertainties in early planning phases. Several interviewees expressed appreciation for the reduced complexity made possible by the use of a concept catalogue. In contrast to traditional development processes, where a custom design is often developed from scratch, WoonST offers ready-to-use configurations tailored for repeatable application. As one respondent described it: "*Je hoeft niet meer opnieuw te beginnen bij elk project. Het is eigenlijk net als met Lego: je kiest het blokje dat je nodig hebt en je weet dat het werkt.*". The housing associations found this particularly helpful for assessing new sites quickly. Instead

of launching into extensive design or tendering procedures, teams could compare the available typologies with the physical and programmatic characteristics of a location, allowing faster decisions. This was especially valuable given the pressure to accelerate production within fixed investment frameworks. However, the benefits of standardization were not without limitations.

One key issue was that not all locations fit neatly into the standard typologies. Spatial conditions such as narrow lots, irregular street layouts or local zoning plans often made it difficult to apply standard concepts without some degree of adaptation. Interviewees pointed out that, while the catalogue offered a good starting point, it could not cover every site-specific situation. In these cases, housing associations had to negotiate adjustments with builders or determine whether the project still qualified as a WoonST development. One interviewee put it succinctly: "*Sommige plekken zijn gewoon niet geschikt voor standaardwoningen. Dan moet je kiezen: aanpassen of buiten WoonST housen.*". This tension between standardization and flexibility required a pragmatic approach. In several cases, minor modifications to standard concepts, such as altering rooflines, entrances or window placements, were sufficient to satisfy local aesthetic or planning requirements. Builders appeared generally willing to accommodate such changes, provided they did not undermine the potential industrialized construction process. Nevertheless, these deviations had to be weighted carefully, as too much customization risked reintroducing inefficiencies.

"*Elke wijziging heeft impact. Soms zie je dat een kleine aanpassing meteen gevolgen heeft voor het hele bouwproces."*

Internally, the housing associations also had to come to terms with the limits of flexibility. Some departments, particularly those focused on asset management or technical control, were initially hesitant to accept prefabricated solutions that diverged from internal standards. Issues like installation methods, ventilation systems or façade materials occasionally prompted debate. Over time, interviewees reported growing acceptance, especially when the speed and cost benefits of standardization became visible. In this sense, the WoonST program contributed to a shift in organisational thinking: from a focus on perfect customization to a model of strategic repeatability. Importantly, the standardisation did not imply a loss off choice. Multiple typologies and aesthetic options were available within the catalogue, and housing associations retained agency in selecting combinations that aligned with their spatial and social goals. As one interviewee explained: "*We hebben niet het gevoel dat we in een keurslijf zitten, Binnen de standaard zijn er genoeg varianten om uit te kiezen.*". This perception of controlled flexibility, being able to work within a defined system without feeling constrained, was crucial to the broader acceptance of the WoonST concept. Standardization played a foundational role in enabling faster, more predictable housing development within WoonST 2.0. While not universally applicable to every project, the standard product catalogue offered clear advantages in terms of planning speed, cost efficiency and inter-organisational alignment. At the same time, a certain degree of flexibility remained necessary to accommodate site-specific and institutional requirements. The interviews suggest that over time, housing associations grew more comfortable operating within these boundaries, recognising that limited customization did not necessarily compromise quality or sustainability. Instead, it allowed them to focus their resources on

delivering more home, more quickly, which is an outcome that increasingly took precedence over the pursuit of bespoke design.

4.1.4. Internal organizational tensions

Implementing WoonST within the participating housing association did not occur without friction. The shift toward standardization and industrial delivery not only required procedural adaptation but also challenged deeply embedded norms and preferences within various departments. These internal tensions surfaced particularly in areas where teams were accustomed to high levels of control over design, technical specifications or supplier selection. One of the most frequently mentioned sources of tension was the shift in responsibility from project teams to centralized coordination. While the concept catalogue offered clarity and speed, it limited the autonomy of individual project leads who were used to managing custom development trajectories. Respondents described how this change triggered resistance, particularly among those who felt their input on design and material choices was being sidelined. As one participant noted: "*Er zijn collega's die moeite hebben met het feit dat niet meer alles zelf ontworpen wordt. Ze moeten ineens vertrouwen op wat er al ligt.*". Asset management and maintenance departments were also identified as frequent sources of hesitation. These teams often held long-standing preferences for certain materials, technical systems or suppliers and were wary of embracing unfamiliar solutions embedded in the industrial concepts. This concern was not merely cultural, it also stemmed from practical considerations about long-term serviceability and compatibility with existing housing stock. As one respondent explained: "*Onze technische dienst had zorgen over installaties die afwijken van onze standaard. Ze vragen zich af hoe dat straks past in het beheer en onderhoud.*".

Such tensions occasionally led to lengthy internal discussions, where the benefits of standardization, such as faster timelines and lower costs, had to be weighted against concerns about long-term quality, brand consistency and operational control. These conversations revealed differing interpretations of what constituted "acceptable compromise". For some, slight deviations from standard technical protocols were tolerable if they enabled quicker delivery. For others, any loss of control over specifications represented a threat to long-term organizational reliability. Moreover, the introduction of WoonST surfaced differences in organizational cultures. Within some housing associations, teams that were oriented toward innovation or external partnerships embraced the new approach relatively quickly. In contrast, departments with a more risk-averse or internally focused mindset tended to be more skeptical. As one interviewee described it: "*Je merkt dat sommige afdelingen vooral denken in risico's en andere juist in kansen. Dat botst als er iets nieuws komt zoals dit.*".

Over time, housing associations began to find ways to navigate these tensions, Internal alignment improved when early WoonST projects began to demonstrate positive results. Seeing tangible outcomes, such as reduced planning times or successful handovers, helped convince skeptical departments that the trade-offs involved in standardization were justifiable. In some cases, WoonST coordinators took on a mediating role, facilitating conversations between departments and helping translate the strategic goals of the program into operational terms that different teams could understand. Another important factor was the gradual shift in internal mindsets, as the logic of repetition and scale became more idly accepted. Departments that were initially protective of their autonomy began to recognize that adapting to the new model did not necessarily mean giving up on quality of influence.

Instead, it required a different form of collaboration, one based on selecting from a pre-approved set of tools rather than building everything from scratch.

> "*We zijn eraan gaan wennen dat je binnen kaders werkt, en dat die kaders eigenlijk best goed zijn.*"

The internal implementation of the WoonST-program within housing associations surfaced various tensions between established practices and new ways of working. These frictions were most visible in areas where professional norms, technical preferences or project autonomy were strongly held. Yet through practical experience, deliberate coordination and organizational learning many of these tensions were gradually addressed. The process highlighted that standardization in housing not only involves changing systems and products, but also reconfiguring roles, responsibilities and institutional mindsets.

4.1.5. Learning and strategic alignment

As WoonST progressed from its initial phase to a more structured implementation, interviewees described a process of organizational learning and strategic alignment that unfolded both within individual housing associations and across the broader network of actors involved. This learning trajectory was not linear or uniform but it was widely recognized as a key enabler of improved collaboration and efficiency over time. In the early stages, many processes were still under development and the boundaries of responsibility between municipalities, housing associations and builders were not always well defined. Several interviewees recalled the complexity of navigating this new system, where traditional practices no longer applied and institutional memory offered little guidance. Over time, both the structure of WoonST and the experience gained through early projects helped clarify expectation and foster a shared working rhythm. One respondent explained: "*Het was een zoektocht in het begin, maar na een paar projecten begonnen we patronen te zien. We wisten beter wat er nodig was en wat we van elkaar konden verwachten.*".

An important part of this learning process was reflection on project selection. In the early phase, some projects were taken on that were poorly matched with the constraints of conceptualized delivery. This resulted in wasted tim and resources. As experience accumulated, housing associations became more discerning in which projects to propose for WoonST. A more structured intake emerged, focused on identifying locations that matched the technical and spatial logic of standard housing concepts. As one interviewee noted: "*In het begin wilden we alles onder WoonST brengen, maar nu kijken we beter of een locatie echt geschikt is. Dat bespaart gedoe.*". Strategic alignment also evolved through closed coordination with builders. Initially, communication was primarily formal and structured through procurement agreements. Over time, this gave way to more open and reciprocal exchanges. Builders adjusted their catalogue in response to feedback from housing associations and offered more detailed guidance on how their products could be adapted to specific site conditions. This iterative process not only improved the quality of project matches but also built mutual trust and reduced negotiation time. Internally, housing associations also began to reassess their own development strategies in light of the opportunities WoonST offered. Several interviewees indicated that their organizations started to think in terms of product-market fit and scalability, rather than treating each housing

project as a standalone design task. This marked a shift in mindset from reactive project management to proactive portfolio thinking.

"*We zijn gaan kijken naar onze voorraad en plannen met een ander oog, meer vanuit herhaalbaarheid dan uniek ontwerp.*".

Another key elements was the creation of institutional memory and knowledge transfer. As teams gained experienced with WoonST, they developed internal documentation, checklists and decision-making frameworks that helped streamline future projects. This also reduced dependence on individual project leaders, making the process more resilient and replicable. The ability to apply lessons learned from one project to the next was seen as major improvement over traditional development cycles, where each project often started from zero. Interviewees also emphasized the role of coordination teams in maintaining alignment between the strategic goals of WoonST and the day-to-day realities of implementation. These coordinators helped translate the broader vision into practical steps, ensuring that teams stayed focused on the added value of a standardization while remaining responsive to site-specific needs. Their presence created a bridge between the long-term ambitions of the initiative and the immediate demands of project delivery.

The WoonST program catalyzed a learning process that led to greater strategic coherence and operational maturity. Housing associations moved from an experimental approach to one grounded in experience, reflection and adaptation. Through improved project selection, closer collaboration with builders and the development of internal tools and knowledge systems

4.2 NH Bouwstroom

The NH Bouwstroom is characterized by its informal, trust-based partnerships and emphasis on long-term collaboration between housing associations and builders. Based on interview data, it highlights the role of coordination, the negotiation between standardization and project realities and the internal shifts within participating organizations.

4.2.1. Shared urgency and a flexible partnership model

The NH Bouwstroom emerged from a shared sense of urgency among housing associations to accelerate the production of affordable housing in the region. Across all interviews, respondents cited rising demand, long project lead times and growing frustration with conventional procurement processes as key motivations to seek a new approach. The housing associations recognized that tackling these challenges individually was increasingly inefficient, prompting them to explore regional collaboration as a way to gain leverage, reduce duplication and create continuity in production. The decision to initiate NH Bouwstroom was not based on a predefined structure but was instead driven by mutual interest and a readiness to act. Several participants emphasized that the model began informally; without rigid agreements or top-down mandates. This informality was experienced as liberating in the initial phase. It allowed space for conversation, experimentation and trust-building rather than immediate bureaucratic structuring. One respondent noted: "*Wij zijn gewoon begonnen. Geen ingewikkelde aanbesteding, maar gesprekken: wie wil meedoen en waarom?*". The process was therefore characterized less by institutional procedure and more by interpersonal commitment.

Within this context, the early engagement of a small number of builders was also described as a strategic choice. Rather than opting for a broad, price-focused tender, NH Bouwstroom selected builders on the basis of their willingness to enter into a long-term collaborative relationship. This approach shifted the focus from short-term transactional efficiency to long-term strategic alignment, reinforcing the relational foundation of the partnership.

"*We hebben de bouwers niet gekozen omdat ze de goedkoopste waren, maar omdat we zagen dat ze echt wilden samenwerken. Ze wilden meedenken, niet alleen leveren.*"

At the same time, the open and flexible setup also brought challenges. While the lack of strict procedure made it easier to start, it also left room for ambiguity regarding roles, expectations and processes. Several respondents indicated that in the absence of a more formal framework, housing associations sometimes fell back into old habits, such as re-tendering projects among the selected builders or debating from joint planning intentions. This undermined a key tension within flexible the model: the balance between informal cooperation and the need for coordination and consistency. As one interviewee explained: "*Het idee was: vaste partners, sneller werken. Maar sommige corporaties gingen toch weer 'shoppen' tussen de bouwers. Dan verlies je wat je wilde winnen.*".

Despite these frictions, there was a strong consensus that the underlying urgency and shared goals remained a unifying force. The challenge of high land costs, stretched internal capacity and slow municipal procedures were broadly recognized across the housing associations involved. This common understanding helped to maintain momentum

even when coordination was imperfect or when specific projects faced setbacks. Interviewees repeatedly stressed the importance of informal trust and mutual commitment as the glue that held the initiative together during its formative phase. A recurring reflection was that NH Bouwstoom worked not because it was formally enforced but because participants wanted it to work. As one respondent put it: "*Er was geen verplichting, maar wel een gedeeld besef: als we dit niet doen, blijven we ieder voor zich rommelen en dan gaan we het tempo nooit halen.*". This mindset underpinned the willingness of organizations to adapt their routines and take risks in pursuit of a shared outcome. The NH Bouwstroom is built on a foundation of urgency, trust and pragmatic flexibility. While the informality of its early structure enabled a swift start and open collaboration, it also created tensions that required deliberate effort to manage. The interviews suggest that what made the model viable was not its procedural design but the alignment of interests and values among the participating housing associations and builders. This alignment, though tested at times, provided the conditions under which a new, more collaborative approach to housing development could begin to take root.

4.2.2. Role of coordination and inter-organizational learning

As NH Bouwstroom progressed beyond its initial formation, coordination emerged as a critical factor in sustaining collaboration and building a functioning joint development process. While the model was intentionally flexible at the outset, interviewees emphasized that some form of structured coordination quickly became necessary to align expectation, distribute knowledge and maintain momentum across the participating housing associations and builders. Central to this effort was the coordination team, which served not only as an administrative backbone but also as a facilitator of learning. Respondents described how coordination went beyond scheduling meetings or managing frameworks, it included tracking projects, identifying overlap in intentions between parties and creating platforms for shared reflection.

"*De smeerolie die alles draaiende houdt, zonder coördinatie vallen we terug in losse projecten.*"

These coordination efforts helped create routines that supported mutual learning. Regular project updates, learning sessions and informal exchanges contributed to a gradual build-up of collective experience. Early misunderstandings, such as misaligned expectations between housing associations and builders, were increasingly replaced by shared reference points and common terminology. Several respondents mentioned the growing ability to "speak the same language", a key shaft that reduced friction and increased the pace of project scoping and planning. Builders play an active role in this learning process as well. As partnerships deepened, they began to adapt their communication and planning strategies to better fit the needs of housing associations. At the same time, housing associations became more attuned to what builders required to offer reliable delivery. One interviewee remarked: "*We leren van elkaar hoe het werkt. De bouwer weet nu beter wat wij vragen en wij snappen beter wat zij nodig hebben om tempo te maken.*".

An important part of this inter-organizational learning is the emergence of shared tools and templates. As experiences accumulated, the coordinating team began to document

practices and develop materials that could be reused across projects. These included intake forms, timeline templates and process checklists. These tools helped standardize communication and reduce the variation that often slowed down early-stage development. As the Bouwstroom continued, these collections became part of a shared knowledge base that supported smoother project starts and more consistent interactions. However, coordination and learning did not evolve without challenges. One interviewee pointed out that even with repeated meetings, the actual translation of lessons into daily practice was sometimes uneven.

> "*We praten veel, maar het blijft lastig om echt routine te krijgen. Iedereen werkt toch nog een beetje op z'n eigen manier*"

This reflected the reality that housing associations still operated with their own internal systems, hierarchies and planning rhythms. While the shared language improved, embedding shared routines into each organization's workflow remained a work in progress. Despite this, the interviews reflect a steady trajectory of improvement. Project timelines shortened, misunderstandings decreased and the sense of operating within a shared development ecosystem strengthened. In several instances, lessons from one project were directly applied to another, reducing duplication and increasing efficiency. This cross-project learning was not formally mandated, but it was enabled through the regular contact and continuity fostered by the coordinating structure. NH Bouwstroom's development is significantly shaped by the presence of active coordination and the gradual establishment of inter-organizational learning. The coordination team played a pivotal role in maintaining structure without stifling flexibility. Through repeated collaboration, participants developed common routines and expectations that allowed for faster and more predictable project development. While integration into daily practice varies, the foundation of a learning-oriented, regionally aligned housing production system is clearly taking shape.

4.2.3. Tension between standardization and project reality

Within NH Bouwstroom, standardization is introduced as a means to simplify and accelerate the development process. The participating housing associations and builders work with concept-based housing products that are intended to be replicable across different sites. In principle, this approach reduces design costs, shortens preparation time and offers more predictability in planning and execution. However, in practice, applying these standard solutions often comes into tension with the physical and institutional complexity of specific housing projects. One of the key challenges lies in spatial variation. Many development locations in the region present unique conditions, sloping lots, irregular plots or context-specific planning requirements, that make direct application of standard products difficult. Although the housing associations value the catalogue of predefined housing types, not all sites are suitable for these models without adaptation. One interviewee explains: "*We willen standaardiseren, maar geen enkele locatie is echt standaard. Je moet altijd iets aanpassen om het passend te maken.*".

This need for adjustment reduces the expected efficiency gains and raises questions about how much deviation from the original product still qualifies as standard. Builders, while generally open to flexibility, warn that even small changes can ripple through production

processes. Housing associations, on their end, sometimes feel compelled to request alterations to meet internal design guidelines, tenant expectations or municipal aesthetic requirements. As a result, projects begin to drift from the simplicity that standardization is meant to offer. Another source of tension comes from the continued use of comparison mechanisms between builders, even though the framework aims to encourage long-term collaboration. While the intention is to match projects based on fit rather than competition, some housing associations still organize ‘mini-tenders’ or feasibility assessments among the selected builders. This adds time and administrative work and partially undermines the trust-based model. One participant remarks: “*We zouden uitgaan van vertrouwen en herhaling maar toch zie je dat mensen willen vergelijken. Dan verlies je snelheid en het idee van vaste partners.*”. These hybrid practices reflect an ongoing negotiation between new and old ways of working. Internally, housing associations must balance the benefits of standardization with their responsibility to deliver context-appropriate and socially responsive housing. For some organizations, this trade-off leads to hesitation. Project teams want certainty that what is delivered fits both the location and the expectation of stakeholders, including future tenants. As one respondent puts it: “*Standaardisatie is handig maar je wil ook woningen maken waar mensen zich echt thuis voelen. Dat vraagt soms om maatwerk.*”.

Over time, NH Bouwstroom participants begin to develop shared strategies to navigate these tensions. Builders are increasingly transparent about the boundaries of what can and cannot be adjusted in their concepts and housing associations become more selective in matching projects to the available catalogue. Still, this remains a dynamic process. Every new project tests the limits of the standard and requires negotiation to determine what level of adaptation is acceptable without undermining the broader goals of efficiency and predictability. While standardization is a key pillar of NH Bouwstroom, its implementation is far from straightforward. The everyday reality of project development introduces variables that challenge the replicability of concept housing. Spatial constraints, organizational habits and institutional expectations all push against the promise of repeatability. Yet rather than seeing this tension as a flaw, participants treat it as a space of learning, where each project offers insights into how far standardization can stretch without losing coherence. It is in managing, not eliminating this tension that NH Bouwstroom continues to evolve.

4.2.4. Internal transitions in development practice

NH Bouwstroom changes not only how organisations collaborate externally nut also how they organise development work internally. Housing associations now rely on a long-term programme rather than single, bespoke projects and this shift requires new roles, routines and decision paths. A first transition concerns the balance between project autonomy and portfolio steering. Project leaders who are used to ‘from-scratch’ design work must not begin with a fixed concept catalogue and a preset builder relationship. One interviewee observed: “*Mijn team start niet meer met een leeg vel. We beginnen met een product dat al is uitgedacht en moeten daar de locatie omheen organiseren.*”. As a result, design dialogue moves upstream: discussions about layouts, facade options and installation choices happen during programme meetings, not during each individual project start-up.

Second, procurement and technical departments adapt to a product-oriented mindset. Instead of comparing tenders on price alone, teams evaluate whether a location matches the technical envelope of a standard concept. This means saying ‘no’ more often to unsuitable sites or late-stage customisation requests. One interviewer explained: “*We*

toetsen nu eerst: past het bouwsysteem? Als het antwoord nee is, dan zoeken we een andere oplossing buiten de Bouwstroom.". Such gatekeeping prevents costly redesign and reinforces programme disciplines. Financial planning also changes. Because prices and specifications are fixed in the framework agreement, finance teams shift focus from negotiating contractor margins to managing cash-flow across a multi-year pipeline. Consequently, internal approval cycles shorten and align with the programme calendar rather than with ad-hoc project milestones.

"*Het bestuur ziet exact wat een woning kost in 2026 en 2027. Dat maakt het makkelijker om investeringsbesluiten in serie goed te keuren.*".

At the same time, these transitions create friction. Departments responsible for asset quality or neighbourhood image still expect freedom to specify materials, colour schemes or landscaping. Programme leads therefore invest in internal communication, showing that limited variation can coexist with uniform construction. As one interviewee put in: "*We houden inspiratiesessies om te laten zien hoe je binnen dezelfde module toch diversiteit krijgt. Dat verlaagt de weerstand.*". Over time, sceptical teams begin to accept that industrialised concepts need not undermine design intent or tenant satisfaction. Finally, knowledge management becomes deliberate and collective. Lessons from one project feed directly into the next via shared checklists, a growing FAQ and bi-monthly 'Maandmiddag overleg' sessions. These forums allow project teams to raise issues and log agreed solutions for future reference. The process turns isolated problem-solving into programme-wide learning loops, gradually embedding a culture of continuous improvement. NH Bouwstroom drives an internal realignment from bespoke, project-centric practices to programmatic, product-oriented routines. While this transition generates push-back in parts of the organisation, the combination of cost certainty, faster approvals and structured learning helps shift mindsets. The housing associations are not merely delivering individual projects faster, they are re-engineering their own development machinery to operate at programme speed.

4.3. Bouwstroom Haaglanden

This section presents findings on Bouwstroom Haaglanden, distinguished by highly formalized procurement process and collaboration. Interviews reveal tensions between the standardized product catalogue and complex urban site constraints, the critical role of the regional coordination team and challenges related to uneven builder uptake and minimal municipal engagement.

4.3.1. Political vs. municipal support

Bouwstroom Haaglanden is strongly rooted in political commitment. Representatives from nine municipalities collectively signed letters of support, expressing a clear intention to speed up housing production through industrialized construction methods. This political endorsement signals a regional urgency and a desire to break through existing bottlenecks in housing delivery. Interviewees recognize this high-level support as an important foundation, setting the stage for collaboration between housing associations and builders. However, despite this political backing, the daily reality within municipal organizations often tells a different story. Interviewees note that while aldermen publicly endorse the programme, their enthusiasm does not always translate into concrete changes at the operational level. Municipal permitting departments, spatial quality teams and planning officials continue to apply traditional processes and timelines. As one interviewee mentions: "*Politiek is er helemaal klaar voor, maar op het niveau van de vergunningverlening zie je weinig versnelling.*". This gap creates tension between expectations set at the political level and the experiences of housing associations and builders trying to navigate the system. Several respondents emphasize that this lack of municipal follow-through manifests most clearly during the permitting and design approval stages. Although the Bouwstroom offers standardized product concepts meant to simplify and accelerate approvals, spatial quality teams within municipalities still scrutinize these concepts with the same rigor as fully bespoke designs. As a result, housing associations spend significant time justifying and explaining the standard housing products.

"Je blijft bij elke gemeente opnieuw uitleggen dat het een standaardproduct is, maar ze behandelen het alsof het een uniek ontwerp is."

This disjoint also affects the allocation of development sites. Housing associations require a steady supply of suitable plots to meet guaranteed volume commitments, yet only a limited number of municipalities explicitly set aside land for Bouwstroom projects. Others continue to rely on conventional tendering methods, which often involve unique design requirements and lengthy preparation phases. A project manager explains: "*Hoewel het bestuur zegt dat ze willen versnellen, merk je dat op het niveau van locaties aanwijzen nog veel losse processen plaatsvinden.*". This inconsistency leads to additional complexity and uncertainty for housing associations attempting to plan their production pipelines. The tension between political ambition and municipal practice has practical consequences. Builders and housing associations anticipate shorter lead times and cost saving through the use of industrialized, standardized products. When municipal procedures do not adapt accordingly, these benefits are compromised. One team member warns: "*Als de gemeente*

niet meebeweegt, krijgen wij de verantwoordelijkheid voor de risico's rondom het volume en de doorlooptijd.". This mismatch places pressure on all parties, risking delays and potentially undermining confidence in the Bouwstroom. Some efforts are underway to bridge this gap. The regional coordination team organizes workshops with municipal officials, spatial planners and housing associations to foster better understanding of the standardized concepts and their flexibility within local contexts. Pilot projects in certain municipalities experiment with parallel permitting and pre-approved design palettes to reduce bureaucratic hurdles. Despite these promising developments, interviewees stress that these changes are still exceptions rather than the rule. The systemic alignment of municipal processes with Bouwstroom objectives remains a major challenge. While Bouwstroom Haaglanden benefits from clear political endorsement, the practical execution at municipal levels lags behind.

4.3.2. A strongly formalised procurement route

In contrast to the relatively informal beginnings of other Bouwstromen, Bouwstroom Haaglanden follows a highly structured and formal procurement process. After political endorsement, the programme moves decisively towards clarity and predictability by selecting two main builders through a competitive, multi-stage tender. This tender process consisted of three dialogue rounds, designed to rigorously assess both price and technical compliance with the required housing concepts. Interviewees emphasized that this procurement structure brings a clear framework that benefits all parties. Housing associations appreciate knowing upfront which builders they can work with and at what fixed prices. As one participant notes: "*De helderheid over prijs en product zorgt voor rust in het proces.*". This predictability allows associations to better plan their production pipelines and align budgets with the fixed catalogue of housing typologies. The procurement framework distinguishes two building approaches: concrete-based stacked apartments and fully modular construction. These concept lines cover the range of PMCs 2, 3 and 4. Builders developed extensive variant catalogues to accommodate different urban conditions. Despite the advantages of this extensive product catalogue, interviewees acknowledge limitations in flexibility.

"*We proberen zoveel mogelijk variatie aan te bieden, maar zelfs met 89 varianten zijn er plekken waar het niet helemaal past.*".

The strict contract and tender conditions limit scope for on-site customization or last-minute design changes. Housing associations feel they lose some design autonomy they previously had, especially when municipalities enforce local architectural or planning preferences. As a housing association representative reflects: "*Je krijgt zekerheid over prijs, maar minder vrijheid om maatwerk te leveren.*". Interviewees also highlight that this formal procurement route imposes a disciplined project pipeline. Housing associations are expected to channel projects through one of the two prequalified builders, while actively matching sites to concepts. This reduces the need for repeated tendering and enables builders to invest confidently in production capacity. However, interviewees recognize this approach demands ongoing alignment and trust: maintaining fair project allocation between builders and ensuring the catalogue evolves to meet emerging needs are continuous tasks.

4.3.3. Coordination team as linchpin

Within Bouwstroom Haaglanden, the coordination team plays an indispensable role in bridging the complexity of a multi-actor program with the practical demands of project delivery. As the regional initiative involves twelve housing associations and two main builders, managing the interactions, expectations and processes across these actors requires continuous and dedicated efforts. Interviewees repeatedly stressed that the coordination team functions as the programme's operational heart, ensuring the building blocks of collaboration come together. The coordination team, situated within the SVH is responsible for maintaining the rolling project cycles, keeping an updated overview of which sites are in preparation and ensuring they are matched to the appropriate builder and housing association. This matchmaking task is crucial given the programme's formal procurement setup and the need to guarantee volume commitments for builders. One respondent stated: "*Zonder de coördinatie is het onmogelijk om het overzicht te houden en projecten tijdig te koppelen.*". Beyond logistics the team acts as a mediator in situations where project realities clash with the strict catalogue products or local planning requirements. Several interviewees emphasize the frequent negotiations the coordination team undertakes between municipalities, housing associations and builders to resolve site-specific constraints. For instance, when municipalities request facade variations or additional architectural features not presented in the standard catalogue, the coordination team facilitates discussions to find compromises that balance design integrity with program efficiency. As one builder remarks: "*De coördinator zorgt ervoor dat we niet vastlopen in eindeloze discussies, maar dat er een werkbare oplossing komt.*". The coordination team also plays a vital communication role, connecting high-level political ambitions with on-the-ground implementation. They organize regular meetings and workshops where all parties share updates, discuss challenges and align expectations. Interviewees mention that this transparency fosters trust and prevents misunderstanding that could slow the program down. A housing association participant notes: "*De coördinatie houdt iedereen scherp en betrokken, dat voorkomt dat we terugvallen in ons eigen eilanddenken.*". Nevertheless, the team's capacity is a concern. The coordination workload is substantial, encompassing project tracking, conflict resolution, partner communication and strategic reporting. Several interviewees express that the small size of the team risks bottlenecks or burnout, especially as the program scales up. Increasing resources or decentralizing certain coordination functions could be necessary to maintain effectiveness.

"De coördinatie is onze smeerolie, maar we moeten oppassen dat die niet opdroogt."

4.3.4. Standard product versus site-specific constraints

A persistent challenge within Bouwstroom Haaglanden lies in reconciling the standardised housing products with the diverse and often complex realities of individual development sites. The program's premise rests on applying a fixed catalogue of housing typologies to accelerate delivery, ensure cost certainty and achieve economies of scale. Yet, the dense urban fabric of Haaglanden and the municipality of local requirements frequently complicate this straightforward vision. Interviewees describe the tension that arises when the standard product catalogue meets stringent municipal planning policies, neighbourhood expectations and site-specific physical constraints. Municipalities impose demands such as varied facades, corner accents, stepped heights or materials signed with local architectural

traditions, which often extend beyond the scope of the pre-approved product variants. An interviewee remarks: "*De catalogus is uitgebreid, maar past niet altijd binnen de strenge stedenbouwkundige regels van elke gemeente.*". These regulatory demands trigger iterative adjustments and can erode the uniformity that underpins industrialised building efficiency.

Builders face technical and operational repercussions when standard products require on-site modifications. Changes to the building envelope or structural elements, even if small, can disrupt the prefabrication workflow and affect the supply chain. This trade-off challenges the fundamental assumption that repetition leads to time and cost savings

"Elke afwijking van het standaardontwerp betekent extra engineering, langere doorlooptijd en hogere kosten."

Housing associations navigate this tension in a context of competing pressure. On one hand, they rely on the certainty offered by the Boustroom to meet ambitious delivery targets and control budgets. On the other, they must satisfy municipal demands and community expectations to ensure local support and project feasibility. An interviewee noted: "*We willen snelheid en standaardisatie, maar gemeente en omwonende willen maatwerk en identiteit.*". This creates a complex negotiation where associations sometimes accept deviations at the expense of program consistency. The negotiation process often unfolds through the coordination team, which mediates between builders, housing associations and municipal planners. By facilitating compromise solutions the team seeks to preserve as much standardisation as possible while respecting local conditions. A respondent explained: "*We proberen een balans te vinden: voldoende flexibiliteit voor de gemeente maar zonder het concept te verwateren.*". Interviewees agree that this balance is delicate and requires continuous attention. Beyond regulatory and community factors, site-specific physical constraints such as irregular lot shapes, limited parking space or infrastructure limitations further complicate direct application of the catalogue. These conditions sometimes force associations bespoke elements, which again reduces the time and cost benefits of industrialisation. Despite these challenges, interviewees maintain that the product catalogue remains a valuable tool. It offers a starting point that is significantly faster than designing from scratch and provides a basis for dialogue with municipalities and neighbours. This clarity helps manage expectations and guides early feasibility studies.

"Het is een referentiepunt; we weten wat we kunnen aanbieden en waar de grenzen liggen."

4.3.5. Uneven uptake and the role of guaranteed volume

A defining characteristic of Bouwstroom Haaglanden's current phase is the uneven distribution of projects between its two selected builders. While the program guarantees each builder a minimum annual volume of approximately 250 units, interviewees report a significant imbalance in the actual allocation of projects, which influences both the operational dynamics and the long-term viability of the initiative. The concrete-based product, perceived by many housing associations as more adaptable to the region's complex urban sites, attracts the majority of the projects. This adaptability allows the builder to address a broader range of site-specific requirements. As one housing association representative notes: "*Aannemer X past beter binnen de diverse contexten die we hier tegenkomen, daarom kiezen we vaker voor hen.*". In contrast, the fully modular product,

while lauded for its industrialized construction benefits and speed, find fewer suitable projects due to its relatively rigid design constraint. Interviewees observe that certain site conditions and municipal preferences limit the applicability of this modular approach. One builder reflects: "*De modules zijn technisch geoptimaliseerd, maar sommige locaties vragen maatwerk dat moeilijk te realiseren is binnen het systeem.*". Consequently, the modular line secures a smaller portion of the volume, which raises concerns about maintaining factory efficiency and cost competitiveness.

The uneven uptake has several implications for the program. Firstly, it challenges the intended balance between builders, which was designed to foster competition, innovation and risk-sharing. An imbalance risks overloading one builder while underutilising the other, potentially leading to capacity bottlenecks or increased unit costs. A participant warns: "*Als het volume niet goed verdeeld wordt, ontstaat er spanning en kunnen afspraken onder druk komen te staan.*". Maintaining a healthy distribution is therefore essential to sustaining long-term collaboration and market stability. Secondly, the volume guarantees underpin the builder's investment decisions in manufacturing capacity and supply chain development. Predictable, sufficient order flows allow builders to commit to factory improvements and optimize procurement. When one builder's volume falls short, the financial rationale for such investments weakens, affecting the entire program's scalability. Interviewees stress that volume certainty is a prerequisite for industrialisation to deliver on its promise. To address these challenges, the regional coordination team actively monitors the project pipeline and seeks to balance assignments between builders. This involves aligning site characteristics with builder capabilities, steering project towards the most suitable product lines and facilitating dialogue when reallocation is necessary. One housing association participant explains: "*De coördinatie helpt bij het maken van keuzes zodat beide bouwers hun volume halen, maar ook het beste resultaat kunnen leveren.*".

Nevertheless, interviewees acknowledge that this balancing act is complex. The diverse nature of Haaglanden's urban landscape, combined with municipal requirements and housing associations preferences, means that a perfect slit is difficult to achieve. Some associations express a preference for specific builders based on previous collaborations or perceived flexibility which can further skew volume distribution. Looking forward, interviewees indicate that the program is exploring refinements to the matching mechanisms. These include developing more granular site assessment criteria, improving communication between all actors and potentially expanding the builder pool if demands and standardisation allow. The goal is to optimize volume allocation without sacrificing project quality or delaying delivery. Uneven uptake of the two main product ines in Bouwstroom Haaglanden presents a practical challenge with significant implications for program efficiency and builder viability.

4.4. Case study comparison

In this chapter the three Bouwstromen will be compared. The comparison focuses on four key emerging themes; public-private collaboration, procurement and partnership models, standardization and flexibility and internal organizational dynamics. In table 4.5 an overview of findings and related quotes can be found. Table 4.4 shows an overview of the three Bouwstromen with their differences and similarities.

Theme	NH Bouwstroom	WoonST 2.0	Bouwstroom Haaglanden
Region	North Holland	MRE	Haaglanden
Municipality	Limited operational involvement	Limited operational involvement - political support on paper	Strong operational support
Governance	Coordination team + working groups	Integrated coordination and strategy team	Coordination team and steering group
Design	Initiative with the contractor based on PVE	Initiative with the contractor based on PVE	Initiative with the contractor based on PVE - often influenced by the municipality
Tender	Three individual columns - total of six contractors	Multiple PMC's - two contractors, one for stacked and one for ground-bound houses	Multiple PMC's - two builders, one for stacked and one for modular houses
Conceptual vs. industrial	Conceptual buildings & industrialized modules	Conceptual buildings	Conceptual buildings
Approach to concepts	Innovative PMC development	Procurement of predefined PMCs	Tailored use of multiple PMC variation
Project distribution	"Match days" between the six builders and housing associations to see who fits the project	Direct contractor approach by the housing association based on the project	Direct contractor approach by the housing association based on the project
Communication	Website, linkedin, own "werkgroep - communication"	Website, linkedin, own "bestuur groep"	SVH - already existing associations for housing associations
Marketing	Direct party connection - trying to sell the idea one-on-one	Road shows + Direct party connection - trying to sell the idea one-on-one	Internal project development - bouwstroom on of the options for development
Initiator	Conversation between housing associations	Conversation between municipalities and housing associations	Initiative following SVH
Goals	~750 homes/year for 10 years	2500 homes by 2030 (1750 stacked & 750 one-family homes)	2000 homes by 2028
Types of projects	Within Amsterdam mostly temporary homes (max. 15 years), other locations permanent	Permanent	Permanent
Contract form	Program: - Intentieovereenkomst between associations and contractor	Program: - Raamovereenkomst between housing	Program: - Raamovereenkomst between housing associations and contractors

	Project: - D&B or other contract between housing associations and contractor	associations and contractors - Intentieovereenkomst between housing associations and municipalities Project: - D&B (or other traditional contract) between housing associations and contractor	- Intentieovereenkomst between housing associations Project: - D&B (or other traditional contract) between housing associations and contractor

Table 4.4: Comparative case study overview (own image 4-5-2025)

4.4.1. Public-private collaboration

A key thread running through all three Bouwstromen is the recognition that collaboration between housing associations and municipalities is essential to overcoming the traditional barriers to rapid and affordable housing delivery. Yet, the form and effectiveness of public-private collaboration vary considerably across the cases, significantly shaping their trajectories and outcomes.

WoonST 2.0 stands out as the most institutionalized collaboration among the three Bouwstromen. From the outset, municipalities and housing associations co-sign the framework agreements, committing not only politically but operationally to a shared approach. This arrangement established a clear sense of joint ownership and responsibility, without the municipality feeling ‘pressured’ or ‘stuck’ in a contract. Because municipalities were involved in the initiation of the program, WoonST creates momentum and a degree of certainty that eases the procedural path for housing associations. This joint governance mode fosters a platform where regulatory bottlenecks are addressed collaboratively rather than sequentially. Yet, while this cooperation sets the tone, interviewees also warn that this commitment is unevenly felt at the operational level within municipalities. Project managers and civil servants often lack familiarity with WoonST’s standardized approach, necessitating significant internal communication effort to bridge the gap between political ambition and administrative practice. These dynamics reveal that strong public-private collaboration requires alignment not just across organizations but also within them.

NH Bouwstroom takes a distinctly different route, marked by a more informal and flexible collaboration model. Here, the partnership revolves primarily around a group of housing associations and builders who emphasize trust, mutual commitment and adaptability. Municipalities do not hold a comparable role within the Bouwstroom, while still impacting the day-to-day practicality of projects and location sites. Interviewees characterize this informal collaboration as a double-edged sword: on one hand, it allows for agile decision-making and experimentation, on the other, it creates ambiguity about roles and responsibilities, occasionally leading to inconsistent application of agreed principles. In this environment, relationships and personal commitment become the glue that holds the system together, but sustaining this trust-based model at scale requires dedicated coordination and continuous dialogue.

Bouwstroom Haaglanden presents an even further contrast. While it benefits from explicit political endorsement , this high-level backing does not consistently permeate administrative practices. Interviewees report that municipal departments responsible for permitting, spatial quality and planning continue to operate largely as they did prior to the Bouwstoom, often treating standardized housing concepts as just another project. This gap

between political ideology and municipal follow-through poses a significant challenge. Housing associations find themselves repeatedly explaining and justifying the bouwstroom approach at local levels, which slows progress and erodes the time gains promised by industrialization. This disconnect reveals that political commitment, while necessary, is insufficient without accompanying changes in municipal processes and culture.

These differences in public-private collaboration and governance have direct consequences. WoonST 2.0 model provides a foundation for coordinated action and early problem-solving but requires continuous internal alignment within municipalities to sustain its benefits. NH Bouwstroom's approach encourages innovation and responsiveness but risks fragmentation and inconsistent implementation without formal structures. Haaglanden's political backing raises expectations and visibility but falls short in transforming municipal operations, limiting its ability to fully profit on the industrialized housing model. Together, these cases illustrate that successful public-private collaboration in housing conceptualization depends not only on shared goals but on the nature and depth of municipal engagement. Formalized co-ownership models can accelerate alignment and coordination, but must be supported by efforts to embed understanding and commitment. Informal trust-based models enable flexibility but demand strong coordination mechanisms to manage complexity. Political endorsement sets an essential tone but must be matched by procedural reforms and cultural change within municipalities to realize promised accelerations.

The quality and configuration of public-private collaboration and governance emerge as defining factors influencing how each Bouwstroom navigates the persitent tensions between speed, scale, standardization and local specificity. Understanding these nuances is key for designing and sustaining regional approaches to conceptualized housing delivery.

4.4.2. Procurement and partnerships

Procurement and partnerships models form the backbone of each Bouwstroom's operational approach, dictating how housing associations and builders engage to deliver conceptualized housing. Though the goals across WoonST, NH and Haaglanden is to reduce transaction costs, improve predictability and build faster, their procurement pathways diverge. Reflecting varied priorities and regional context.

WoonST 2.0 adopted a procurement model resting on the deliberate selection of builders based on their long-term commitment to collaboration rather than based on the basis of lowest cost alone. This model reflects a prioritization of relationship depth and trust over transactional competition. This iterative approach benefits from municipalities' active participation, which brings spatial and planning insights into early procurement decisions. The flexible nature of procurement allows WoonST 2.0 to accommodate adjustments and learn from initial projects. However, this fluidity also creates some initial ambiguity and requires significant coordination to prevent misunderstandings or duplication of efforts.

NH Bouwstroom adopted a procurement model characterized by a degree of experimentation and co-development. Interviewees describe this process as evolving rather than fixed, with housing associations and builders jointly refining a catalogue of industrialized housing types. Builders are chosen for their willingness to engage in joint problem-solving and to invest in repeatable production lines. While this approach fosters a stable partnership environment, interviewees highlight that some housing associations still default to mini-tendering among the pre-selected builders, indicating that procurement practices are

still in flux. The lack of rigid formalization allows flexibility but demands stronger governance to maintain coherence and maximize efficiency.

Haaglanden stands apart with a strongly formalized, multi-stage tender process. The procurement rigorously selects two builders who supply fixed, well-defined housing product lines. This clarity in procurement, pricing and product specification provides housing associations with certainty, enabling detailed planning and budget alignment. Interviewees praise the transparency and predictability of this structure. However, the fixed nature of the tender reduces opportunities for design flexibility and customization, which can lead to challenges in accommodating diverse urban sites and local planning conditions. The procurement's rigidity necessitates ongoing coordination to match projects appropriately and to handle deviations demanded by municipalities or neighbourhood stakeholders. The differences in procurement approaches directly affect how housing associations plan and execute projects. WoonST evolving and participatory model supports learning and adaptation but may extend timelines due to less formalized structures. NH Bouwstroom co-creating selection promotes innovative relationships but risks inefficiencies if mini-competitions persist. Haaglanden formal tender ensures cost and delivery certainty but requires trade-offs in design, potentially constraining uptake on complex sites.

These contrasts reveal that procurement and partnership models must balance competing needs: the desire for clarity, stability and cost control against the requirement for flexibility and local responsiveness. The selection of builders and the structure of procurement contracts profoundly influence not only operational efficiency but also the capacity to navigate site-specific constraints and stakeholder demands. Procurement strategies across the Bouwstromen reflect their unique regional and institutional context. The extent to which procurement is formalized, collaborative or flexible shapes the trajectory and challenges of conceptualized housing delivery. Understanding these nuances is essential for tailoring procurement models that foster both standardization and adaptability within complex housing markets.

4.4.3. Standardization and flexibility

Standardization stands as a central pillar across all three Bouwstromen, whether they focus on conceptualization or industrialization. Standardization is the key mechanism to increase efficiency, reduce costs and accelerate housing production. Yet, the practical application of standardized products reveals a nuanced tension between the benefits of repeatability and the realities of diverse site conditions and stakeholder expectations.

In WoonST 2.0, this tension manifests in a delicate balance. Housing associations and builders work from a catalogue of reference housing types, which offers both a framework and a degree of creative latitude. Interviewees describe the catalogue as a flexible toolbox: it sets boundaries but allows for site-specific adaptations to accommodate local planning requirements or contextual needs. This flexibility supports wider applicability across heterogeneous urban landscapes while maintaining many benefits of standardization. Respondents appreciate this balance, noting that it enables them to tailor developments without losing the time and cost advantages that come from reuse of proven design.

NH Bouwstroom presents a slightly different dynamic. While committed to standard concepts, the Bouwstroom grapples with occasional retreat into mini tendering or bespoke modifications, revealing ongoing struggles to fully institutionalize repeatability. The housing associations sometimes request variations that compromise the originally intended

efficiencies. Interviewees acknowledge that the ideal of strict standardization coexists uneasily with the practicalities of site constraints, organizational preferences and internal negotiation processes. The ongoing negotiation around the degree of allowed flexibility illustrates the program's evolving nature and the challenges of balancing repeatability with customization.

Haaglanden faces arguably the strongest tension in this domain. Its product catalogue is extensive but rigid, reflecting the formal procurement's emphasis on predictability and cost control. However, the dense, complex urban fabric of the region and exacting municipal demands often require deviation from standard models in for example, facade articulation, height variations or material choices. Interviewees describe the negotiation between housing associations, builders and municipalities as a continuous balancing act: every concession to local context risks diluting the economies of scale that the programme depends on. This creates an ongoing challenge to keep the standard product sufficiently "standard" while being sensitive enough to site-specific demands.

Across all Bouwstromen, the interviews underscore that flexibility is not a threat to standardization but an inherent and necessary feature. The capacity to adapt standardized concepts in measured ways determines the feasibility and acceptance of conceptualized housing in diverse settings. Yet, this adaptability must be managed carefully: excessive customization threatens to erode time and cost savings, while insufficient flexibility risks rejection by municipalities and communities. The impact of how each Bouwstroom navigates this balance is profound. WoonST's adaptive standardization supports broad uptake but requires ongoing management of product variation. NH Bouwstroom's mixed approach reflects a transition still in progress, with room to strengthen repeatability. Haaglanden's rigid but challenged standardization demands intensive coordination and negotiation to reconcile industrial goals with urban complexity. The interplay between standardization and flexibility emerges as a core tension shaping the evolution and effectiveness of regional Bouwstromen. Mastering this tension is critical to achieving scalable, efficient and contextual appropriate conceptual housing delivery.

4.4.4. Internal organizational dynamics

The transition toward conceptual housing delivery fundamentally changes the internal workings of housing associations across all three Bouwstromen. Interviewees reveal that shifting from bespoke, project-by-project development to standardized, programmatic approaches requires substantial changes in organizational culture, decision-making processes and interdepartmental coordination.

In WoonST 2.0, early interviews highlight an initial phase of uncertainty and adjustment. Housing associations grapple with moving away from traditional development models where each project is uniquely designed and managed. Internal tensions arise, particularly between departments responsible for asset management, technical standards and development, each with different priorities regarding design. Nonetheless, as projects progress and tangible benefits become evident, acceptance grows. Additionally, new governance or people actively promoting the program help accelerate the acceptance process. Communication initiatives and internal learning sessions help ease resistance, enabling a gradual cultural shift towards embracing repetition and scaled delivery.

NH Bouwstroom presents similar internal challenges but emphasizes the structural realignments needed to support programmatic thinking. Interviewees describe a necessary

balance between project autonomy and portfolio-level control. Development teams accustomed to tailoring every detail must now work within predefined product frameworks, while financial and technical departments adapt to managing multi-year pipelines and fixed-price contracts. This realignment demands new skills and coordination mechanisms. Some respondents note that, although initial resistance persists, the clarity and stability introduced by the programmatic model facilitate faster approvals and more confident investment decisions, ultimately streamlining organizational workflows.

In Bouwstroom Haaglanden, the internal dynamic is further complicated by the tension between political ambition and bureaucratic practice. Housing associations face pressures both externally and internally to uphold quality, tenant satisfaction and neighbourhood integration while conforming to a rigid procurement framework. The reduced design flexibility inherent in the formal tender process challenges departments accustomed to customizing projects to local context. Interviewees recount the struggle to reconcile corporate standards with standardized modules and facade options, leading to cautious internal buy-in. Despite this, the steady exposure to industrialized concepts and the support of the coordination team contribute to gradual acceptance and adaptation.

Across all cases, the interviews underline that organizational change is not instantaneous but evolves through iterative learning and practical experience. Internal champions, effective communication and demonstration of early project successes are crucial to overcoming skepticism and fostering shared understanding. The shift in mindset, from viewing projects as unique endeavors to components of scalable programs, reflect broader institutional transitions that underpin the sustainability of the Bouwstroom. The impact of these internal dynamics on the overall effectiveness of each Bouwstroom is significant. Where housing associations succeed in aligning departments and fostering programmatic approaches, the potential for standardized housing to accelerate delivery and improve cost control increases substantially. Conversely, internal misalignment risks reintroducing bespoke complexities that undermine the efficiency gains of conceptualization. Internal organizational dynamics represent a critical frontier for Bouwstromen. Navigating the cultural and procedural shifts necessary to support standardized, programmatic housing development is as vital as external collaboration and procurement design. The evolution of these internal processes ultimately shapes the resilience and scalability of each Bouwstroom's scalable housing ambitions.

4.4.5. Industrialized vs. conceptual

A salient distinction emerging across the three Bouwstromen concerns the nature of their building approaches, specifically the difference between industrialized construction and conceptual product development. This differentiation shapes how housing associations, builders and municipalities engage with the process and affects the potential speed, cost and standardization outcomes.

NH Bouwstroom represents a clearly industrialized model. Interviewees consistently describe NH's products as fully industrialized, involving off-site prefabrication, streamlined factory process and an emphasis on volume production. The builders selected in NH have invested significantly in production capacity and process optimization, enabling rapid assembly and reducing on-site labor and unpredictability. One interviewee highlights: "*Bij NH Bouwstroom bouwen we echt industrieël, met grote prefab-elementen en korte*

doorlooptijden.". This industrial focus necessitates predictable, steady volume commitments and tight alignment between design, manufacturing and logistics.

In contrast, both WoonST and Haaglanden primarily developed conceptual products. These products are standardized in design, with clearly defined typologies, facade treatments and spatial arrangements but can be executed through either industrialized or traditional building methods. The interviews reveal that housing associations and builders perceive these conceptual products as flexible frameworks. As one participant explained: "*Onze concepten zijn standaarden maar de bouw kan industrieel of meer traditioneel plaatsvinden, afhankelijk van het project en de locatie.*". Similarly, Haaglanden builders underscore that while their product catalogue supports industrialized options, many projects still involve conventional on-site construction due to site complexity and municipal requirements, enhancing the uneven distribution of projects within Bouwstroom Haaglanden.

This distinction has practical implications. Industrialized buildings, as pursued by NH Bouwstroom, offers significant potential for cost reduction and timeline compression by leveraging repetitive manufacturing processes and minimizing variability. However, it demands a high degree of certainty about project volume, design uniformity and logistical coordination. Deviations from the industrial process, whether due to site conditions or changing specification, can significantly erode these benefits. Conceptual building, as observed in WoonST affords greater adaptability to local conditions and stakeholder preferences. The standardized designs act as reference frameworks that ensure a degree of repeatability and quality assurance but do not strictly mandate off-site prefabrication or assembly-line processes. This flexibility supports broader applicability across varied urban contexts but may limit the speed and cost advantages associated with full industrialization. It also 'supports' project-specific alterations better compared to fully industrialized methods, creating an atmosphere in which parties are making adaptation easier, which results in deviation from the 'standard' and therefore influences the efficiency of the Bouwstroom. Interviewees in WoonST and Haaglanden also highlight the strategic choice of maintaining conceptual flexibility to accommodate municipal and community demands for architectural diversity and site responsiveness. This approach allows housing associations to balance the benefits of standardization with political and social acceptability, particularly in complex urban areas.

The divergence between industrialized and conceptual building within the Bouwstromen reflects differing regional priorities and developmental constraints. NH Bouwstroom's industrialized focus aligns with a high-volume, process-driven production logic that requires predictable workflows and minimal customization. WoonST 2.0 and Haaglanden, by favoring conceptual product development and traditional building methods, position themselves to navigate more varied regulatory landscapes and community expectations, at the expense of industrial efficiencies.

Finding	Supporting quote	Interview Source
Public-private collaboration as a foundation	*“De gemeente is er echt vanaf het begin bij, dus er is vroegtijdig afstemming waardoor alles soepeler loopt.”*	WoonST interview 2
	“Vertrouwen tussen corporaties en bouwers is essentieel; zonder dat komt het hele programma stil te liggen.”	NH Bouwstroom interview 4
	“Politieke steun is sterk, maar gemeentelijke afdelingen volgen vaak niet mee in hun processen.”	Haaglanden interview 3
Early confusion and growing clarity	*“In het begin was er onduidelijkheid over wie wat doet, maar gaandeweg werden de rollen duidelijker.”*	WoonST interview 5
	“We moesten het vooral doen door te leren, wat soms frustrerend was, maar noodzakelijk voor vooruitgang.”	NH Bouwstroom interview 1
Role of standardization and flexibility	*“Onze concept catalogus is het uitgangspunt; we kunnen het een beetje aanpassen afhankelijk van de locatie, maar niet te veel.”*	WoonST interview 3
	“Te veel maatwerk vertraagt en ondermijnt het industriële proces.”	NH Bouwstroom interview 2
	“Gemeente willen dat het ontwerp past bij de buurt, waardoor we soms concessies moeten doen.”	Haaglanden interview 4
Internal organizational tensions	*“Sommige afdelingen willen meer controle over het ontwerp, andere focussen op kostenbesparing, dat zorgt voor interne discussies.”*	WoonST interview 1
	“De overgang van projectmatig naar programmatisch werken is een grote verandering binnen onze organisatie.”	NH Bouwstroom interview 5
Learning and strategic alignment	*“We organiseren regelmatig bijeenkomsten om te delen wat werkt en wat niet; dat helpt het proces echt vooruit.”*	WoonST interview 4
	“Strategische afstemming kostte tijd, maar nu worden beslissingen sneller en voorspelbaarder genomen.”	NH Bouwstroom interview 3
Conditions for success and future outlook	*“Een sterk coördinatieteam is de lijm die alles bij elkaar houdt.”*	NH Bouwstroom interview 2
	“Als gemeente hun vergunningverlening stroomlijnen, kunnen we echt versnellen.”	Haaglanden interview 1

Table 4.5: Research findings supported by quotes overview (own image 15-5-2025)

5. Discussion

5.1 How do actor roles and responsibilities change within a Bouwstroom compared to traditional construction processes?

The transition from traditional construction processes to the programmatic, conceptual framework embodied by Bouwstromen marks a fundamental shift in the roles and responsibilities of key actors; housing association, municipalities and contractors. Unlike traditional project-based delivery where actors operate in relatively siloed and reactive capacities, Bouwstromen encourages a reconfiguration of these roles toward more integrated, strategic and proactive positions.

5.1.1. Housing association

Traditionally, housing associations often acted as micro-managers of individual projects, writing elaborate PVE's with each millimeter of a project thought out. In the Bouwstroom context, however, their role evolves into that of a portfolio manager or program coordinator. As shown in interview data from all three Bouwstromen, housing associations shift from reactive project supervisors to proactive managers of multi-project pipelines. They engage in early alignment with municipalities and builders, participate in framework agreements and contribute to joint decision-making on standardized product catalogues. Internally, this requires organizational realignment with development, procurement, finance and technical teams adapting to manage repeatable product lines rather than bespoke projects. Financial planning transitions from negotiating individual project budgets to managing cash flow across muti-year housing pipelines. As one interviewee noted, this change enables clearer investment decisions and accelerates approval cycles but also demands new internal coordination and knowledge management processes to sustain programmatic delivery.

5.1.2. Municipalities

Municipal roles also transform significantly. Where municipalities traditionally functioned primarily as permit issuers and regulatory gatekeepers, Bouwstromen are pushing them toward becoming strategic facilitators of housing delivery. This includes early involvement in framework agreements, joint land allocation and planning coordination aimed at reducing bureaucratic bottlenecks. However, the interviews reveal an uneven degree of municipal engagement across regions. For example, in WoonST 2.0, municipalities are formally embedded as partners with clear governance roles, enabling upfront resolution of spatial constraints and faster permitting. In contrast, in NH Bouwstroom and Haaglanden, political support often outpaces administrative follow-through, with permitting and planning departments continuing to apply traditional, project-based supervision. This gap creates tension and delays that undermine the potential acceleration of conceptualization. Consequently, municipalities face the dual challenge of aligning internal processes with new programmatic ambitions while fostering greater familiarity and trust with housing associations and builders.

5.1.3. Builders and contractors

Builder roles shift from being largely reactive executors of bespoke designs to proactive product owners within the Bouwstroom. Contractors invest in repeatable manufacturing capacity, standardized product lines and process optimization to support volume production. Their involvement in early planning and procurement negotiations allows them to better align production with a continuous project-stream, reducing uncertainty. The emphasis moves toward long-term partnerships rather than one-off contracts, fostering mutual trust and learning with housing associations. However, builders must also navigate the tension between maintaining industrial efficiency and accommodating site-specific adaptations imposed by municipalities or associations. This balancing act influences production, planning and cost control.

5.1.4. Coordination and governance

A new actor role emerging across all Bouwstromen is that of dedicated coordination teams or program officers. These teams act as the connective tissue between municipalities, housing associations and builders, managing project-streams, facilitating knowledge sharing, resolving conflicts and ensuring alignment with program goals. Their function addresses the complexity introduced by mutli-actor collaboration and standardization ambitions, providing critical continuity and operational oversight.

Summary

Together, these shifts reflect a movement from isolated, project-centric practices toward integrated, programmatic governance. Actors take on more strategic and anticipatory roles while emphasizing alignment, trust and repeatability. However, this transition is accompanied by organizational relationships and adapting administrative processes to new ways of delivery. The successful evolution of actor roles and responsibilities is therefore a foundational condition for realizing the acceleration and efficiency gains promised by Bouwstromen.

5.2. What collaboration challenges and opportunities do actors perceive when working within a Bouwstroom?

Collaboration within Bouwstromen represents both a critical enabler and a source of ongoing complexity. The transition from traditional project-based construction to programmatic, standardized delivery introduces new interdependencies and shifts in actor interaction patterns. Across the three Bouwstromen, actors experience distinct challenges and opportunities that shape the collaborative system.

5.2.1. Collaboration opportunities

Collaboration within Bouwstromen significant opportunities that differ from those experienced in traditional construction processes. By moving beyond isolated project delivery toward a more integrated and programmatic approach, actors benefit from enhanced alignment, predictability and learning that can accelerate housing production and improve quality control. A fundamental opportunity lies in the ability of Bouwstromen to align multiple actors around a shared vision and concrete goals. Unlike traditional fragmented processes, Bouwstromen fosters early and continuous engagement through formal

agreements or trust-based partnerships. For example, WoonST governance structure ensures municipalities are embedded in decision-making from the outset, enabling coordinated land allocation and early resolution of planning constraints. This early alignment helps avoid many of the costly delays common in traditional project-by-project workflows in which actors often work in silos with limited communication. NH Bouwstroom's model capitalizes on relationship-building and trust, enabling flexible and adaptive collaboration that encourages innovation and joint problem-solving. Housing associations and builders develop close working relationships that facilitate quick adjustments to merging challenges. This relational dynamic allows for a more responsive process, which is particularly valuable in complex or uncertain project environments. In Haaglanden, political endorsement combined with a clear, formal procurement process creates a platform for cooperation characterized by predictability and shared expectations. Builders receive volume guarantees, although small, which incentivize investment in industrial capacity and housing associations gain certainty over cost and delivery timelines. This charity is a powerful enabler of trust and long-term collaboration, reducing the inefficiencies of repeated tendering and uncertain contract conditions.

Coordination teams are another major collaborative asset. By serving as the operational 'glue", these teams manage flows and maintain alignment across a diverse network of actors. Their facilitative role ensures that the complexity of multi-actor collaboration does not devolve into fragmentation. Interviewees emphasize that such coordination is crucial for keeping projects on track and sustaining momentum, particularly as program scale and complexity increases. Moreover, collaboration within Bouwstromen fosters a culture of shared learning. Through regular meetings, workshops and knowledge-sharing platforms, actors collectively identify best practices and adapt processes. This contrasts with traditional delivery models, where each project often starts anew without building systematically on past experience. The programmatic mindset encourages continuous improvement, reduces repeated mistakes and enhances organizational memory. Finally, collaboration offers a strategic opportunity for institutional realignment. Housing associations shifts from reactive project managers to proactive program directors while builders transition from one-off contractors to long-term partners. This redistribution of roles enhances capacity and accountability, creating a foundation for sustained conceptualized housing delivery.

5.2.2. Challenges

Despite these compelling opportunities, the collaborative process within Bouwstromen is flooded with significant challenges that hinder performance and frustrate participants. Many of these challenges stem from the tension between existing institutional practices and the demand of programmatic standardized delivery. A major challenge is the disconnect between political commitment and operational municipal practices. While Bouwstromen often receive strong political backing at the national or regional level, interviews reveal that the commitment rarely permeates municipal permitting and spatial quality departments. These teams frequently continue to operate under traditional, project-unique paradigms, treating standardized products as if they were bespoke developments. This results in repeated justifications and negotiations for concepts that were intended to be pre-approved, significantly slowing down processes. The interviews from Haaglanden and NH Bouwstroom consistently highlight this phenomenon, pointing to

“selling” standardized concepts multiple times and prolonged permitting timelines that undermine the promised acceleration.

Role ambiguity and governance informality present another obstacle, especially in less formalized models. While trust-driven collaboration fosters flexibility, it also introduces uncertainty about decision rights and responsibilities. Without clear structures, actors may duplicate efforts, avoid accountability or revert to competitive “mini” tenders within the framework, fragmenting the cooperative spirit. Interviewees indicate that sustaining trust requires substantial coordination effort and institutional memory, which can be strained as programs grow. The inherent tension between maintaining programmatic standardization and responding to locations and stakeholder demands further complicates collaboration. Housing associations, municipalities and communities regularly request alterations to “standards”. Although such flexibility is essential to acceptance, it often triggers prolonged negotiations and compromises that erode the efficiency and cost benefits of conceptualization. Coordination teams frequently find themselves mediating these tensions, but repeated compromises risk diluting the core industrial logic of the Bouwstroom.

Internal organizational misalignment within housing associations also disrupts effective collaboration. Procurement, technical asset management and financial departments often have divergent priorities, knowledge level and risk tolerance regarding standardized products and programmatic delivery. This results in inconsistent messaging externally and slowed decision-making internally, weakening housing associations’ ability to negotiate confidently and coherently with partners and municipalities. Furthermore, collaboration demands sustained commitment, which can be difficult to maintain over the long time horizons typical of conceptualized housing programs. Changes in leadership, shifting political priorities or budgetary constraints can erode trust and momentum. The need for continuous alignment and communication imposes resources burdens on all actors, which can lead to coordination fatigue and reduced engagement. Finally, the scale and complexity of multi-actor collaboration introduce logistical and relational challenges. Managing dozens of projects across multiple municipalities and housing associations requires sophistical coordination capacity. Interviewees warn that without adequate resources and clear governance, collaboration can devolve into confusion, frustration or power struggles threatening program coherence.

Summary

Collaboration within Bouwstromen unlocks significant advantages: early alignment reduces delays, trust-based relationships improve adaptability, formal procurement clarifies roles and expectations, coordination teams enhance coherence and a culture of shared learning drives continuous improvement. These factors collectively create a more predictable, efficient and scalable framework for housing delivery than traditional approaches. However, while collaboration within Bouwstromen offers clear benefits, realizing these requires overcoming entrenched institutional inertia, role confusion, conflicting priorities and resource constraints. Successfully navigating these challenges is a precondition for fulfilling the ambitious goals of conceptualized, programmatic housing delivery.

5.3. How does the governance structure of a Bouwstroom facilitate or hinder collaboration between actors?

Governance structures form the backbone of Bouwstromen, shaping how diverse actors interact, make decisions and share responsibilities. The interviews reveal that the design and implementation of governance significantly influence the quality, efficiency and resilience of collaboration, either enabling seamless coordination or fostering ambiguity and friction.

5.3.1. Facilitators

In WoonST 2.0, governance is characterized by agreements that explicitly include municipalities as partners in the housing delivery framework. This co-ownership fosters joint responsibility and early alignment on key issues. Interviewees emphasize that such formalization enhances transparency and mutual accountability, creating a stable basis that helps actors navigate within the program. The presence of clear roles and shared objectives reduces conflicts and accelerates problem-solving. As one interviewee explains: "*De formele afspraken zorgen ervoor dat iedereen weet wat er van hem verwacht wordt, dat scheelt veel discussie.*". Moreover, WoonST governance incorporates dedicated coordination teams with well-defined mandates. These teams manage projects, facilitate communication and mediate discussion points, thereby maintaining alignment and momentum. This formal structure supports scalability, allowing the program to handle increasing volumes without losing coherence. NH Bouwstroom adopts a more flexible, trust-based governance model. By selecting partners based on relational qualities rather than strict contractual obligations, it nurtures innovation and adaptability. Interviewees value this informality for enabling open dialogue and rapid adjustments, which can be crucial in uncertain or complex project environments. The trust-based model lowers barriers to collaboration and fosters a culture of mutual support. Bouwstroom Haaglanden presents the most formalized governance setup. The formal contracts and predefined roles between housing associations and builders create clarity in procurement and delivery responsibilities. This rigor supports cost control and volume predictability, which is essential for conceptual construction.

5.3.2. Hindrances

The downside of NH Bouwstroom's trust-based structure is that this flexible governance often leads to unclear decision-making pathways and blurred responsibilities. Some interviewees report confusion over who holds accountability for critical tasks, resulting in duplicated efforts or inconsistent application of processes. The occasional fallback to mini-competition among pre-selected builders undermines the cooperative spirit. Without strong coordination and documentation, such informal governance risks fragmentation. Especially as the program grows this is a risk. One respondent reflects: "*Het vertrouwen is hoog maar we missen soms de structuur om dit efficiënt te benutten.*". In Bouwstroom Haaglanden, however, the formality of their governance structure introduces rigidity that can hinder collaboration. Interviewees highlight that municipal departments often remain disconnected and stuck in traditional methods. The current governance structure does not translate into internal municipal alignment, not involving the municipalities directly and therewith creating bottlenecks. The fixed product catalogue and strict contractual obligations limit flexibility, requiring intensive coordination to manage local adaptations.

5.3.3. Enablers and constraints

Across the Bouwstromen, governance emerges as a double-edged sword. Clear, formal structures can provide necessary clarity, accountability and stability which enables efficient collaboration and scalability. However, excessive rigidity may stiffen the Bouwstroom, impacting flexibility and frustrate actors navigating complex site-specific and political realities. Conversely, informal and trust-based governance can foster innovation and adaptability but struggles with scalability and consistent accountability. Without formal mechanisms to clarify roles and document agreements, cooperation risks fragmentation and inefficiency. A common thread is the critical role of coordination teams or program officers that operate within or alongside governance frameworks. These teams mediate tensions, maintain alignment and ensure continuity, functions that become increasingly important as programs expand or complexity grows.

The governance structure of a Bouwstroom significantly shapes how collaboration unfolds. Structures that balance formal clarity with adaptive flexibility tend to facilitate stronger, more resilient partnerships. The cases studied illustrate that neither extreme formality nor pure informality suffices. Effective governance blends clear roles and shared accountability with space for negotiation and adaptation. Successfully navigating this balance is essential for enabling the multi-actor collaboration required to deliver conceptual housing at scale.

5.4. How can Bouwstromen contribute to the broader adoption of IC methods in urban development projects?

Bouwstromen represents a promising institutional innovation aimed at embedding IC within the traditionally fragmented and project-based urban development sector. The findings reveal that Bouwstromen facilitate the broader adoption of IC methods by providing structure, learning environments and aligning different actors around repeatable production logic. However, the extent and nature of their contribution vary across cases and per project. A primary mechanism through which Bouwstromen can promote IC adoption is the establishment of standardized product catalogue and multi-project pipelines. Interviewees emphasize that having predefined housing concepts reduces design variability, accelerates decision-making and improves time and cost predictability. This standardization support the industrial logic of prefabrication and mass production, creating conditions for builders to invest in factory capacity and streamlined processes. For instance, NH Bouwstroom's focus on fully industrialized products exemplifies how steady volume commitment and programmatic, sequential projects enable deep integration of IC methods into urban housing production. Moreover, Bouwstromen fosters collaborative governance structures that bring together housing associations, municipalities and builders in joint frameworks or partnerships. This collaboration addresses traditional barriers to IC adoption, such as misaligned expectation, lack of coordinated land availability and inconsistent permitting processes. In WoonST 2.0, formalized municipal involvement ensures early alignment on spatial and regulatory issues, smoothing the path for IC usages. In contrast, the informal but trust-heavy relationships in NH Bouwstroom allows experimentation with IC approaches within a less bureaucratic setting.

Bouwstromen also contribute to IC adoption by embedding knowledge sharing and continuous learning within their governance. Dedicated coordination teams and regular stakeholder meetings create platforms for 'best-practice' discussions, troubleshooting

challenges and collectively refining both product and process standards. This institutional learning accelerates the maturation of IC methods, enabling gradual improvements in design, logistics and stakeholder management. Furthermore, Bouwstromen encourages a shift in organizational roles and mindsets among housing associations and builders. Housing associations evolve toward programmatic coordinators, managing portfolios rather than isolated projects. Builders, in their turn, invest in repeatable production capacity. This realignment is critical for IC adoption because it moves actors beyond project-specific, ad hoc approaches toward industrial-scale production logic. Interviewees from all cases note that this shift is gradual and challenging but essential for embedding IC in urban development. However, the interviews also show constraints on Bouwstromen's influence. Municipal processes and regulatory fragmentation limit the degree to which IC can be fully implemented. Particularly in Haaglanden, political support has not yet translated into consistent administrative practices that facilitate IC uptake. Additionally, the tension between standardization and local adaptation necessitates ongoing negotiation that can slow broader adoption.

Bouwstromen contribute to the broader adoption of IC methods by creating the ideal environment in which IC can flourish. While Bouwstromen cannot fully overcome external institutional and contextual constraints alone, they represent a critical vehicle for shifting urban development towards more industrialized, efficient and scalable housing production.

5.5. What is a Bouwstroom and how does the implementation affect collaboration within urban development projects in the Netherlands?

A Bouwstroom is a regional, programmatic approach designed to accelerate affordable housing delivery through systematic application of conceptual housing typologies. It represents a significant departure from traditional project-by-project development by coordinating multiple housing associations, builders and municipalities around a shared program. The essence of a Bouwstroom lies in aligning actors and processes to enable repetition, volume certainty and standardization, thereby fostering efficiency, cost control and faster production times. The concept of a Bouwstroom is grounded in addressing persistent challenges in Dutch urban development that have historically limited housing supply growth. By creating a collaborative framework at the regional level, Bouwstromen seek to overcome these barriers, embedding conceptualization as the new norm of production.

The implementation of a Bouwstroom significantly reshapes collaboration within urban development projects. Unlike conventional models where actors operate within silos, Bouwstromen requires actors to reconfigurate their roles, responsibilities and interaction patterns towards integrated, programmatic coordination. First, the governance structure that underpin Bouwstromen shifts collaboration from fragmented and transactional to coordinated and relational. All involved actors become co-owners of a shared production line, supported by this new partnership. This co-ownership facilitates early and ongoing alignment on land allocation, design standards and regulatory compliance. Dedicated coordination teams emerge as indispensable actors managing the complex web of relationships, ensuring transparency, resolving conflicts and maintaining momentum. This governance redesign creates an environment of trust, accountability and a shared commitment which are essential for conceptualization.

Secondly, the implementation redefines the roles and responsibilities of actors. Housing associations shifts from managing isolated projects to overseeing mutli-year, programmatic pipelines of standardized housing products. This requires internal

organizational realignment with new competencies in portfolio management, financial forecasting and knowledge sharing. Municipalities must integrate Bouwstroom principles into spatial planning and permitting processes, demanding cultural and procedural changes that are ongoing and challenging. Builders invest in industrialized production capacity and engage in early design and procurement collaboration to synchronize their product with programmatic demands. This role redistribution creates dependencies and requires actors to balance autonomy with collaboration, adapting traditional power dynamics and expectations.

Third, Bouwstromen influence collaboration by introducing standardized product catalogues and repeatable processes that underpin conceptualization. While this standardization enhances predictability and efficiency, it also generates tension as stakeholders negotiate the boundaries between programmatic uniformity and project-unique flexibility. Municipalities and communities often demand adaptations to meet local architectural and social preferences, necessitating ongoing negotiations among housing associations, builders and municipal officials. Coordination teams play a pivotal role in mediating these tensions to preserve the industrial logic without sacrificing context sensitivity. This dynamic interplay shapes collaborative routines and decision-making processes, embedding learning and adaptation in the governance framework.

Fourth, the implementation impacts collaboration through its capacity for institutional learning and cultural change. Bouwstromen foster collective reflection and continuous improvement via regular meetings, shared documentation and feedback loops. Actors develop common language, shared expectations and mutual understanding that depend over time. This learning culture supports the transition from individual project mindsets to programmatic, standardized thinking. This change is vital for scaling and sustaining housing delivery. However, the process is gradua and complex, often hindered by traditional organizational practices, role ambiguity and lack of knowledge. Success depends on embedding collaboration into both organizational routines and inter-organizational relationships.

Finally, while Bouwstromen unlock substantial collaborative benefits, their implementation also exposes significant challenges. The misalignment between political endorsement and municipal operational engagement frequently slows progress. Role ambiguity and governance informality can undermine trust and accountability. The tension between standardization and flexibility requires careful balancing to maintain conceptual efficiencies alongside widespread acceptance. Internal organizational dynamics within housing associations and municipalities can complicate unified collaboration efforts. Moreover the scale and complexity of managing multi-actor collaborations impose high coordination demands. In conclusion, a Bouwstroom is more than a technical or procurement innovation, it is a comprehensive institutional and relational transformation. Its implementation reshapes collaboration by fostering integrated governance, redefining actor roles, embedding standardization, balancing flexibility and cultivating a culture of shared learning. While these changes offer a pathway to overcoming longstanding barriers in Dutch urban development, realizing their full potential requires navigating entrenched institutional natures, complex actor dynamics and continuous alignment efforts. This multifaceted transformation highlights that accelerating affordable housing through conceptual production is as much about evolving collaboration and governance as it is about technology or process design. Bouwstromen, therefore, stand as critical experimental arenas where new forms or partnerships, coordination and programmatic delivery are forged to meet urgent societal needs.

Dimension	WoonST 2.0	NH Bouwstroom	Bouwstroom Haaglanden
Governance structures	The WoonST diagram shows a moderate co-occurrence of “woningcorporaties” and “governance structures”, indicating housing associations’ active role in the steering committee. “Gemeente” also links to governance but less strongly, suggesting municipalities are involved but not dominant in governance discussions.	In NH Bouwstroom, “Gemeente” and “Governance structure” co-occur strongly, the thickest flow in its diagram, underscoring that municipalities are central to setting up program processes and its success. “Aannemers” also tie into governance, though more thinly, reflecting their participation in decision forums and co-creative dynamics of the NH Bouwstroom.	Haaglanden’s diagram reveals a thinner link between “Gemeente” and “Governance structure” than NH, suggesting the municipality plays a more consultative than directive governance role. “Corporaties” and “Governance structure” co-occur more frequently, highlighting their relative leadership in shaping program rules.
Collaboration opportunities	“Woningcorporaties” and “Collaboration opportunities” are strongly connected, showing that housing associations in WoonST perceive many areas to co-create. The contractor node also feeds opportunities flows, but less so, indicating builders see fewer but still significant chances to innovate together.	NH’s diagram places “Collaboration opportunities” as the most heavily linked theme: both “Woningcorporaties” and “Gemeente” flow into it with nearly equal width, signifying that associations and municipalities jointly identify numerous collaborative openings. Contractors, while connected, register fewer opportunity codes, pointing to a secondary but meaningful role in ideation	In Haaglanden, “Collaboration opportunities” flows are led by “Corporaties” and “Aannemers”, meaning both perceive ample joint avenues, more so than municipalities. This suggests that in Haaglanden the builder-association relationship drives opportunity spotting, with the municipality playing a supporting role.
Collaboration challenges	The diagram for WoonST shows “Gemeente” and “Collaboration challenges” as the single thickest link; municipal processes (permits, spatial fitting) are repeatedly coded as barriers. Associations and contractors both link to challenges, but with thinner flows, indicating they face fear but still	NH Bouwstroom’s heaviest challenge flow originates from “Gemeente”, mirroring WoonST: permit timing and site-specific requirements are the primary pain points. “Aannemers” and “Corporaties” feed into challenges too, though with thinner bands, reflecting shared but lesser pain around, for	Haaglanden demonstrates a more balanced challenge profil: “Aannemers”, “Corporaties” and “Gemeente” all contribute flow of similar thickness into “Collaboration challenges”, indicating that each identify comparably significant obstacles. This pattern points to a tripartite

	notable coordination hurdles.	example, logistical misalignments or contractual friction.	struggle rather than a single dominant source.
Actor role changes	WoonST largest co-occurrence is between “Actor role changes: aannemer” and “Actor role changes”, highlighting contractors' pronounced shift toward product stewardship. A similarly large, but slightly thinner, flow from “Actor role changes: Gemeente” shows municipalities also changing roles (from gatekeepers to facilitators). Housing associations are coded here but more moderately.	In NH Bouwstroom, “Actor role changes” overwhelmingly link to “Corporaties”, making housing associations’ biggest transformation toward portfolio management. Contractors and municipalities also show up under role changes but with narrower flows, indicating they evolve roles too, albeit less dramatically.	Haaglanden’s diagram shows “Actor role changes: gemeentelijke betrokkenheid” with the thickness flow, underscoring a strong role shift needed for municipalities (towards program enabler). Contractors and associations follow with flows of moderate thickness, suggesting a more evenly distributed role evolution across all actors.

Table 5.6: Cross-case co-occurrence comparison (own work, 12-5-2025)

6. Scientific relevance

This chapter reflects on the three most salient insights from the study, situates them within existing scholarship, distinguishes scientific and societal implications, acknowledges methodological limitations and proposes avenues for future research.

6.1. Key insights

Actor roles evolve in programmatic governance. Whereas traditional construction frames contractors and housing associations in discrete, project-specific roles (Boelhouwer, 2020), analysis in this study shows that Bouwstromen demand a “product logic” in which contractors become co-designers and housing associations shift toward portfolio management. This aligns with Gibb and Isack’s (2003) observation that IC methods reconfigure responsibilities, but extends it by demonstrating how long-term, multi-project frameworks concretely redistribute decision-making authority among actors. Furthermore, the Bouwstroom governance structure should help balance between standardization and contextualization. Program governance in Bouwstromen creates efficiencies through typology matrices and PMCs, yet risks homogeneity if variation mechanisms are insufficient. Compared to conventional project governance studies (Too & Weaver, 2014), findings in this study underscore the need for adaptive permit and design processes at the municipal level (Boelens, 2010), ensuring that standardized concepts can still respond sensitively to local conditions. Lastly, actors alignment is the most crucial factor in the success of Bouwstromen. Consistent with Oander and Landin’s (2005) emphasis on interdependencies, the cross-case comparison in this study reveals that Bouwstromen succeed when definitive actors (power, legitimacy and urgency) share clear objectives early on. Unlike studies that treat BIM and digital tools as primary enablers (Goulding & Arif, 2013), this research highlights interpersonal trust and shared governance routines as equally vital for scaling IC initiatives.

6.2. Implication

Future theoretical models of IC implementation should integrate a programmatic governance perspective, accounting for shifting actor salience over time. This study suggests extending beyond traditional stakeholder mapping methods and include actor-based analysis to encompass dynamic, multi-project context and refining governance taxonomies to include standardization-variation hybrids.

Practitioners, especially municipalities and housing associations, should institutionalize flexible permit pathways for predefined building concepts and embed limited variation options within PMC catalogs to maintain neighbourhood character. Contractors are advised to develop robust product management capabilities, investing in early actor workshops to align expectations and build trust.

6.3. Limitations

A primary limitation is the focus on three “new-build” Bouwstromen. Renovation-focused initiatives (de Vries & Wassenaar, 2022) and emerging pilot programs were not analysed. These renovation streams may entail different actor dynamics, particularly regarding heritage regulations and retrofit specialists. Additionally, the emphasis on housing associations as lead clients excludes the perspectives of commercial investors, a gap that limits generalizability beyond social housing. Methodologically, reliance on semi-structured interviews risks self-report bias, especially considering the work history at a contractor company of the researcher. Participant observation or quantitative performance data could enhance rigor. If conducted again, the study would incorporate a longitudinal design, tracking evolving actor roles over multiple project cycles rather than a single snapshot.

6.4. Future research directions

Building upon this thesis, several areas and themes merit further investigation:

1. Renovation Bouwstromen: Exploring how programmatic frameworks operate in retrofit context, where technical constraints and regulatory urgency differ, would deepen understanding of IC’s flexibility (de Vries & Wassenaar, 2022).
2. Investor diversity: examining private and institutional investor’s uptake of Bouwstroom principles could reveal how financial imperatives shape PMC selection and risk allocation, compared to housing association’s more social-mission orientation.
3. Architect role and adaptation: better examining the role of the architect within the Bouwstroom program could reveal new insights. Because of standardization, design freedom is lessened and architects have to collaborate with new parties such as builders and suppliers.
4. Longitudinal actor salience: a multi-phase study tracking how actor power, legitimacy and urgency evolve across project life cycles would refine dynamic governance models (mitchell et al., 1997).
5. Focus case study on WoonST: given WoonST’s role as a pioneer, an in-depth single-case investigation could yield richer insights into best practices and pitfalls serving as a blueprint for nascent Bouwstromen.

By addressing these areas, future research can enhance both the scientific understanding and practical implementation of collaborative, conceptualized construction in the Dutch housing sector and beyond.

7. Societal relevance

This chapter presents recommendations derived from the findings and theoretical insights of this research. These recommendations aim to support the further development and effective implementation of Bouwstromen. The recommendations are structured progressively, from project-specific suggestions to broader programmatic consideration, and finally, to implications for national policy and governance. Each set of recommendations is grounded in the challenges and opportunities identified across the case studies. Appendix 3 includes a brochure meant for Bouwstroom participants with a clear and concise overview of these recommendations.

7.1. Project specific

At the project level, clear communication and role clarification are essential to ensure that all actors understand the novel workflows inherent to programmatic, standardized housing production. Early and transparent involvement of municipal operational teams is critical to bridge the gap between strategic political endorsement and day-to-day implementations. Establishing clear intake or filtering mechanisms can help project teams select sites and locations that align with the predefined housing concepts, avoiding inefficient resource allocation. Furthermore, project teams should foster a mindset shift from bespoke design toward the acceptance of standardized product catalogues. Training and knowledge sharing within housing associations and contractors can reduce initial hesitation and improve confidence in programmatic procurement and execution. Emphasizing the benefits of repeatability, such as short timelines, cost savings and sustainability, can support adoption. Attention to local context should not be overlooked. While maintaining core standardization, allowing predefined, manageable flexibility within projects can enhance social acceptance and municipalities and mitigate risk of project delays caused by protracted negotiations over site-specific adaptations.

- Clarify roles early: encourage all project participants to establish clear responsibilities at the outset to improve coordination and reduce misunderstandings.
- Invest in product demonstrations: use roadshows, site visits and model exhibitions to familiarize partners and stakeholders with standardized housing concepts and build confidence.
- Support internal learning: facilitate workshops and training session within housing associations and contractors to align teams with programmatic, industrialized processes.
- Balance standardization and flexibility: allow manageable, predefined local adaptations while maintaining core product uniformity to meet contextual needs and improve acceptance.
- Engage municipal teams early: involve municipal planners and permitting officers from the beginning to foster shared understanding and smoother approvals.

7.2. Program and Bouwstroom-level

At the program level, governance structures should continue to emphasize formalized collaboration with clearly articulated roles and responsibilities. The experience of the case studies demonstrates that sustained trust and early alignment between housing associations, municipalities and builders are key to ‘no-relearning’ efficiencies and smoother

workflows. Investing in coordination teams or program offices capable of managing multi-actor complexity, resolving conflicts and fostering continuous learning will remain critical. Building institutional memory within the program, for example through systematic documentation of lessons learned and iterative refinement of product catalogues, supports scaling and replicability. Encouraging regular, structured dialogue between actors can preempt misunderstandings and facilitate shared problem-solving. Additionally, programs should actively engage municipal departments involved in permitting and spatial planning, ensuring that political support translates into operational alignment. Municipalities might benefit from tailored capacity building and clear guidance on adapting procedures to programmatic housing delivery. Finally, attention should be paid to the tension between standardization and flexibility. Programs might formalize frameworks for local adaptation that are transparent and predictable, reducing ad-hoc negotiations and supporting industrial efficiencies without sacrificing contextual fit.

- Establish dedicated coordination teams: invest in coordination functions empowered to manage multi-actor complexity, mediate conflicts and maintain project pipelines.
- Maintain and evolve product catalogues: regularly update standardized housing concerts based on lessons learned and stakeholders feedback to improve fit and efficiency.
- Encourage structured communication: create regular forums for housing associations, municipalities and builders to share knowledge, discuss challenges and align expectations.
- Support municipal capacity building: facilitate targeted training and workshops to help municipalities adapt procedures and culture to programmatic housing delivery.
- Formalize flexibility frameworks: develop clear, transparent rules for local adaptations within the Bouwstroom to reduce ad-hoc negotiations and preserve industrial benefits.

7.3. City-level

Municipalities are essential in turning political support for Bouwstromen into effective, day-to-day action. Research shows that while political backing is often strong, operational departments like planning and permitting do not always fully align with programmatic housing delivery. To improve this, municipalities should involve these departments early and continuously in Bouwstroom projects to build shared understanding and reduce delays caused by unfamiliarity with standardized concepts. Streamlining permit procedures tailored to Bouwstroom's standardized housing can accelerate approvals and increase predictability. Developing fast-track pathways or specialized processes can reduce administrative burdens for all parties involved. Regular, structured dialogue between municipal staff, housing associations and builders is crucial for coordinating site-specific adaptations and addressing challenges collaboratively. This fosters transparency, trust and helps balance standardization with local needs. Investing in training municipal staff on industrialized construction and programmatic delivery will improve their capacity to facilitate Bouwstromen effectively. Clear, transparent frameworks for managing local flexibility can accommodate necessary adaptations without compromising industrial efficiencies or causing ad-hoc delays. By adopting these measures, municipalities can evolve from traditional regulators to proactive facilitators, playing a key role in enabling Bouwstromen to deliver affordable, sustainable housing at scale.

- Embed Bouwstroom principles in all departments: ensure that political support translates into operational commitment by involving planning, permitting and quality teams early and continuously.
- Streamline permit processes for standardized housing: adapt approval pathways to accommodate pre-approved housing typologies, reducing administrative delays.
- Foster ongoing multi-stakeholder dialogue: organize regular communication between municipal teams, housing associations and builders to coordinate site-specific requirements and share insights.
- Build internal expertise on programmatic delivery: invest in training municipal staff on the principles and practices of industrialized and programmatic housing to increase institutional knowledge.
- Promote transparent local flexibility: develop guidelines that allow municipalities to balance efficiency with contextual adaptation in a predictable manner.

7.4. National-level

On a national scale, Bouwstromen represent a critical lever for addressing the Dutch housing shortage and advancing sustainability goals. Policymakers can support this transition by refining regulatory frameworks to better accommodate programmatic, standardized housing delivery. This includes simplifying permit procedures for pre-approved standardized housing concepts and incentivizing collaboration between municipalities, housing associations and builders. National programs could facilitate knowledge exchange platforms to disseminate best practices, enabling Bouwstromen to learn from each other and accelerate innovation adoption. Supporting research into the social acceptance and environmental impacts of conceptualized and industrialized housing will also inform evidence-based policy refinements. Finally, national funding mechanisms might be aligned to incentivize long-term partnerships and upfront investments in industrialized production capacity. Recognizing the upfront nature of these investments, financial instruments that mitigate risk and reward programmatic scale could enhance builder engagement and market transformation.

- Simplify regulatory frameworks: adjust national policies to better support standardized and industrial housing delivery, including streamlined permitting for pre-approved concepts.
- Facilitate knowledge exchange: create national platforms for Bouwstromen to share best practices, innovations and lessons learned to accelerate collective learning.
- Align financial incentives: develop funding mechanisms that encourage long-term partnerships and investments in industrialized construction capacity, recognizing upfront risks and benefits.
- Support research on social and environmental impact: invest in studies that assess the broader impacts of conceptual and industrialized housing to inform evidence-based policy development
- Encourage cross-sector collaboration: promote coordination between government agencies, housing associations, builders and research institutions to create an enabling environment for industrialized housing.

8. Reflection

When I conducted this thesis as an MBE student I was simultaneously a “starter” within Dutch society. I am concerned about the current Dutch housing crisis: ever-rising prices, scarce availability and mounting social pressure to deliver new homes quickly. Looking back, I realize that this sense of urgency might have colored my research. For example, an interviewee’s off-hand remark: “*We’d rather build an extra house than chase super-sustainable measures*”, resonates with my own concerns about delivering sufficient volume. These statements were accepted at face value, rather than probing for underlying trade-offs or creative solutions that might reconcile sustainability with quantity. Recognizing this bias has been my first step towards bracketing it: I now routinely pause to question whether my own priorities are shaping the questions I ask and I intend to incorporate a structured checklist in future interviews to ensure that all trade-offs are explored fully. My prior job at a contractor’s office also casts a shadow. Though I consciously sought out voices from public agencies and consultancies to balance the narrative, I see that my familiarity with contractor-language and workflows may have inclined me to sympathize more readily with their feasibility concerns. To address this, I have re-examined my coding process, specifically the weight assigned to contractor perspective. This step helped guard against an inadvertent over-representation of contractor priorities in the final analysis.

At the start of this thesis, I framed the study around industrialized construction methods, aiming to understand how IC implementation impacted collaboration dynamics. After the first few interviews, however, it became clear that Bouwstromen focus more on early-stage conceptualization than on detailed IC workflows. Recognizing this misalignment, I pivoted to a conceptual governance lens that better captured how multi-actor coordination unfolds before any building methods are specified. WHile this shift enriched the study, it also meant I spent significant time mapping IC typologies that ultimately played a supporting role. In future projects, I will define my conceptual scope more tightly before fieldwork and schedule explicit “pivot-checkpoints” early on, to ensure time invested always aligns with the core phenomenon under investigation. The rich narratives captured through interviews illuminated many governance patterns, yet I quickly realized that they needed corroboration through document analysis. Procurement guidelines, programma charters and BZK white papers could have provided valuable triangulation, clarifying the gap between stated collaboration intentions and formal policy or contractual mandates. In future studies, I plan to integrate more systematic rounds of document coding alongside interviews. By tagging references to regulations or guidelines as they are set in transcripts, I would have strengthened both the rigor and the transparency of my findings. One of the most illuminating lessons came from conversations with “higher-up” actors, programme directors, coordination-team managers and policy-unit leads. Their bird’s-eye perspective revealed governance levers and bottlenecks invisible at the project team level. In hindsight, I spread my interviews too thinly across many roles and would have benefited from a more concentrated focus on these programme-level coordinators. To capture this lesson, I have revised my future research recommendations to include that future researchers prioritize those actors groups most likely to yield strategic insights into multi-actor governance.

I also learned that a deeper engagement with the national policy context is essential. While Chapter 2 briefly introduces BZK’s housing targets and RVO grant mechanisms, a dedicated policy-landscape section, mapping specific statutes, subsidy programmes and

regulatory requirements, would have better grounded my empirical cases. I intend to draft a concise overview of these policy instruments, explicitly linking them to the governance challenges and opportunities identified in the Bouwstroom cases. From a project-management perspective, I devoted an inordinate amount of time to deciding whether to treat the unit of analysis as the individual project or the overarching programme, and whether to concentrate on a single actor type or adopt a multi-actor approach. Although iterative adjustment is a hallmark of qualitative research, earlier resolution of these foundational parameters would have streamlined my data-collection timeline and reduced mid-stream “angle-seeking”. To prevent this in future work I will embed clear decision-points in my Graduation Plan, milestones by which all core research design choices must be confirmed or formally renegotiated with my supervisors.

As I look back on this thesis and educational career, I realize that it has been as much a personal exploration as an academic one. I have learned to question my own assumptions, to listen more deeply and to embrace the discomfort of reevaluating my viewpoints. Through every interview, every late-night rewrite and every methodological detour, I have grown, not just as a researcher, but as someone who cares deeply about the built environment and the problems to be solved in it. Carrying these lessons forward, I feel better equipped and more self assured to contribute to the future of the built environment.

Closing words

Dear Mona Keijzer,

In light of the recent political turbulence and the fall of the cabinet, it is clear that the proposed rent freeze “huurbevriezing” has been put off the table. While the political situation remains uncertain, the housing crisis itself remains urgent and requires pragmatic, well-considered responses. The huurbevriezing proposal faced significant criticism from multiple sides, including financial excerpts, housing organizations and legal advisors. Many pointed out that the rent freeze would provide only minimal relief to tenants, while potentially threatening the financial viability of housing associations. This concern is particularly relevant because housing associations are critical players in the construction of new affordable homes and in sustainability investments, two pillars needed to address the housing shortage. The policy;s limited scope and the risk of chilling future investment in new and renovated housing underline the need for alternative approaches that do not inadvertently harm the very sector tasked with delivering solutions.

Rather than focusing on abolishing or freezing regulations, I propose a STOER: “standaardiseren van tegenstrijdige en overbodige regelgeving”. These rules have not been made without reason or consideration so let's not hastily scrape them. Standardized regulations across municipalities and housing providers can create clarity, reduce administrative complexity and level the playing field. This approach facilitates consistent implementation, lower transaction costs and help build trust among actors. Effective supervision and support further ensure quality and accountability without introducing unnecessary barriers. Given the diverse local contexts and the evolving nature of industrialized and programmatic housing delivery, allowing for control, transparent flexibility within a standardized framework is essential. Such balance enables municipalities and housing associations to tailor approaches to local needs while maintaining the efficiency and predictability necessary for scale.

In the current uncertain political climate, I encourage the ministry to prioritize these pragmatic measures that strengthen collaboration and trust, rather than pursuing populist or short-term fixes. The housing shortage demands durable, scalable solutions grounded in aligned governance, shared responsibility and clear regulatory frameworks. I remain hopeful that good leadership will steer policies toward supporting the critical transition needed in the Dutch housing sector, enabling everyone to work effectively together to meet the country’s pressing housing needs.

Sincerely,

Laurèl de Gier

Master student Management in the Built Environment

17-6-2025, Rotterdam

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Appendices 1 | Form consensus

Introductie

U wordt uitgenodigd om deel te nemen aan een onderzoek genaamd “Rethinking the Construction Playbook”. Dit onderzoek wordt uitgevoerd door Laurèl de Gier van de TU Delft en Brink | Bouw, Infra en Vastgoed.

Het doel van dit onderzoek is het begrijpen van **Bouwstromen en hoe deze de actor dynamiek verandert** in gebiedsontwikkelingsprojecten in Nederland. Het doel is om de mogelijkheden en problemen die opkomen bij bij conceptueel of industrieel bouwen te analyseren en de manieren waarin een Bouwstroom deze problemen kan helpen of voorkomen in kaart te brengen. Het onderzoek vindt plaats doormiddel van kwalitatief onderzoek waarbij informatie wordt opgehaald doormiddel van interviews met professionals wie werken in een Bouwstroom. De bevindingen helpen om bottlenecks en probleemgebieden te constateren om Hiermee het bouwproces te versnellen en efficienter te maken. Het interview zal ongeveer een uur duren. De data zal gebruikt worden om geanonimiseerde transcripties te maken welke worden gebruikt in een masterthesis welke enkel gepubliceerd zal worden op de TU Delft Repository. U wordt gevraagd om mee te doen aan een interview.

Zoals bij elke onlineactiviteit is het risico van een databreuk aanwezig. Wij doen ons best om uw antwoorden vertrouwelijk te houden. We minimaliseren de risico’s door de audio opnamen van het interview volledig anoniem te transcriberen. De geanonimiseerde transcripties zullen bewaard worden op een project drive van de TU Delft waar enkel het projectteam (lees: onderzoeker en begeleiders Daniel Hall & Marja Elzinga) toegang tot verleent krijgen.

Uw deelname aan dit onderzoek is volledig vrijwillig, en u kunt zich elk moment terugtrekken zonder reden op te geven. U bent vrij om vragen niet te beantwoorden. De audio opnames van het interviews worden verwijderen zodra deze anoniem getranscribeerd zijn. Dit zal zo snel mogelijk na het interview worden gedaan al dan niet later dan 5 werkdagen nadat het interview gehouden is.

Laurèl de Gier

PLEASE TICK THE APPROPRIATE BOXES	Yes	No
A: GENERAL AGREEMENT – RESEARCH GOALS, PARTICPANT TASKS AND VOLUNTARY PARTICIPATION		
1. Ik heb de informatie over het onderzoek gedateerd 21-03-2025 gelezen en begrepen, of deze is aan mij voorgelezen. Ik heb de mogelijkheid gehad om vragen te stellen over het onderzoek en mijn vragen zijn naar tevredenheid beantwoord.	☒	☐
2. Ik doe vrijwillig mee aan dit onderzoek, en ik begrijp dat ik kan weigeren vragen te beantwoorden en mij op elk moment kan terugtrekken uit de studie, zonder een reden op te hoeven geven.	☒	☐
3. Ik begrijp dat mijn deelname aan het onderzoek de volgende punten betekent: een interview welke doormiddel van audio zal worden opgenomen. De audio opnamen van het interview zal volledig anoniem worden getranscribeerd. De audio opnames van het interviews worden verwijderen zodra deze anoniem getranscribeerd zijn. Dit zal zo snel mogelijk na het interview worden gedaan al dan niet later dan 5 werkdagen nadat het interview gehouden is.	☒	☐
5. Ik begrijp dat de studie 31-07-2025 eindigt.	☒	
B: POTENTIAL RISKS OF PARTICIPATING (INCLUDING DATA PROTECTION)		
6. Ik begrijp dat mijn deelname de volgende risico's met zich meebrengt: mentale ongemak. Ik begrijp dat deze risico's worden geminimaliseerd door duidelijk te maken dat deelname geheel vrijwillig is en het interview op ieder gewenst moment gestopt kan worden.	☒	☐
7. Ik begrijp dat mijn deelname betekent dat er persoonlijke identificeerbare informatie en onderzoek data worden verzameld, met het risico dat ik hieruit geïdentificeerd kan worden en potentiële schade kan oplopen aan mijn professionele reputatie.	☒	☐
8. Ik begrijp dat binnen de Algemene verordening gegevensbescherming (AVG) een deel van deze persoonlijk identificeerbare onderzoek data als gevoelig wordt beschouwd, namelijk (jaren van) werkervaring, functieomschrijving en contact gegevens.	☒	☐
9. Ik begrijp dat de volgende stappen worden ondernomen om het risico van een databreuk te minimaliseren, en dat mijn identiteit op de volgende manieren wordt beschermd in het geval van een databreuk; anoniem transcriberen van de audio opnamen van het interview, verwijderen van de audio opnamen zodra deze	☒	☐

anoniem getranscribeerd is al dan niet 5 werkdagen nadat het interview plaats vond.		
10. Ik begrijp dat de persoonlijke informatie die over mij verzameld wordt en mij kan identificeren, zoals naam, werkplaats, functieomschrijving, contact gegevens, niet gedeeld worden buiten het studieteam.	☒	☐
11. Ik begrijp dat de persoonlijke data die over mij verzameld wordt, vernietigd wordt op 31-07-2025	☒	☐
C: RESEARCH PUBLICATION, DISSEMINATION AND APPLICATION		
12. Ik begrijp dat na het onderzoek de geanonimiseerde informatie gebruikt zal worden voor de inhoud en appendix van een masterthesis welke gepubliceerd wordt op de TU Delft Repository.	☒	☐
13. Ik geef toestemming om mijn antwoorden, ideeën of andere bijdrages anoniem te quoten in resulterende producten.	☒	☐
D: (LONGTERM) DATA STORAGE, ACCESS AND REUSE		
16. Ik geef toestemming om de geanonimiseerde data, transcripties van de audio opnamen van het interview, die over mij verzameld worden gearchiveerd worden in TU Delft Repository opdat deze gebruikt kunnen worden voor toekomstig onderzoek en onderwijs.	☒	☐
17. Ik begrijp dat de toegang tot deze repository beperkt is tot het projectteam.	☒	☐

Signatures

X _____

28-03-2025

_____ _____ _____

Naam deelnemer: Handtekening Datum

Ik, **de onderzoeker**, verklaar dat ik de informatie en het instemmingsformulier correct aan de potentiële deelnemer heb voorgelezen en, naar het beste van mijn vermogen, heb verzekerd dat de deelnemer begrijpt waar hij/zij vrijwillig mee instemt.

X _____

Laurèl de Gier 21-03-2025

_____ _____ _____

Naam onderzoeker Handtekening Datum

Contactgegevens van de onderzoeker voor verdere informatie: Laurèl de Gier, 06-29399188, L.N.deGier@student.tudelft.nl

Appendices 2 | Interview protocol

Introductie | Nederlands
“Welkom en dankjewel dat je met mij wilde zitten. Mijn naam is Laurèl en ik ben aan het afstuderen van de mastertrack Management in the Built Environment aan de TU Delft. Hiervoor moet ik een onderzoek uitvoeren. Het onderwerp en onderzoek mocht ik volledig zelf vormgeven, hier ben ik het afgelopen half jaar mee bezig geweest. Ik heb ervoor gekozen om door middel van interviews, praktijk ervaringen op te halen en daarom zitten wij nu hier.

Wat ik precies wil onderzoeken is de verandering in rollen, verhoudingen en verantwoordelijkheden van actoren op het moment dat er gebouwd wordt met industriële bouwmethodes. Denk hierbij aan grootschalig prefab, modulair of ontwerpen via DfMA (design for manufacturing and assembly).

Bouwstromen zijn een trend die is ontstaan als antwoord op deze veranderingen in samenwerking. Hoewel er steeds meer bouwstromen starten is hier nog geen onderzoek naar gedaan, wat zorgt voor een ideale startpositie voor mij. Ik wil tijdens dit gesprek vooral jouw ervaringen en observaties horen. Waarom is deze trend ontstaan en wat voor gevolgen brengt samenwerken in een bouwstroom met zich mee?

Ik heb een aantal standaard vragen voorbereid maar ik wil vooral een gesprek voeren. Wees dus niet bang om uitgebreid te vertellen of een andere weg in te slaan. Als ik aan het einde er achter kom dat ik nog thema’s mis kan ik deze altijd nog aanhalen.

Introduction | English
“Welcome and thank you for meeting with me. My name is Laurèl and I'm graduating from the mastertrack Management in the Built Environment aan de TU Delft. Therefore, I need to conduct research. The subject and method was completely up to me and that is what I have been working on the past half year. I have chosen to hold interviews in order to gather real life practice experiences and that is why we are here right now.

I want to look at how roles, attitudes and responsibilities of actors change when a project is built with industrialized construction methods. IC can be methods like large scale prefab or modules or designing via DfMA (design for manufacturing & assembly).

Bouwstromen are a trend as a response to these changes in collaboration. While a lot of Bouwstromen have been, and are being, started, no research is done on them. Creating an ideal starting position for me to do so. During this talk I want to hear about your experiences and observations on the Bouwstroom. Why has this trend started and what kind of consequences does working in a Bouwstroom have?

I have prepared a few standard questions but I mostly want to have an actual conversation. So please feel free to be as elaborated as you want or bring in new subjects if you feel it is important. Preferably, at the end you will have to talk about everything that you deem important and will not leave with the feeling that certain things were not discussed because they were not on my “agenda”. If I feel that there are thema’s missing I can always ask about them in the end.”

Interview thema's | Nederlands

Thema 1 | Rol verandering bij IC-implementatie
Hoofdvraag:

1. *"Waarom ben jij/is jouw bedrijf begonnen met het implementeren van IC-methoden?"*

2. *"Hoe heeft de invoering van IC-methoden jouw rol en verantwoordelijkheden veranderd in vergelijking met traditionele bouwmethoden?"*

Mogelijke vervolgvragen:

1. Kun je een concreet voorbeeld geven waarin IC invloed had op jouw werkwijze?
2. Zijn beslissingen op een ander moment of door andere actoren genomen dan gebruikelijk?
3. Zijn deze veranderingen positief of hebben ze nieuwe uitdagingen met zich meegebracht?
4. Heb je nieuwe vaardigheden of manieren van werken moeten ontwikkelen?
5. Hoe is de samenwerking met andere partijen veranderd ten opzichte van traditionele projecten?

Thema 2 | De impact van Bouwstroom op samenwerking
Hoofdvraag:
"Hoe verandert werken binnen een Bouwstroom de samenwerking vergeleken met traditionele projecten?"

Vervolgvragen:

1. Voelt Bouwstroom gestructureerder of juist flexibeler aan?
2. Wat betekent transparantie binnen een Bouwstroom voor besluitvorming?
3. Hoe ervaar je de verdeling van verantwoordelijkheden en macht tussen actoren?
4. Worden conflicten verminderd, of ontstaan er juist nieuwe spanningen?
5. Helpt Bouwstroom om goedkoper en/of efficiënter te bouwen?

Thema 3 | Samenwerkings uitdagingen in IC projects
Hoofdvraag:
"Wat zijn de grootste uitdagingen in samenwerking binnen een Bouwstroom?"

Vervolgvragen:

1. Kun je een moment beschrijven waarin samenwerking tussen actoren moeilijk verliep?
2. Waren er specifieke misverstanden of tegenstrijdige verwachtingen?
3. Hebben sommige actoren meer of minder invloed gekregen dan voorheen?
4. Heeft vroegtijdige samenwerking de processen verbeterd of juist complexer gemaakt?
5. Hoe beïnvloeden traditionele hiërarchieën en contracten de samenwerking bij IC-projecten?

Thema 4 | Fasering en besluitvorming bij IC-projecten
Hoofdvraag:
“In welke fasen van het project worden cruciale beslissingen over IC genomen, en wie is hierbij betrokken?”

Vervolgvragen:

1. Wanneer vindt de verschuiving van traditionele naar IC-methoden plaats?
2. Zijn er beslissingen die nu eerder of later worden genomen dan bij traditionele projecten?
3. Welke actoren hebben de meeste invloed in deze fases, en hoe is dit veranderd met IC?
4. Hoe beïnvloedt deze fasering risico’s, kosten en efficiëntie?
5. Helpt Bouwstroom om processen beter te structureren?

Thema 5 | Toekomst van IC en samenwerking
Hoofdvraag:
“Wat zou er volgens jou moeten veranderen in de bouwsector om samenwerking in IC-projecten te verbeteren?"

Vervolgvragen:

1. Welke structuren (juridisch, contractueel, cultureel) houden samenwerking tegen?
2. Als je één ding zou kunnen veranderen in de samenwerking, wat zou dat dan zijn?
3. Zijn er lessen uit Bouwstroom die breder toepasbaar zijn in de sector?
4. Wat zou IC-projecten voor jou persoonlijk makkelijker maken?
5. Hoe zie je de samenwerking tussen actoren in de komende 5-10 jaar veranderen?

Interview themes | English

Theme 1 | Actor role shifts in IC
Main question:

1. *"Why have you/has your company started implementing IC-methods?"*

2. *"How has the introduction of IC methods changed your role and responsibilities in comparison to traditional construction methods?"*

Possible follow-ups:

1. Can you describe a situation where IC changed how you approached your work?
2. Were certain decisions taken earlier or by different actors than usual?
3. Have these changes been beneficial or have they created new challenges?
4. Did you have to develop new skills or ways of working?
5. How do you collaborate differently now compared to traditional projects?

Theme 2 | Impact of Bouwstroom on collaboration
Main question:
"How does working in a Bouwstroom change the collaboration compared to traditional projects?"

Possible follow-ups:

1. Do you feel Bouwstroom creates a clearer or more structured collaboration process?
2. What role does transparency play in decision-making within a Bouwstroom?
3. How do you experience the division of responsibilities and power between actors?
4. Have conflicts been reduced, or do different tensions arise?
5. Does Bouwstroom help to build cheaper and/or more efficiently?

Theme 3 | Collaboration challenges in IC projects
Main question:
"What are the biggest challenges in collaboration within a Bouwstroom?"

Possible follow-ups:

1. Can you describe a moment when collaboration between actors became difficult?
2. Were there moments of misalignment in expectations, responsibilities or decision-making?
3. Have certain actors gained or lost influence in the process?
4. Has early-stage collaboration improved or made things more complex?
5. How do traditional hierarchies or contractual models affect IC collaboration?

Theme 4 |Phasing and decision-making in IC-projects
Main question:
"At what stage in the project do critical decisions regarding IC implementation take place, and who is involved?"

Possible follow-ups:

1. When does the shift from traditional to IC methods happen in the planning?
2. Have you noticed decisions being made earlier or later than in traditional projects?

3. Which actors have the biggest say in these phases, and has this changed with IC?
4. How does this phasing effect project risks, costs or efficiency?
5. Does Bouwstroom help structure this process more effectively?

Theme 5 | Future of IC and collaboration
Main question:
“Based on your experiences, what would need to change in the industry to improve collaboration in IC projects?”

Possible follow-ups:
1. What current structure (legal, contractual, cultural) are holding IC collaboration back?
2. If you could change one thing in how actors collaborate in IC, what would it be?
3. Are there any lessons from Bouwstroom that should be applied more broadly?
4. What would make IC projects easier for you personally?
5. How do you see actor collaboration evolving in the next 5-10 years?

Appendices 3 | Bouwstroom brochure

Program level

(NH Bouwstroom | NUL20, 2023)

Coordination

A coordination team is needed to help with collective objectives and shared concensus without re-examining made decisions

Roadshows

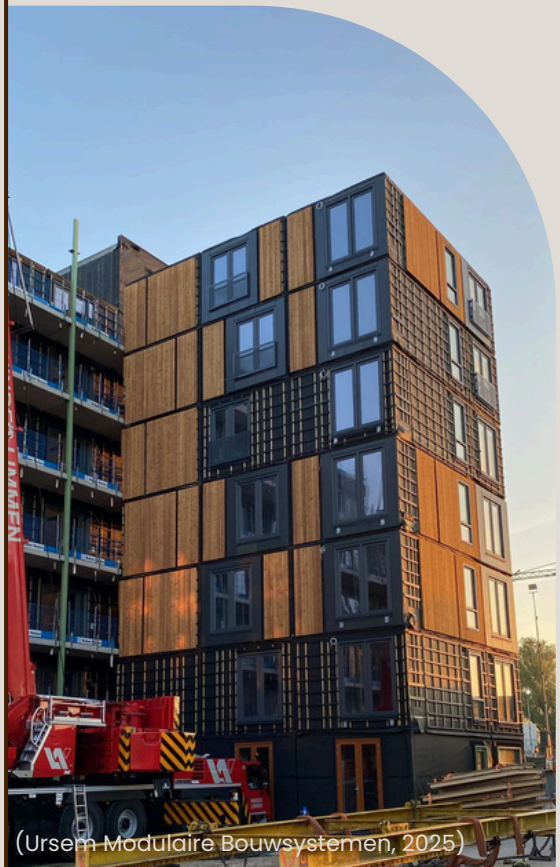
Visiting municipalities and partners in early stages is needed in order to show and explain the product

Responsibilities

Regular meetings and shared objectives help with trust and successful project outcome

About

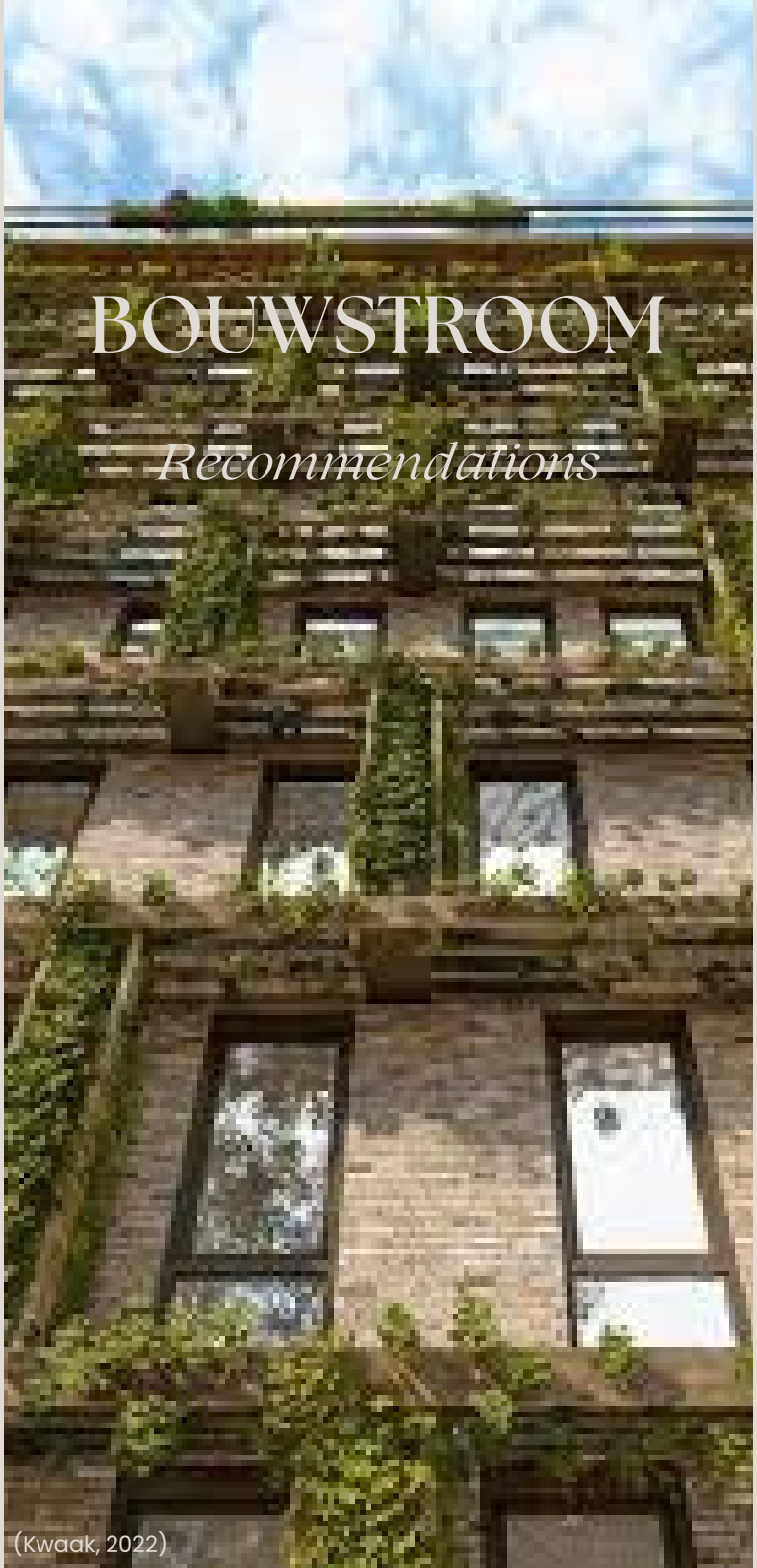
Improving coordination, clarifying roles and balancing standardization with local flexibility are key to unlocking its full potential for faster and more efficient housing delivery



(Ursem Modulaire Bouwsystemen, 2025)

BOUWSTROOM

Recommendations



(Kwaak, 2022)

PROJECT LEVEL

Set design

Standardization should be 90% of the total design, 10% can be used for site specific alterations

Permitting

Because 90% of the design is pre-engineered the permitting process can happen earlier and faster

Industrialization

Industrializing the building process makes it even more predictable and is enabled by standardization

Successful Bouwstromen are not just about building houses faster...

they're about building trust, clarity and collaboration between everyone involved

ADDITIONAL INFORMATION

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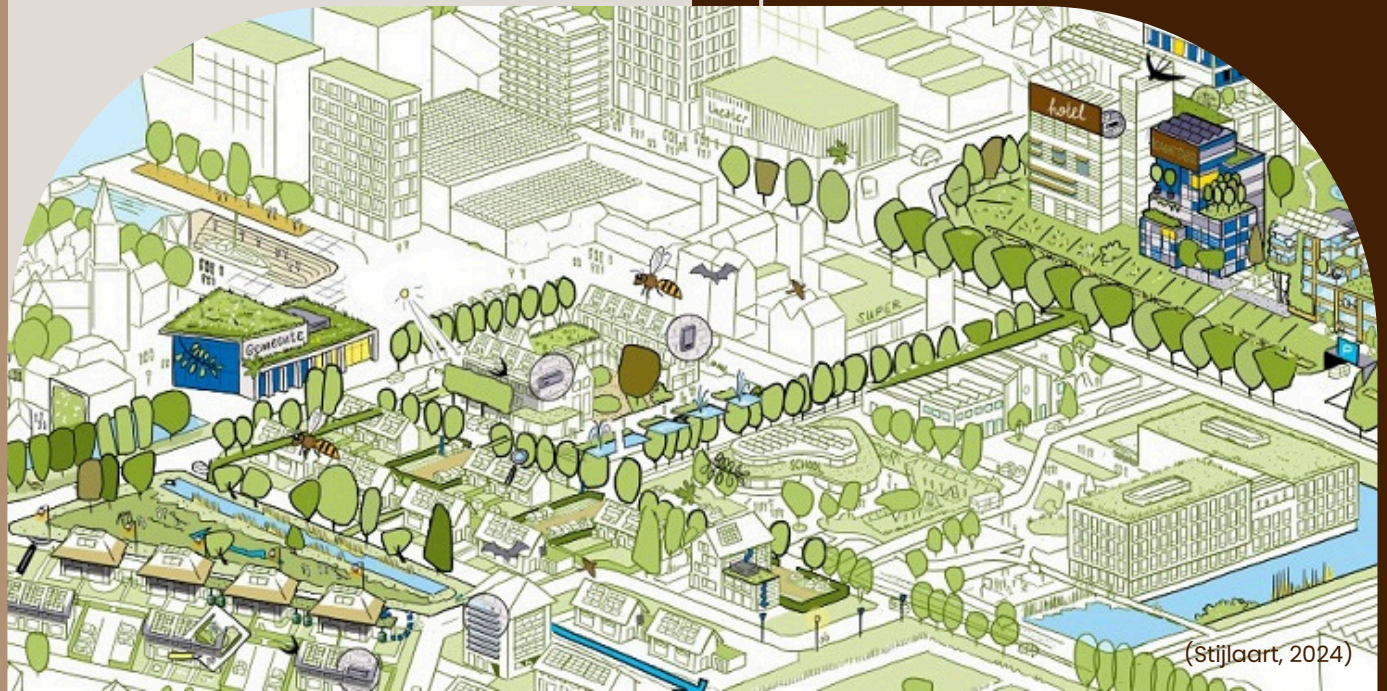
address

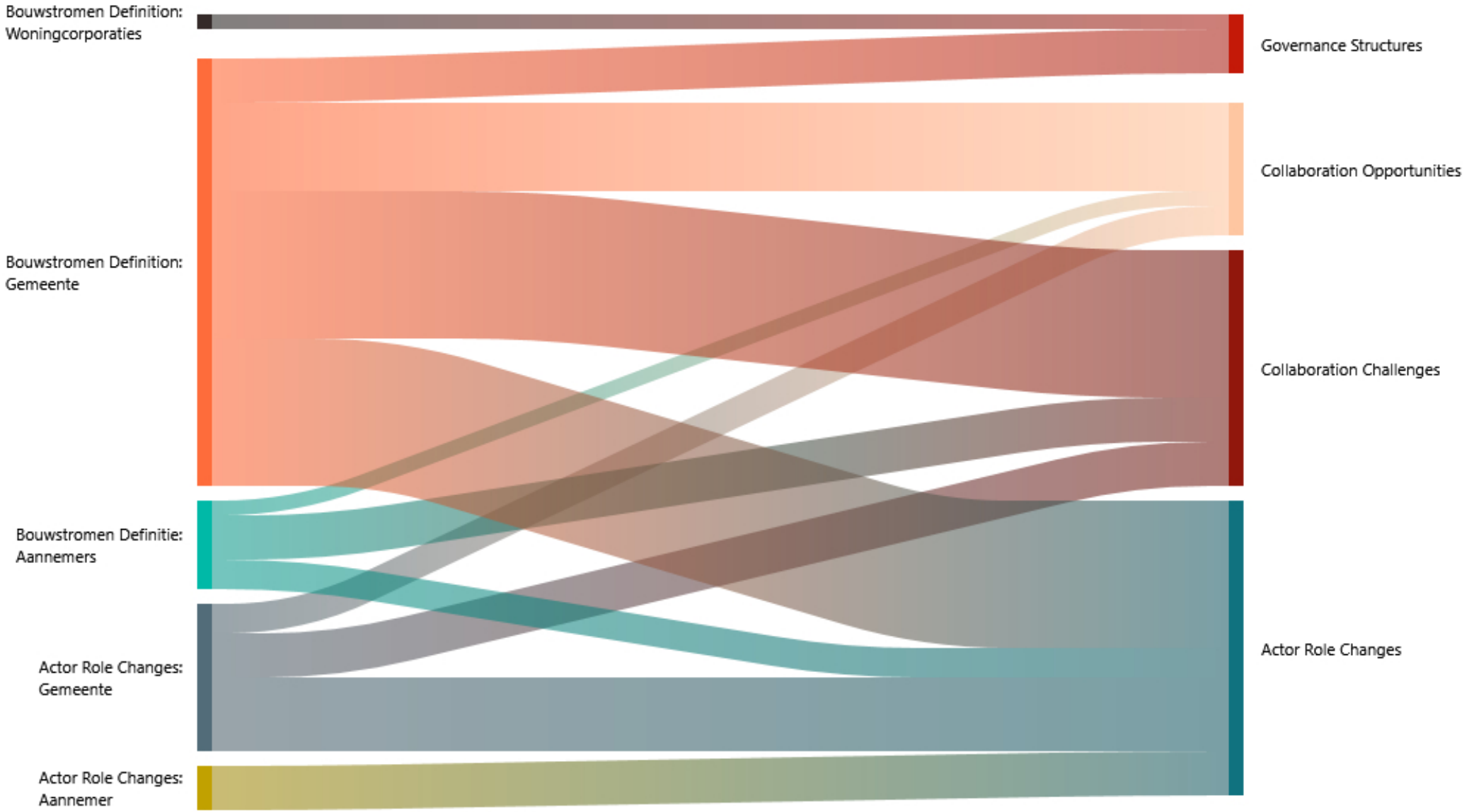
Bouwkunde Faculteit
Julianalaan 134, Delft

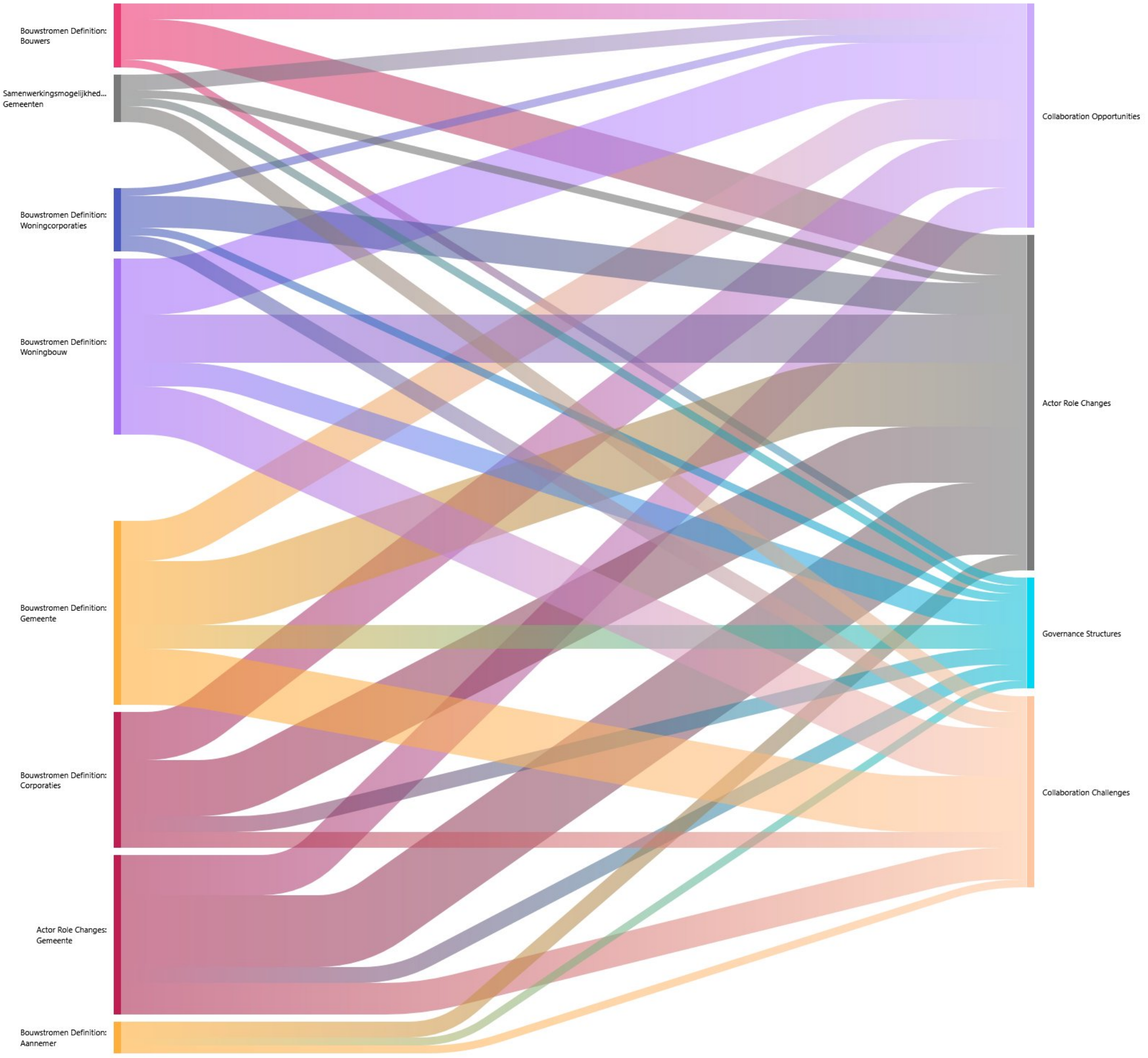


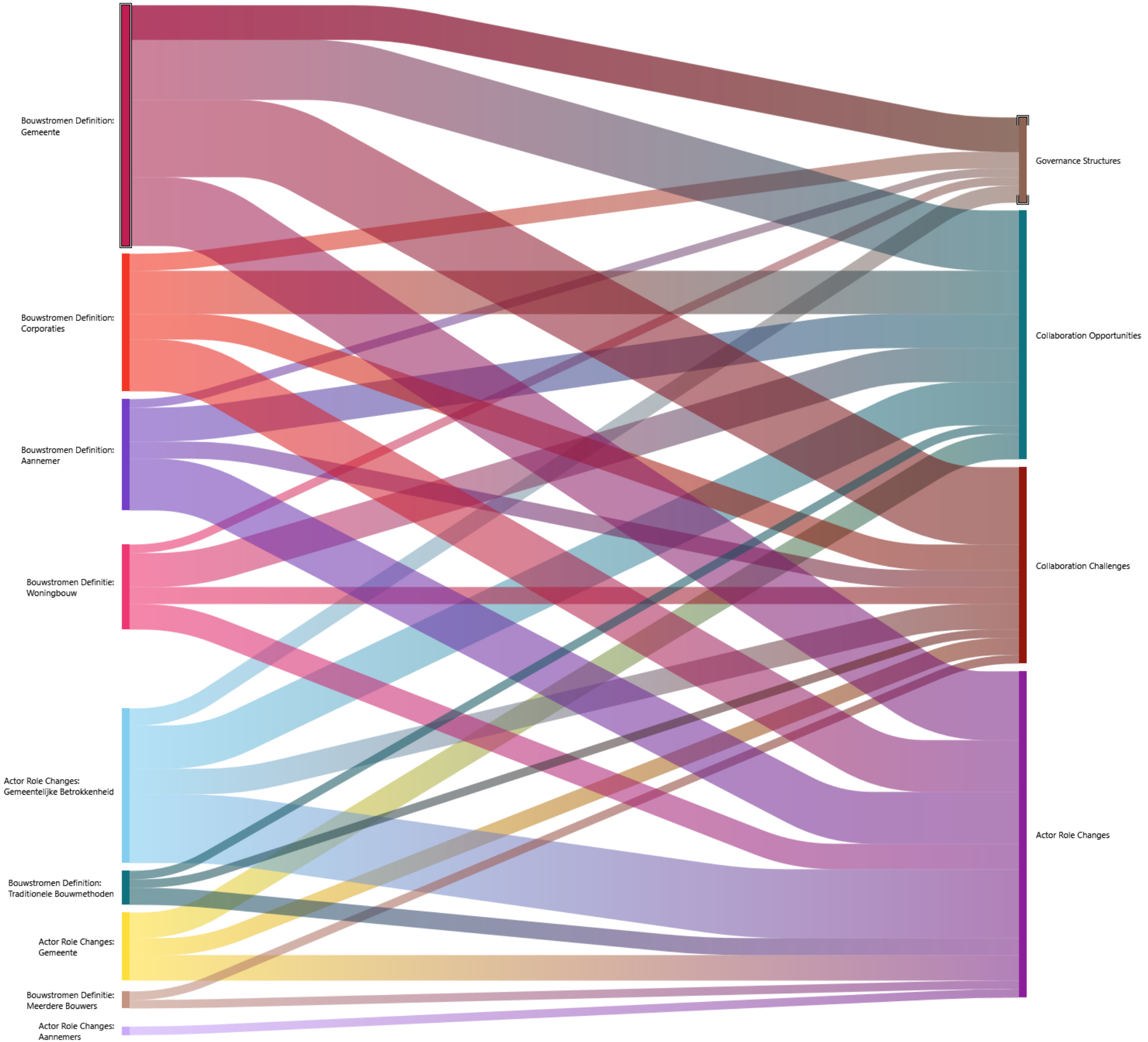
(Stijlaart, 2024)

Appendices 4 | Co-occurrence tables

Figure 1 - WoonST 2.0
Figure 2 - NH Bouwstroom
Figure 3 - Bouwstroom Haaglanden


Bouwstromen Definition: Woningcorporaties
Bouwstromen Definition: Gemeente
Bouwstromen Definitie: Aannemers
Actor Role Changes: Gemeente
Actor Role Changes: Aannemer
Governance Structures
Collaboration Opportunities
Collaboration Challenges
Actor Role Changes


Bouwstromen Definition: Bouwers
Samenwerkingsmogelijkhed... Gemeenten
Bouwstromen Definition: Woningcorporaties
Bouwstromen Definition: Woningbouw
Bouwstromen Definition: Gemeente
Bouwstromen Definition: Corporaties
Actor Role Changes: Gemeente
Bouwstromen Definition: Aannemer
Collaboration Opportunities
Actor Role Changes
Governance Structures
Collaboration Challenges


Bouwstromen Definition: Gemeente
Bouwstromen Definition: Corporaties
Bouwstromen Definition: Aannemer
Bouwstromen Definitie: Woningbouw
Actor Role Changes: Gemeentelijke Betrokkenheid
Bouwstromen Definition: Traditionele Bouwmethoden
Actor Role Changes: Gemeente
Bouwstromen Definitie: Meerdere Bouwers
Actor Role Changes: Aannemers
Governance Structures
Collaboration Opportunities
Collaboration Challenges
Actor Role Changes